C/015/018 Incoming ✓

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

Interwest Mining Compar
Huntington Office
P. O. Box 310
15 North Main Street
Huntington, UT 84528

#5689

August 14, 2018

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

Subj: Submittal of Clean Copies, Supplemental Volume 2, Lease Relinquishments UTU-88554 and UTU-84285, Task #5689, PacifiCorp, Deer Creek Mine, C/015/0018, Emery County Utah.

PacifiCorp, by and through its wholly-owned subsidiary, Interwest Mining Company, as mine manager, hereby submits 2 clean copies of the Lease Relinquishment documents for Federal Leases UTU-88554 and UTU-84285 that were submitted to the Bureau of Land Management on May 30, 2018.

Copies of the lease relinquishment documents are hereby submitted to the Utah Division of Oil, Gas, and Mining as supplemental information in the form of Supplemental Volume 2, Lease Relinquishments UTU-88554 and UTU-84285. Please date stamp each copy and return one copy to Interwest Mining.

If you have any questions or concerns regarding this notification, please contact myself at 435-687-4712.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Geology and Environmental Affairs Manager

Cc: Chuck Semborski, IMC
Dennis Oakley, IMC
Scott Child, IMC
file

APPLICATION FOR COAL PERMIT PROCESSING

Permit Change ☒ New Permit ☐ Renewal ☐ Exploration ☐ Bond Release ☐ Transfer ☐

Permittee: PacifiCorp

Mine: Deer Creek Mine **Permit Number:** C/015/0018

Title: Amendment to Add Supplemental Volume 2, Lease Relinquishments UTU-88554 and UTU-84285, PacifiCorp Deer Creek Mine, C/015/0018, Emery County, Utah

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

Copies of Federal Lease Relinquishments Submitted to BLM Dated May 30, 2018 for Reference Purposes

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

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

Kenneth Fleck (Print Name) Kenneth E. Fleck Manager of Environmental Affairs August 14, 2018 (Sign Name, Position, Date)

Subscribed and sworn to before me this 14th day of August, 2018

Miranda Lofley
Notary Public

My commission Expires: 03, 2022

Attest: State of Utah } ss:
County of Emery

MIRANDA LOFLEY
NOTARY PUBLIC
STATE OF UTAH
COMMISSION # 699728
COMM. EXP. 03/26/2022

For Office Use Only:	Assigned Tracking Number:	Received by Oil, Gas & Mining

Form DOGM- C1 (Revised March 12, 2002)

APPLICATION FOR COAL PERMIT PROCESSING
Detailed Schedule Of Changes to the Mining And Reclamation Plan

Permittee: PacifiCorp
Mine: Deer Creek Mine **Permit Number:** C/015/0018
Title: Amendment to Add Supplemental Volume 2, Lease Relinquishments UTU-88554 and UTU-84285, PacifiCorp Deer Creek Mine, C/015/0018, Emery County, Utah)

Provide a detailed listing of all changes to the Mining and Reclamation Plan, which is required as a result of this proposed permit application. Individually list all maps and drawings that are added, replaced, or removed from the plan. Include changes to the table of contents, section of the plan, or other information as needed to specifically locate, identify and revise the existing Mining and Reclamation Plan. Include page, section and drawing number as part of the description.

			DESCRIPTION OF MAP, TEXT, OR MATERIAL TO BE CHANGED
☒ Add	☐ Replace	☐ Remove	Supplemental Volume 2, Lease Relinquishments UTU-88554 and UTU-84285, PacifiCorp Deer Creek Mine, C/015/0018, Emery County, Utah.
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	
☐ Add	☐ Replace	☐ Remove	

Any other specific or special instruction required for insertion of this proposal into the Mining and Reclamation Plan.

This is a new volume of information related to relinquishments of Federal Leases UTU-88554 and UTU-84285 for reference purposes.

Received by Oil, Gas & Mining

Full Relinquishment
Federal Coal Lease
UTU-88554

May, 2018

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

Prepared by:

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

Managing Agent
1407 West North Temple, Suite 110
Salt Lake City, UT 84116

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

RECEIVED
AUG 16 2018
DIV. OF OIL, GAS & MINING

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

1407 W. North Temple, Suite 110
Salt Lake City, UT 84116

HAND DELIVERED

INCORPORATED
AUG 17 2018

May 29, 2018

RECEIVED
MAY 30 2018
Bureau of
Land Management

Div. of Oil, Gas & Mining

Kent Hoffman
Deputy State Director
United States Department of the Interior
Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt lake City, Utah 84101-1345

RE: Overview of Federal Coal Lease Relinquishment Project (20 Federal Leases) East Mountain Logical Mining Unit UTU-73336, Deer Creek and Cottonwood Mines, Emery County, Utah

Dear Mr. Hoffman:

By letter dated February 19, 2018, and on behalf of PacifiCorp, we provided our advance notice of intent to relinquish all or portions of the federal coal leases within the East Mountain Logical Mining Unit (LMU) UTU-73336, with the commitment to eventually provide individual formal federal coal lease relinquishment notices to your office to bring an end to the final chapter to this LMU.

Background and Purpose of Relinquishment

With PacifiCorp's decision and announcement on December 15, 2014, to close the Deer Creek Mine and end production from the LMU, this brought an end to 40+ years of coal production from this LMU. All coal production ceased on January 7, 2015. PacifiCorp has made steadfast efforts to complete all mine closure activities including the construction of permanent portal seals for the entire Deer Creek Mine complex and LMU.

All economically recoverable coal reserves within the entire LMU have been mined out or have been determined uneconomical to mine as acknowledged by BLM's letter dated March 23, 2016 (copy enclosed). Having fully complied with the federal coal lease terms

and their associated federal regulations, PacifiCorp has no intentions to re-open the mines within the LMU. Therefore, the purpose of this relinquishment exercise is to surrender the federal coal lease acreage back to the federal government that is no longer needed and retain selected lease acreage for reclamation purposes only. Refer to Map 1 (enclosed) which depicts the federal coal lease areas being relinquished (yellow) and the areas retained (green) for reclamation purposes.

LMU Lease Relinquishment Project Overview

We have prepared individual relinquishment notifications for 20 of the 21 federal coal leases that have comprised the LMU. Of the 20 federal coal lease relinquishment notifications, 12 leases are full relinquishments and 8 leases are partial relinquishments. Listed below are the 20 federal coal leases included in this relinquishment exercise:

(1) UTU-88554 (Full)
(2) UTU-84285 (Full)
(3) UTU-06039 (Partial)
(4) UTU-24317 (Full)
(5) UTSL-051221 (Partial)
(6) UTU-2810 (Partial)
(7) UTSL-050862 (Partial)
(8) UTU-014275 (Full)
(9) UTU-024319 (Full)
(10) UTU-47977 (Full)
(11) UTU-084924 (Full)
(12) UTU-084923 (Full)
(13) UTU-47979 (Partial)
(14) UTSL-070645/02292 (Full)
(15) UTSL-064607/064621 (Partial)
(16) UTU-083066 (Full)
(17) UTU-040151 (Partial)
(18) UTU-1358 (Full)
(19) UTSL-064900 (Partial)
(20) UTU-47978 (Full)

The eight (8) leases that are being partially relinquished, involve retaining selected portions of these leases for the following purposes:

1. To conduct surface reclamation on the disturbed lands in accordance with the state approved mine permits for the Deer Creek and Cottonwood Mines, and
2. Sustain the legal right-of-entry to these split estate federal lands while reclamation activities are conducted and finalized including the required 10-year minimum bond liability period to achieve Final Phase 3 Bond Release.

The individual lease relinquishment notifications will be submitted to your BLM office under separate cover letters as we get them completed in the order listed above.

Also, please note that federal coal lease UTU-044025 (within the LMU) is **not** included in this overall relinquishment exercise. PacifiCorp will need to retain all of federal coal lease UTU-044025 (total of 40 acres) for reclamation purposes and through the mine permit bond liability period to achieve Final Phase 3 Bond Release.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Conclusion

To the best of its information and belief, PacifiCorp is in compliance with the terms and conditions of this federal coal lease, inclusive of having made all payment obligations relative to rentals and royalties. Furthermore, PacifiCorp represents that the federal lease acres relinquished will not impair the public interest as all obligations under regulation 43 CFR § 3452.1 and all of the lease terms have been met per established BLM guidelines.

All relinquishment notifications have been prepared on behalf of PacifiCorp and have been acknowledged as set forth on each individual notification. We respectfully seek your attention to this matter and request that all twenty (20) lease relinquishments be accepted in a timely manner. Furthermore, with the submittal of these lease relinquishment notifications, this overall action will dissolve the East Mountain LMU UTU-73336 in its entirety.

Should you have any questions, need additional information or wish to discuss this matter with us, please feel free to contact me at 801-220-4612 or by email at Scott.Child@PacifiCorp.com.

Respectfully,

Scott M. Child
Manager, Lands & Regulatory Affairs

INCORPORATED

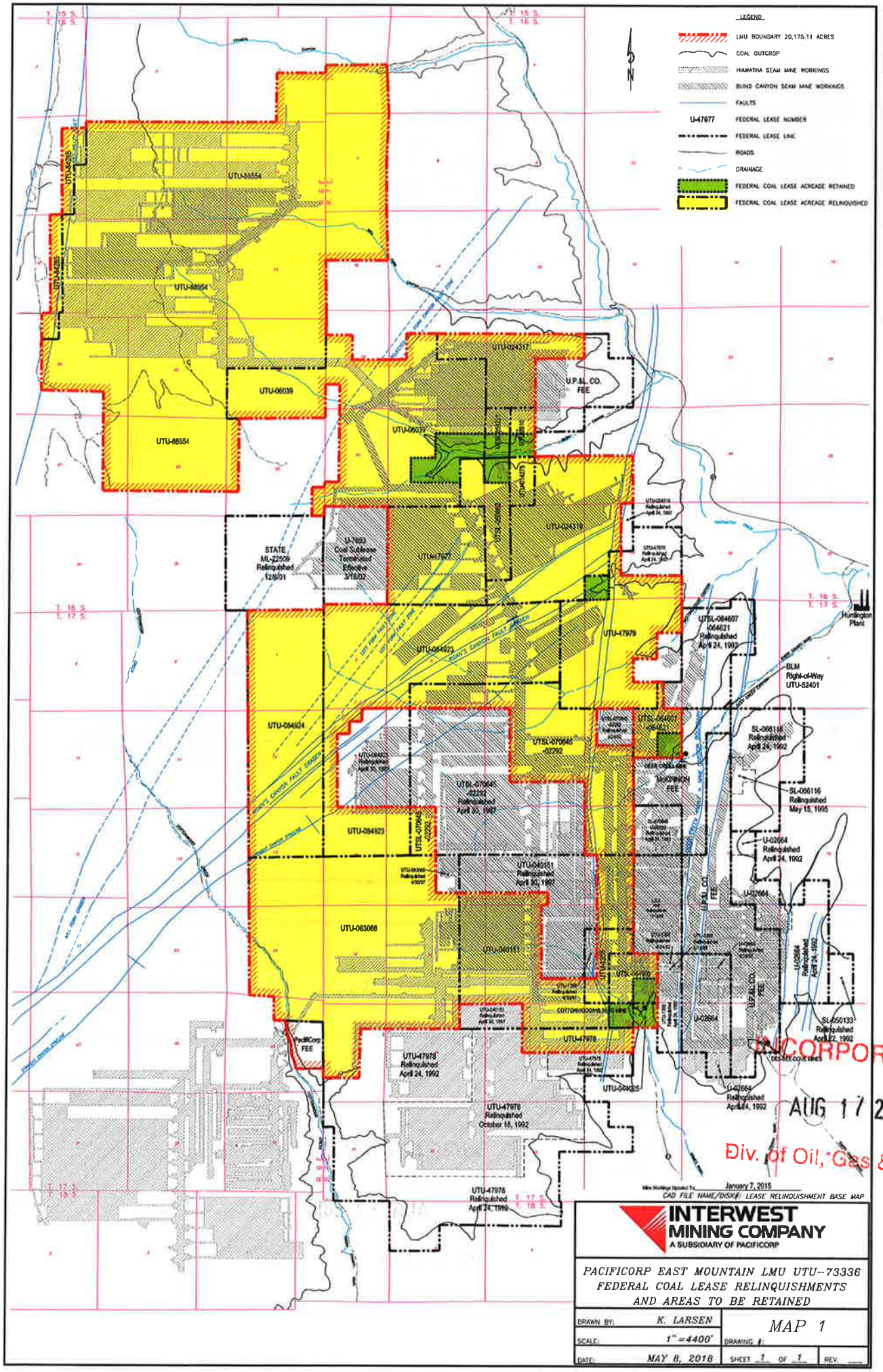
AUG 17 2018

Div. of Oil, Gas & Mining

Enclosures

cc: D. Ralston, B. Morgan, J. Potter, C. Semborski, K. Fleck, D. Oakley

SMC\Interwest\UTBLM2018-21(EastMtnLMU-FedLeaseRelinqProjOverview)



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Green River District
Price Field Office
125 South 600 West
Price, UT 84501
http://www.blm.gov/ut/st/en/fo/price.html

MAR 2 3 2016

In Reply Refer To:
3482 (UTG023)
LMU UTU-73336 Mine Closure, UTU-88554, UTU-84285, UTU-06039
SL-070645/U-02292, U-084923, U-084924, U-083066, U-040151
U-044025, U-1358, SL-064607/064621, U-024317, U-024319
U-014275, SL-051221, U-47977, U-47978, U-47979, SL-050862
U-2810, LDS Fee Land, ML-48258/UTU-88554

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
7014-2120-0004-6185-8850

Mr. Scott M. Child
Manager, Lands and Regulatory Affairs
Interwest Mining Company
1407 W. North Temple, Suite 310
Salt Lake City, Utah 84116

Re: Final Resource Recovery and Protection Plan (R2P2) Amendment and Final Disposition of the East Mountain Logical Mining Unit (LMU), Deer Creek Mine and Interwest Mining Company, as Managing Agent

Dear Mr. Child:

On September 25, 2015, the Bureau of Land Management (BLM) received a final R2P2 amendment from Interwest Mining Company for closing the subject mine and sealing the mine openings. This request follows the "Approved – Portal Sealing and Abandonment Plan – Final Closure of the Deer Creek Mine" letter from the BLM to Interwest dated April 10, 2015. In that letter the BLM approved the sealing of the mine. The received information from Interwest fulfills the requirements described in 43 CFR 3482.1(b) and (c).

Affected Leases and Logical Mining Unit (LMU): The idling of the mine affects the LMU UTU-73336, which includes all the leases and properties in the LMU.

Proposed Plan and Justification: Interwest has extracted all equipment out of the mine except those components required for dewatering the mine prior to final implementation of a ground water containment and distribution system. Upon final construction of the underground water management system, all openings to access the coal will be sealed with block walls containing

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

water drainage P-traps and will be back filled with noncombustible material for at least 30 feet outby. Unauthorized access into the mine and federal coal resources would be secured and the mine workings protected from long term degradation. Justification for the mine closure was PacifiCorp's decision to close the Deer Creek Mine based upon maximum economic recovery. PacifiCorp provided proprietary and confidential information demonstrating that production costs at the mine exceeded market costs and thus provided the decision to close the mine.

Inspection: As equipment has been withdrawn from the mine, the BLM has inspected all areas that have been abandoned before they became inaccessible. The BLM will continue to inspect accessible areas until final sealing has occurred.

Approval and Conditions: The BLM agrees with Interwest's proposal for sealing and securing the mine. The BLM accepts the final R2P2 and the update to the coal reserve as shown in the two-volume "Final Amendment (Per Mine Closure) September 2015 East Mountain LMU UTU-73336 Resource Recovery and Protection Plan for the Deer Creek and Cottonwood/Wilberg Coal Mines".

✓ **Maximum Economic Recovery (MER):** MER has been determined to be achieved due to the mining costs encountered in this mine when compared with coal secured in the open market.

National Environmental Policy Act (NEPA): This approval of a minor modification to an approved R2P2 of an existing underground coal mine is categorically excluded from NEPA analysis, as explained in the Department Manual (5 DM Part 516 11.5 (F) (8)).

The BLM has determined that this R2P2 modification complies with the Mineral Leasing Act of 1920, as amended, the regulations at 43 CFR 3480, and the lease terms and conditions. Interwest is authorized to secure the Deer Creek Mine indefinitely. If you have any questions, please contact Steve Rigby at the Price Field Office (435-636-3604) or Jeff McKenzie at the BLM State Office (801-539-4038).

Sincerely,

Ahmed Mohsen
Field Manager

cc: Roger Bankert, BLM State Office (UT-920)

Office of Natural Resource Revenue
Attn: John Hovanec
DFC, 6th & Kipling, Bldg.85
P.O. Box 25165, MS 63010C
Denver, Colorado 80225-0165

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Utah Division of Oil, Gas, and Mining
Daron Haddock
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Mine Safety and Health Administration
Cord Cristando
45 East 1375 South
Price, Utah 84501

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

COPY

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

1407 W. North Temple, Suite 110
Salt Lake City, UT 84116

HAND DELIVERED

May 29, 2018

RECEIVED
MAY 30 2018
Bureau of
Land Management

Kent Hoffman
Deputy State Director
United States Department of the Interior
Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt lake City, Utah 84101-1345

RE: Notification of Full Relinquishment of Federal Coal Lease UTU-88554, East Mountain LMU, Deer Creek Mine, Emery County, Utah

Dear Mr. Hoffman:

In accordance with 43 CFR § 3452.1 (2017) and the terms of the referenced federal coal lease, submitted herewith in triplicate is documentation in support of PacifiCorp's full relinquishment of acreage under federal coal lease UTU-88554. The total acreage being surrendered is 6,382.82 acres. Refer to Map 1 for lease location within the East Mountain Logical Mining Unit UTU-73336.

The attachments to this letter contain lease specific information compiled using the Bureau of Land Management (BLM) relinquishment checklist developed by your staff. To assist the reviewer in the process, we've completed the checklist with the best available information known to us given the history of this lease. The supporting information is located in the accompanying appendices.

Background and Purpose of Relinquishment

With PacifiCorp's decision and announcement on December 15, 2014, to close the Deer Creek Mine and end production from the LMU, this brought an end to 40+ years of coal production for this LMU. All coal production ceased on January 7, 2015. PacifiCorp has made steadfast efforts to complete all mine closure activities including the construction of permanent portal seals for the entire Deer Creek Mine complex and LMU.

INCORPORATED
AUG 1 7 2018
Div. of Oil, G

All economically recoverable coal reserves within the entire LMU inclusive of this federal coal lease has been mined out or has been determined uneconomical to mine as acknowledged by BLM's letter dated March 23, 2016 (copy enclosed). Having fully complied with the federal coal lease terms and their associated federal regulations, PacifiCorp has no intentions to re-open this mine. Therefore, the purpose of this relinquishment is to surrender this federal coal lease acreage back to the federal government and bring final closure to this matter.

Full Relinquishment

The legal description for full relinquishment of UTU-88554 is described below:

Federal Coal Lease UTU-88554		
Lease Issuance Date:		**4/1/1999 to 4/1/2019**
Lessee of Record:		**PacifiCorp**
Total Federal Coal Lease Acres:		**6,382.82**
Description of Lease Acreage Being Relinquished		**Acres**
T16S, R6E, SLB&M Emery County, UT		
Sec 1:	SE¼	160.00
Sec 10:	E½E½SE¼	40.00
Sec 11:	All	919.96
Sec 12:	All	640.00
Sec 13:	All	640.00
Sec 14:	All	915.20
Sec 15:	E½E½	160.00
Sec 22:	Lots 1,2,4,5,6,7, E½NE¼, SW¼NE¼, N½SE¼, SE¼SE¼	465.13
Sec 23:	N½, N½S½, S½S½ (All)	640.00
Sec 24:	N½	320.00
Sec 25:	W½W½NW¼, W½NW¼SW¼	60.00
Sec 26:	N½, N½S½	480.00
Sec 27:	E½NE¼, NE¼SE¼	120.00
T16S, R7E, SLB&M Emery County, UT		
Sec 6:	Lots 5,6,7,8, S½SE¼	202.66
Sec 7:	All	413.60
Sec 18:	Lots 1,2, NE¼	206.27
	Total Lease Acres for Full Relinquishment:	**6,382.82**
	Lease Acres Remaining:	**0.00**

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Conclusion

To the best of its information and belief, PacifiCorp is in compliance with the terms and conditions of this federal coal lease, inclusive of having made all payment obligations relative to rentals and royalties. Furthermore, PacifiCorp represents that the federal lease

acres relinquished will not impair the public interest as all obligations under regulation 43 CFR § 3452.1 and all of the lease terms have been met including having demonstrated substantial completeness per BLM subsidence guidelines.

This relinquishment notification was prepared on behalf of PacifiCorp and is acknowledged as set forth below.

We respectfully seek your attention to this matter and ask that this relinquishment be accepted in a timely manner. Should you have any questions, need additional information or wish to discuss this matter with us, please feel free to contact me at 801-220-4612 or by email Scott.Child@PacifiCorp.com.

Sincerely,

Scott M. Child
Manager, Lands & Regulatory Affairs

Acknowledged and agreed to this 29 of MAY, 2018 by PacifiCorp, the lessee of record:

Dana M. Ralston
Senior Vice President
Thermal Generation & Mining
Rock Mountain Power (a division of PacifiCorp)

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Enclosures

cc: B. Morgan, J. Potter, C. Semborski, K. Fleck, D. Oakley

SMC\Interwest\UTBLM2018-01(UTU-88554FullReling)

Utah Division of Oil, Gas, and Mining
Daron Haddock
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Mine Safety and Health Administration
Cord Cristando
45 East 1375 South
Price, Utah 84501

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-88554

LEASE ACTIVITIES

1) Coal Lease Number: UTU-88554 *(Full Relinquishment)*

2) Lessee Name and Address:
PacifiCorp
c/o Interwest Mining Company
1407 West North Temple, Suite 110
Salt Lake City, Utah 84116

3) Utah Division of Oil, Gas, and Mining (DOGM) mine permit number: C/015/0018 (Deer Creek Mine).

4) Date of request: _____ Date filed: _____.

5) Acres requested to be relinquished: 6,382.82; Entire lease? YES ☒ NO ☐ (See attached map.) Comments: *Refer to Exhibit A for the legal descriptions of area relinquished. No areas retained. See also Figure 1 (a map depicting the area to be relinquished in its entirety).*

Original Lease Acreage: 6,382.82 Relinquished to date: 0.00 acres Remaining: 6,382.82 acres

6) Have all bonus bid payments been paid? YES ☐ NO ☐ N/A ☒ (If "NO", date anticipated to be paid in full: ___)

7) Are lease rental payments up to date? YES ☒ NO ☐ N/A ☐ (If "NO", date anticipated to be brought up to date: _____)

8) Has the lessee or the former lessee, if previously assigned, conducted mining activities on this lease? YES ☒ NO ☐ (If "NO", complete question 14, then proceed to question 23)

9) Type of mining conducted: Longwall ☒, Room & Pillar ☐, Surface ☐, Other ☐ (Explain) _____

10) If underground mined, excluding surface disturbances associated to subsidence, was there any surface disturbance conducted in association with the underground operation(s)? YES ☐ NO ☒ (If "YES", describe:

11) Date of initial mining: December 2003; last mining: January 2015.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-88554

12) Number of coal beds mined: 2 coal seams (Blind Canyon and Hiawatha)

13) Range of thickness of coal removed for each bed: 7' - 11'

14) Have all estimated recoverable coal reserves been recovered? YES ☒ NO ☐ N/A ☐ (If "NO", tons to remain in place: _____; Justification to leave these reserves must be provided.)
- *Refer to BLM approval letter dated March 23, 2016 (copy enclosed) regarding the final R2P2 for the Deer Creek Mine and final disposition of the East Mountain Logical Mining Unit with a determination that maximum economic recovery has been achieved*

15) Was an R2P2 modification required to account for deficient recovery? YES ☒ NO ☐ (If "NO", explain: _____)
- *Refer to BLM approval letter dated March 23, 2016 (copy enclosed) regarding the final R2P2 for the Deer Creek Mine and final disposition of the East Mountain Logical Mining Unit with a determination that maximum economic recovery has been achieved*

16) Have all production royalty payments been paid to ONRR? YES ☒ NO ☐ (If "NO", date anticipated to be paid in full: _____)

17) Did subsidence occur? YES ☒ NO ☐ (If "YES", continue; if "NO", proceed to 23)

18) Has it been demonstrated that the surface above subsided areas has been substantially stabilized per the criteria outlined in Appendix A? YES ☒ NO ☐ N/A ☐ (If "YES", please attach supporting documentation.)

19) Has the surface area been inspected to determine impacts to surface topography per the criteria outlined in Appendix B? YES ☒ NO ☐ N/A ☐ (If "YES", attach supporting documentation. If "NO", date when inspection is scheduled: ___)
- *Surface topography inspections were conducted through annual reconnaissance flights.*

20) Have there been any impacts to surface or groundwater per the criteria outlined in Appendix C? YES ☐ NO ☒ N/A ☐ (If "NO", attach supporting documentation.)
- *Refer to hydrographs*

21) Have there been any impacts to vegetation per the criteria outlined in Appendix D? YES ☐ NO ☒ N/A ☐ (If "NO", attach supporting documentation.)
- *Refer to DOGM write up*

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-88554

22) Have there been any impacts to private improvements per the criteria outlined in Appendix E? YES ☐ NO ☒ N/A ☐ (If "NO", attach supporting documentation.)
- *There are no improvements.*

23) Has CERCLA Certification been submitted per the criteria outlined in Appendix F? YES ☒ NO ☐ N/A ☐ (If "YES", attach supporting documentation.)
- *As of the date of this submittal. Refer to Appendix F.*

24) Was there any surface disturbance conducted independent of mining activities? YES ☐ NO ☒ (If "YES", describe: _____)

25) Have all concerned agencies commented on this relinquishment request? YES ☐ NO ☐ (If "NO", who has not? _____)

26) After review, BLM proposes the relinquishment of ___ acres (Attach acreage adjustments).

27) Is approval recommended at this time? YES ☐ NO ☐ (If "NO", items deficient or other areas of concern:

_____; Date completed / Satisfied: _____

_____; Date completed / Satisfied: _____

_____; Date completed / Satisfied: _____

INCORPORATED
AUG 17 2018
Div. of Oil, Gas &

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-88554

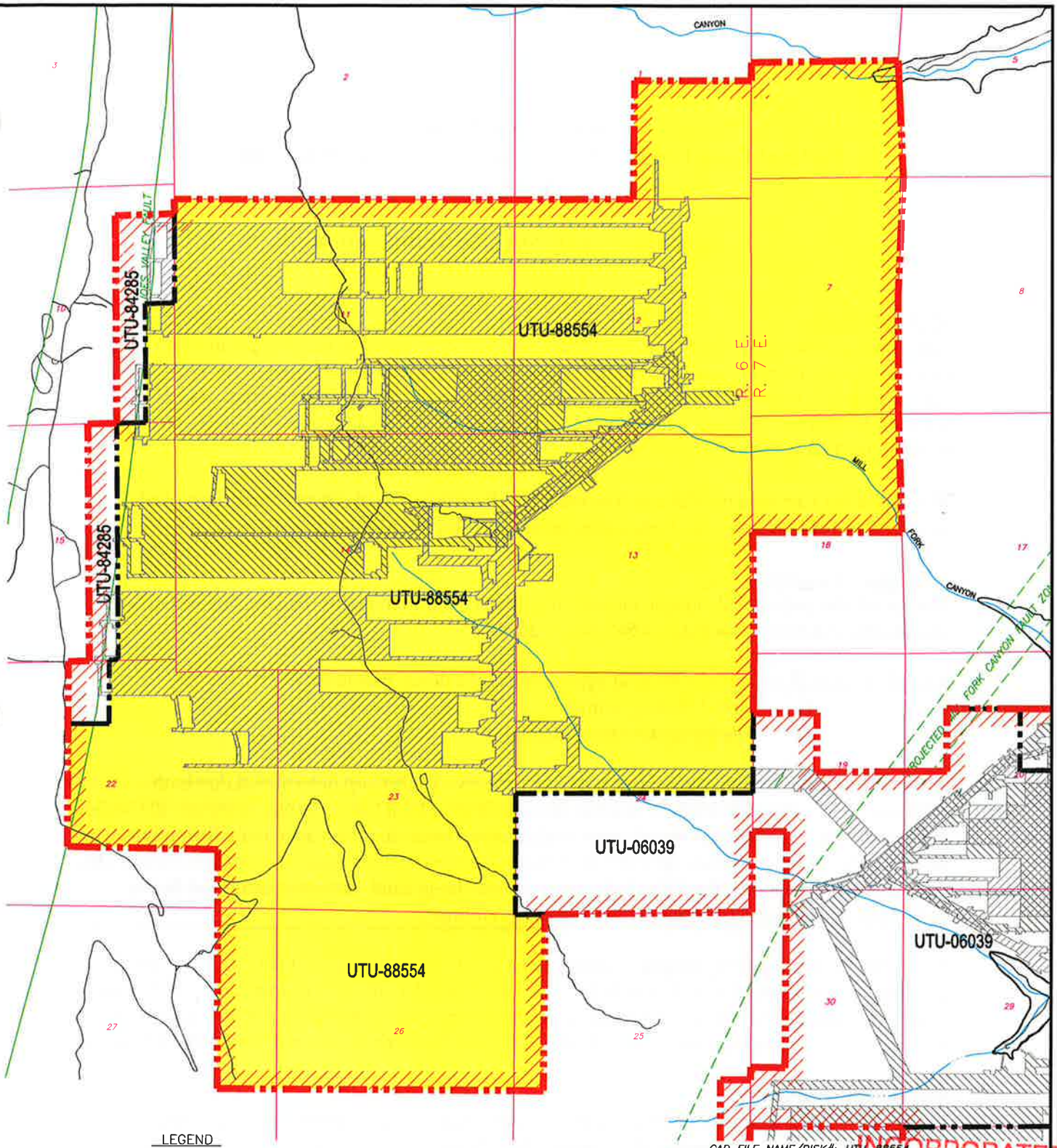
Exhibit A

Full Relinquishment

The legal description for full relinquishment of UTU-88554 is described below:

Federal Coal Lease UTU-88554		
Lease Issuance Date:		4/1/1999 to 4/1/2019
Lessee of Record:		PacifiCorp
Total Federal Coal Lease Acres:		6,382.82
Description of Lease Acreage Being Relinquished		**Acres**
T16S, R6E, SLB&M Emery County, UT		
Sec 1:	SE¼	160.00
Sec 10:	E½E½SE¼	40.00
Sec 11:	All	919.96
Sec 12:	All	640.00
Sec 13:	All	640.00
Sec 14:	All	915.20
Sec 15:	E½E½	160.00
Sec 22:	Lots 1,2,4,5,6,7, E½NE¼, SW¼NE¼, N½SE¼, SE¼SE¼	465.13
Sec 23:	N½, N½S½, S½S½ (All)	640.00
Sec 24:	N½	320.00
Sec 25:	W½W½NW¼, W½NW¼SW¼	60.00
Sec 26:	N½, N½S½	480.00
Sec 27:	E½NE¼, NE¼SE¼	120.00
T16S, R7E, SLB&M Emery County, UT		
Sec 6:	Lots 5,6,7,8, S½SE¼	202.66
Sec 7:	All	413.60
Sec 18:	Lots 1,2, NE¼	206.27
	Total Lease Acres for Full Relinquishment:	**6,382.82**
	Total Lease Acres Remaining:	**0.00**

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



LEGEND

- LMU BOUNDARY UTU-73336
- COAL OUTCROP
- HIAWATHA SEAM MINE WORKINGS
- BLIND CANYON SEAM MINE WORKINGS
- FAULTS
- UTU-88554 FEDERAL LEASE NUMBER
- FEDERAL LEASE LINE
- ROADS
- DRAINAGE
- FEDERAL COAL LEASE RELINQUISHMENT AREA

N

CAD FILE NAME/DISK#: UTU-88554

INCORPORATED

INTERWEST MINING COMPANY 2018
A SUBSIDIARY OF PACIFICORP

Div. of Oil, Gas & Mining

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554

DRAWN BY:	K. LARSEN	FIGURE 1	
SCALE:	1" =3000'	DRAWING #:	
DATE:	MARCH 14, 2018	SHEET 1 OF 1	REV.

Deer Creek Mine
Federal Coal Lease UTU-88554 Full Lease Relinquishment
Appendix A

Subsidence and Surface Stabilization

Mining History

This lease is comprised of a single contiguous block of coal reserves in the Hiawatha and Blind Canyon seams. Coal reserves were recovered by longwall methods. Mining in the Hiawatha seam took place between 12/2003 and 1/2015. Mining in the Blind Canyon seam took place between 5/2006 and 7/2010. The Blind Canyon mine workings and longwall panels directly overlaid the Hiawatha mine workings.

The following narrative provides details related to PacifiCorp's subsidence monitoring and control plan for East and Trail Mountains, including the Trail Mountain Mine.

Subsidence Monitoring Plan

The establishment of a subsidence monitoring plan is a requirement of the Division of Oil, Gas and Mining (DOGM) detailed in R645-301 -525.440.

PacifiCorp initially adopted a twofold approach to subsidence monitoring:

1) aerial photogrammetry,
2) on-the-ground monumentation.

After seven years of comparing the two types of surveys PacifiCorp determined that both methods effectively document the amount of subsidence which has occurred; however, the aerial photogrammetry method has the advantage of showing more detail because more data points can be monitored with less effort. In 1987, with the concurrence of the State of Utah Division of Oil, Gas & Mining (DOGM), PacifiCorp discontinued on-the-ground monumentation and began collecting subsidence data solely by aerial photogrammetry.

The subsidence monitoring program, conducted since 1980, has produced data which not only document the amount of subsidence that has occurred but also allows the operator to predict the amount of subsidence that is likely to occur when mining in new areas. PacifiCorp submits a comprehensive report annually to the BLM, USFS, and the Utah Division of Oil, Gas, & Mining.

Aerial Photogrammetry

PacifiCorp's subsidence monitoring program is primarily based on aerial photogrammetry. PacifiCorp has been using aerial photogrammetry - based subsidence modeling since 1980. This method has proven to be the best way to collect subsidence data on East Mountain. A baseline photogrammetric survey was conducted in 1980 that included over 21,000 elevations measured on approximate 200-foot spacing grid. In flat areas with limited vegetation, the elevations can be read from the photographs with a precision of one-half foot. In steeper areas, where cliffs are

RECORP ORATED
AUG 17 2018
Div. of Oil, Gas & Mining

present, the resolution is not as good, and inaccuracies of greater than ten feet can occur. In steeper areas, photogrammetric monitoring can, and has been, augmented by conventional survey data.

Annual Subsidence Survey Procedures

Aerial photographs of the entire East Mountain LMU area are used in conjunction with widely spaced survey control points on the ground to produce a digital elevation model of the ground surface in successive years from which a surface subsidence map is generated for each year. The ground control points are marked and surveyed using conventional survey methods, then flagged so that they can be seen in photographs taken from the air. Approximately 100 aerial photographs of East Mountain area are taken along 7 flight lines that traverse the LMU area from north to south. Overlapping portions of photographs taken from successive viewpoints along the flight lines produce stereoscopic views of the ground surface. These 93 views of overlapping photograph pairs are called "models" in the photogrammetric process. Elevations of the ground surface over the entire permit area are then calculated using a computer-aided stereo plotter, and verified using the known survey points. Ground elevations are calculated for a grid of approximately 200-foot centers, optimized for terrain. The baseline data, including surveying and flagging ground control points, acquiring the aerial photographs, and generating the surface grid and map, for the East Mountain Area were collected in 1980. These elevations are then compared to elevations measured from the photographs taken annually in the fall. Using this method, ninety percent of the points measured will be accurate to within plus or minus one-half foot.

PacifiCorp participated with the governmental agency task force which included representatives from the Bureau of Land Management, Forest Service and the Division of Oil, Gas and Mining, to develop *"Memorandum of Understanding for Processing of Requested to Relinquish Federal Coal Leases (10-MOU-97-001)"*. This document established "Standards for Relinquishment Consideration" including the amount of accepted variation in annual subsidence data. As stated in the MOU, the area will be considered stable, if the cumulative subsidence during the period (3 years) has been 1 foot or less under normal circumstances. Based on this agreement, subsidence measurements and areas and subsidence areas shown on PacifiCorp's annual subsidence maps show areas of total measurable subsidence greater than two feet. PacifiCorp's experience on East Mountain since 1980 has shown that the areas of minimum detectable subsidence, i.e., one foot or more, very rarely extend outside of the outline of the total mine workings, even in areas where more than one seam has been mined.

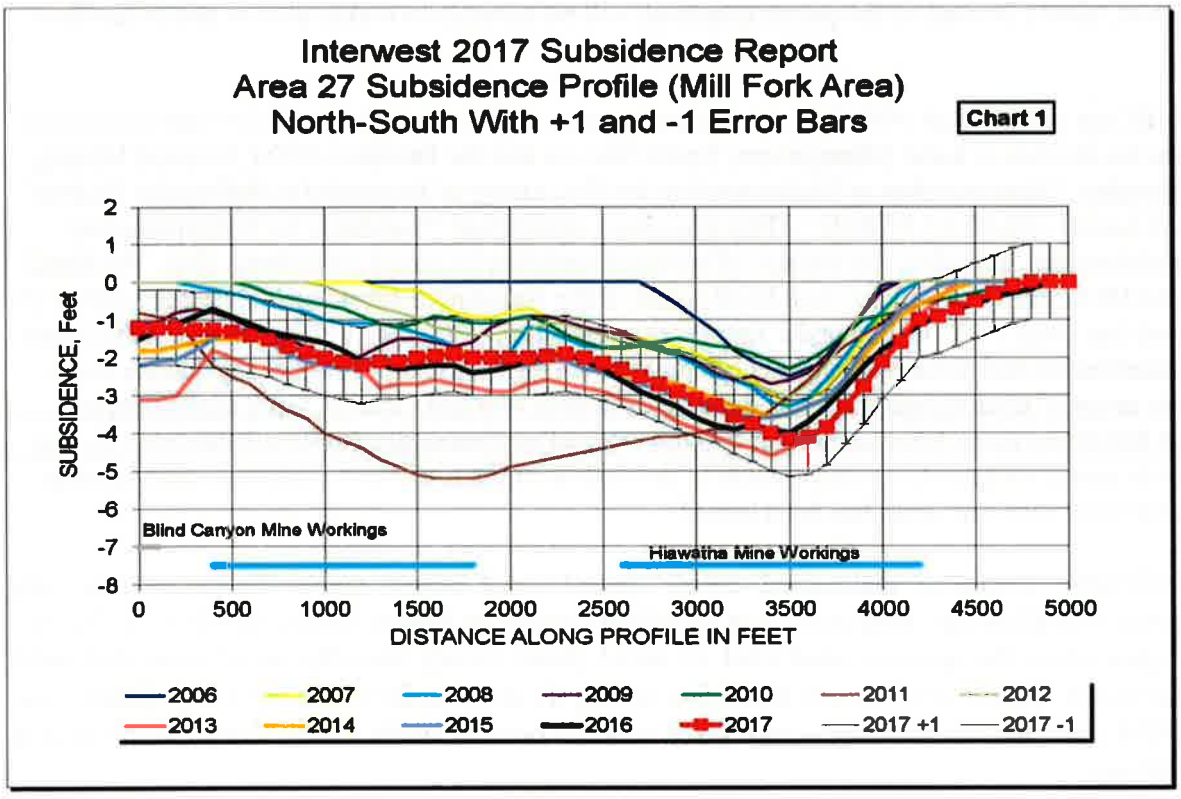
PacifiCorp's contractor maintained survey control aerial targets within the permit boundary necessary to allow the interpretation of coordinate points on photos within $\pm$0.5 foot. Following this procedure the operator conducted an aerial photo survey annually of all areas that were undermined. PacifiCorp has continued monitoring all areas undermined until the operator and DOGM agree that the subsidence in a given area has become stable and no further monitoring is necessary.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

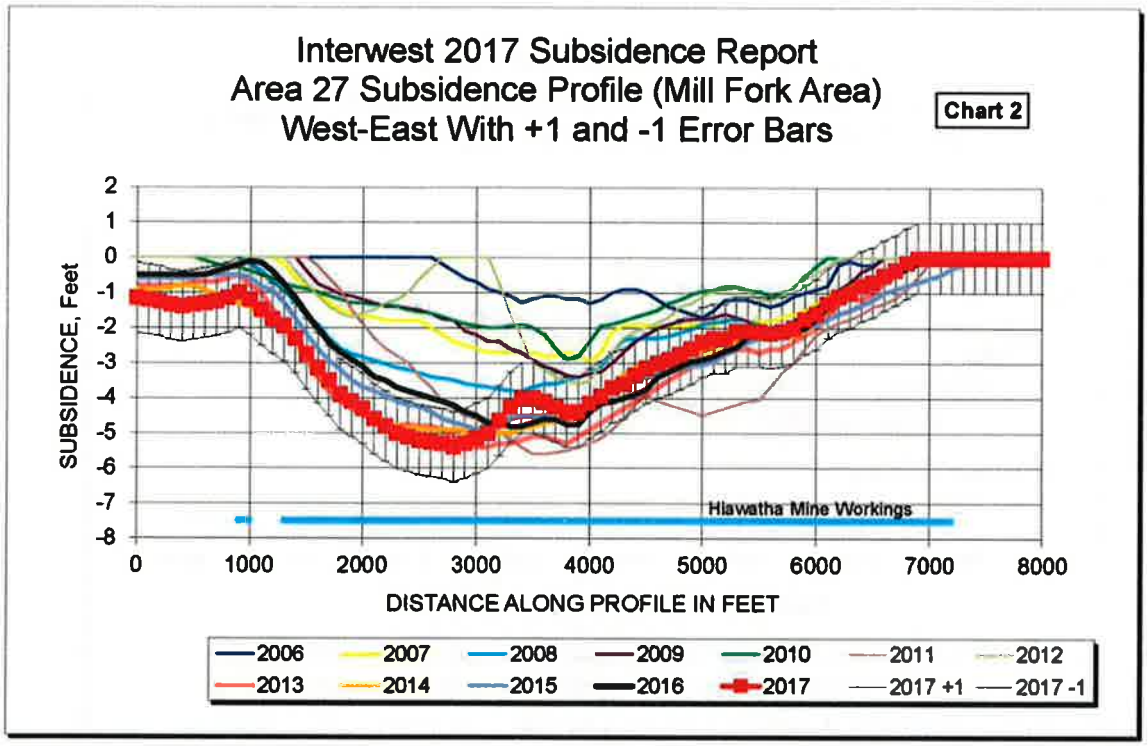
Federal Lease UTU-88554 Subsidence Data

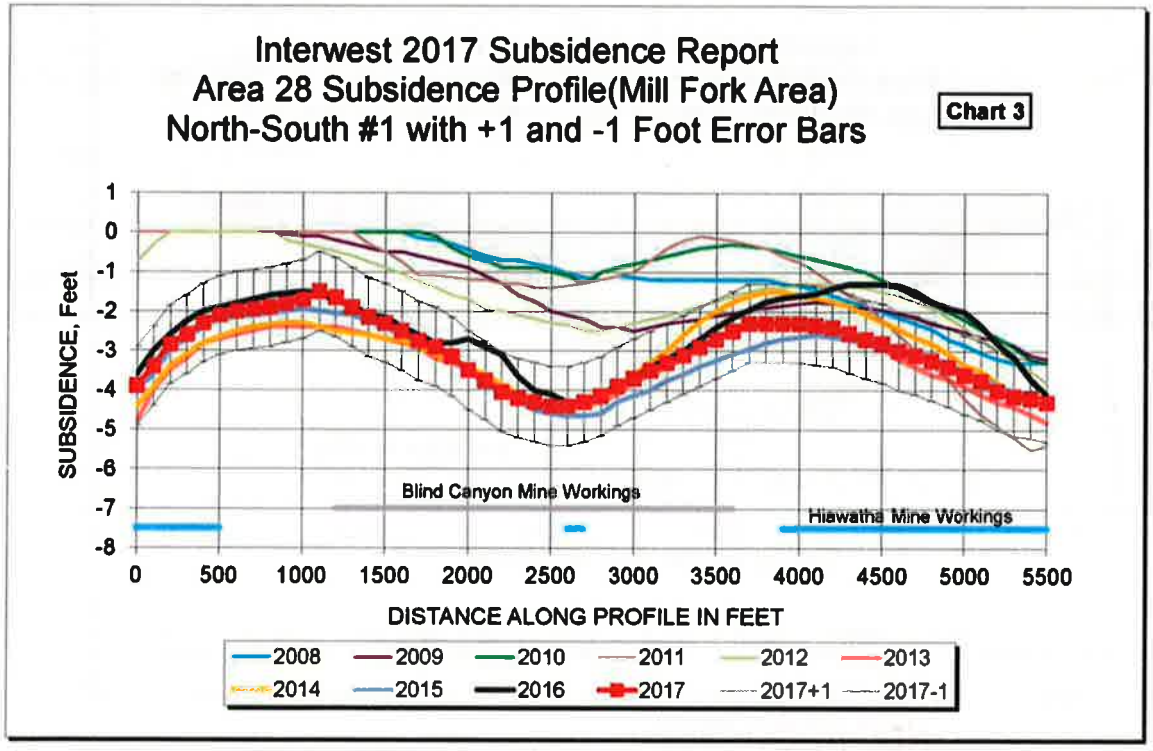
Subsidence in the lease UTU-88554 area has been monitored since 2005. Subsidence measurements by photogrammetric methods have been used, and subsidence profiles (shown on the following figures and accompanying maps) show subsidence measurements made between 2005 and 2017. Photogrammetric methods allow more complete subsidence monitoring coverage in areas that are topographically rugged and difficult to measure using conventional surveying methods.

PacifiCorp delineated a series of eight profiles covering the main longwall panel districts of Lease UTU-88554, including the dual-seam mining overlay area, are referred to as profiles A, B, C, and D on the following figures and accompany maps. Subsidence within this area has reached a maximum of just over 7 feet. No change in subsidence has occurred since 2014, and the area is stable (see following figures and map). Also, the subsidence contour maps for 2017, included herein, show no increase in subsidence.



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

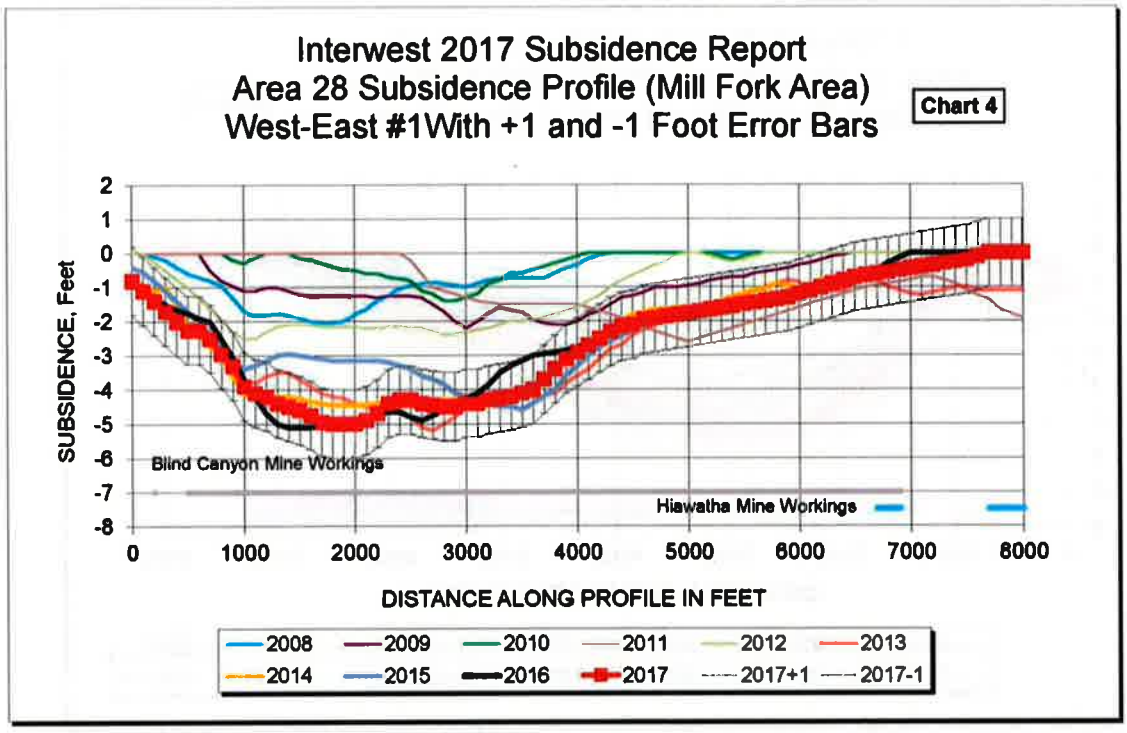


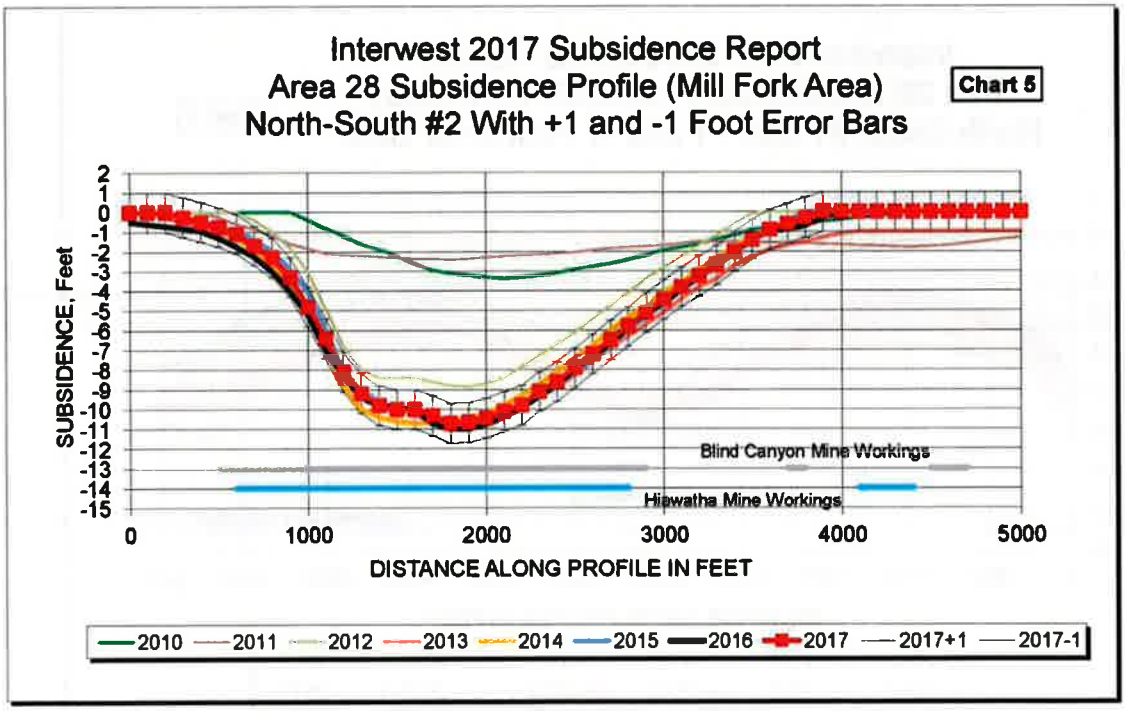


INCORPORATED

AUG 17 2018

Div. of Oil, Gas

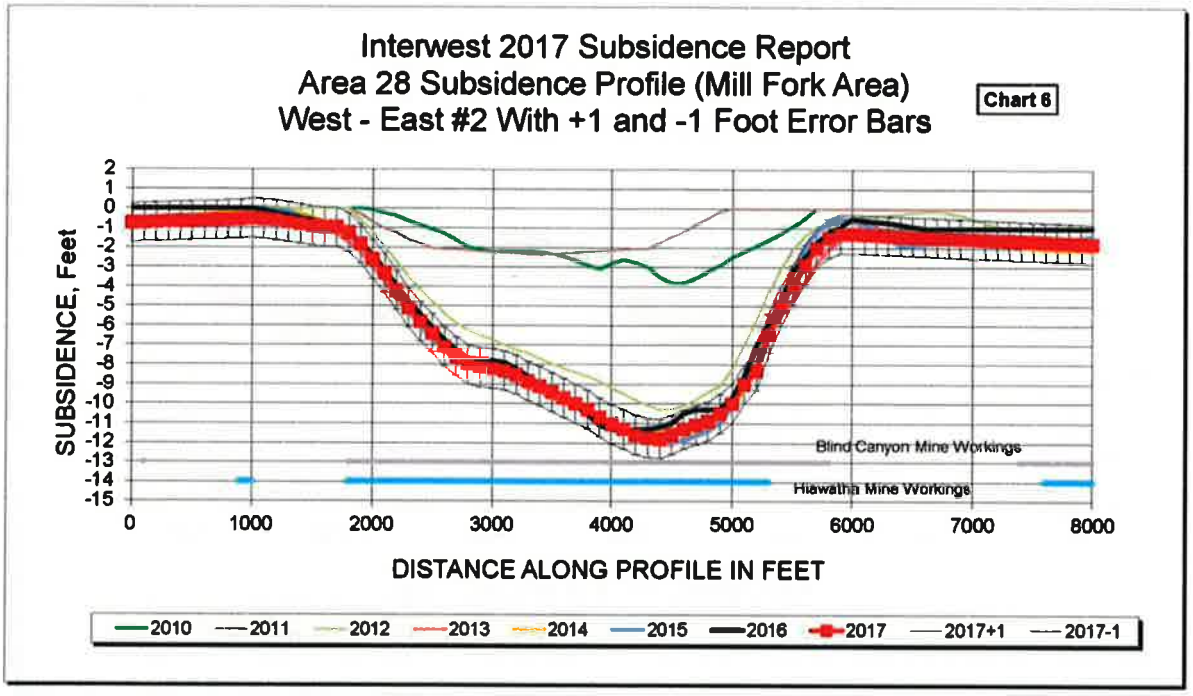


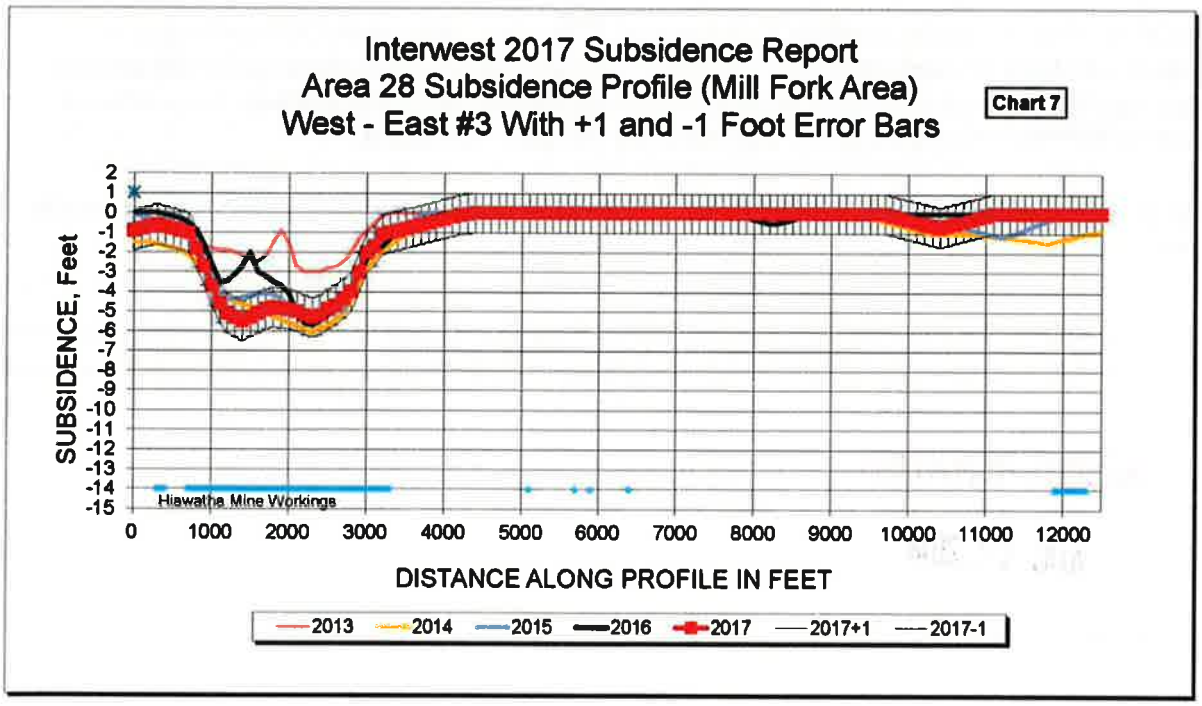


INCORPORATED

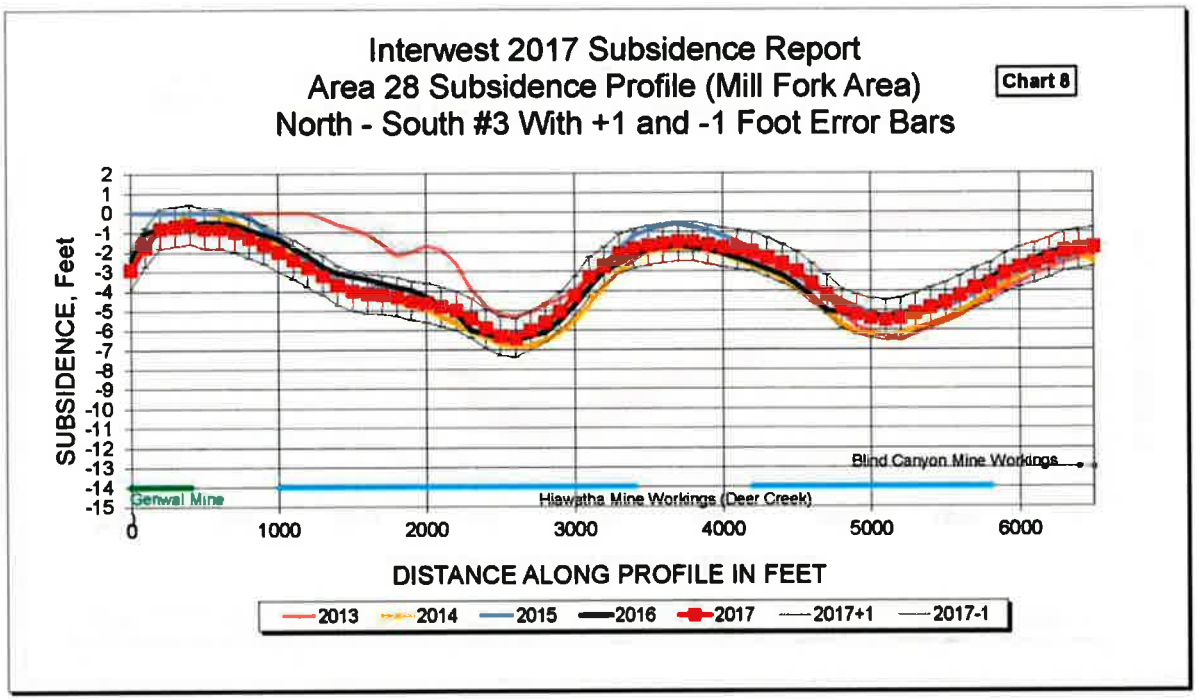
AUG 17 2018

Div. of Oil, Gas & Mining





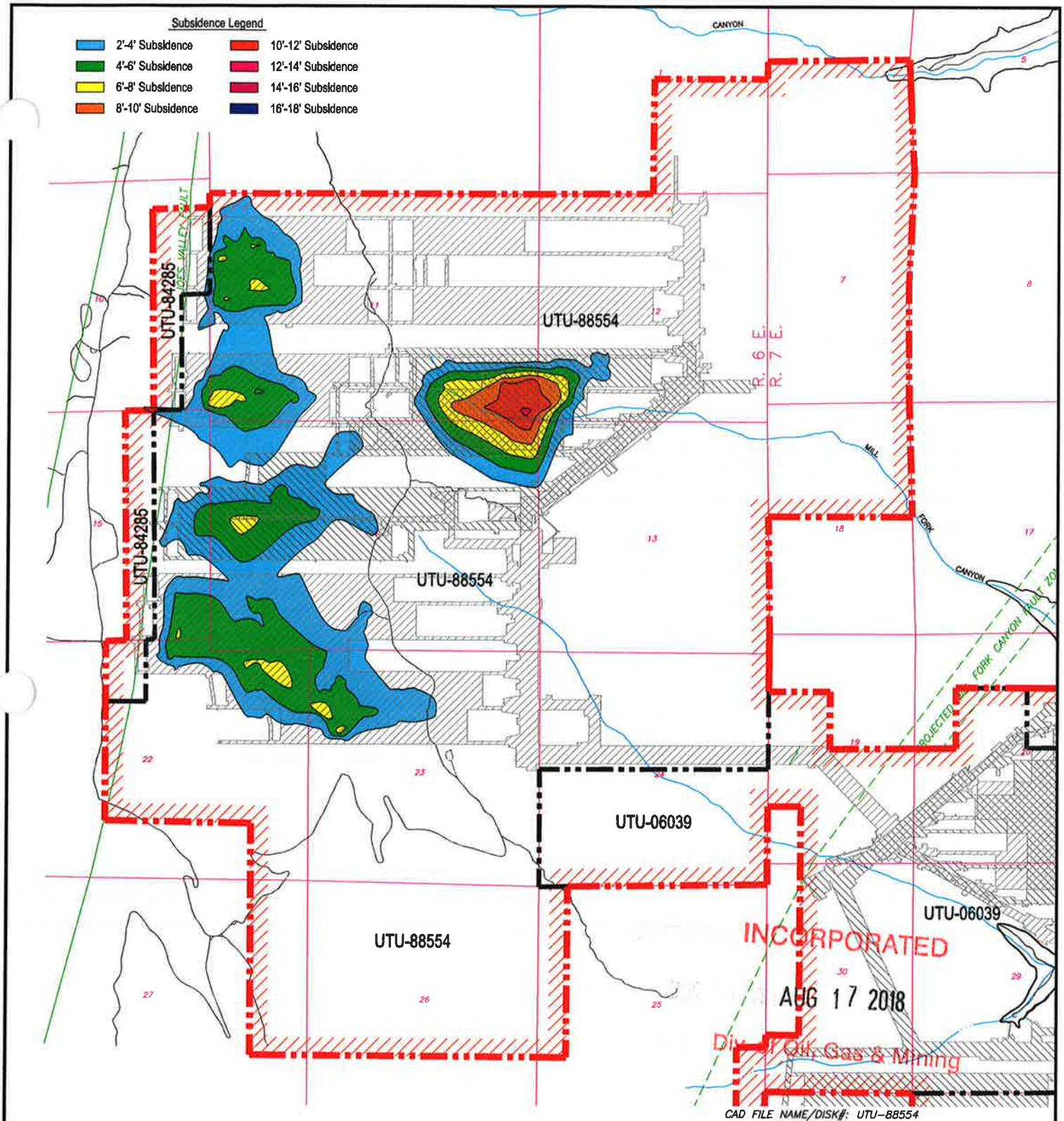
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



Aerial surveys conducted annually by helicopter 2006 - 2017 have detected no subsidence-related effects on the surface in UTU-88554. Conventional surveying methods for subsidence were used briefly during 2005 to measure subsidence in the vicinity of gas well Federal 32-23 near the 12th West longwall panel. No effects on the well were noted.

The proposed relinquishment area of Lease UTU-88554 is stable and subsidence is substantially complete.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: UTU-88554

LEGEND

- LMU BOUNDARY UTU-73336
- COAL OUTCROP
- HIAWATHA SEAM MINE WORKINGS
- BLIND CANYON SEAM MINE WORKINGS
- FAULTS
- UTU-88554 FEDERAL LEASE NUMBER
- FEDERAL LEASE LINE
- ROADS
- DRAINAGE

N

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
SUBSIDENCE BASE MAP

DRAWN BY:	K. LARSEN	APPENDIX A	
SCALE:	1" =3000'	DRAWING #:	
DATE:	APRIL 16, 2018	SHEET 1 OF 1	REV. ___

Deer Creek Mine
Federal Coal Lease UTU-88554 Full Lease Relinquishment
Appendix B

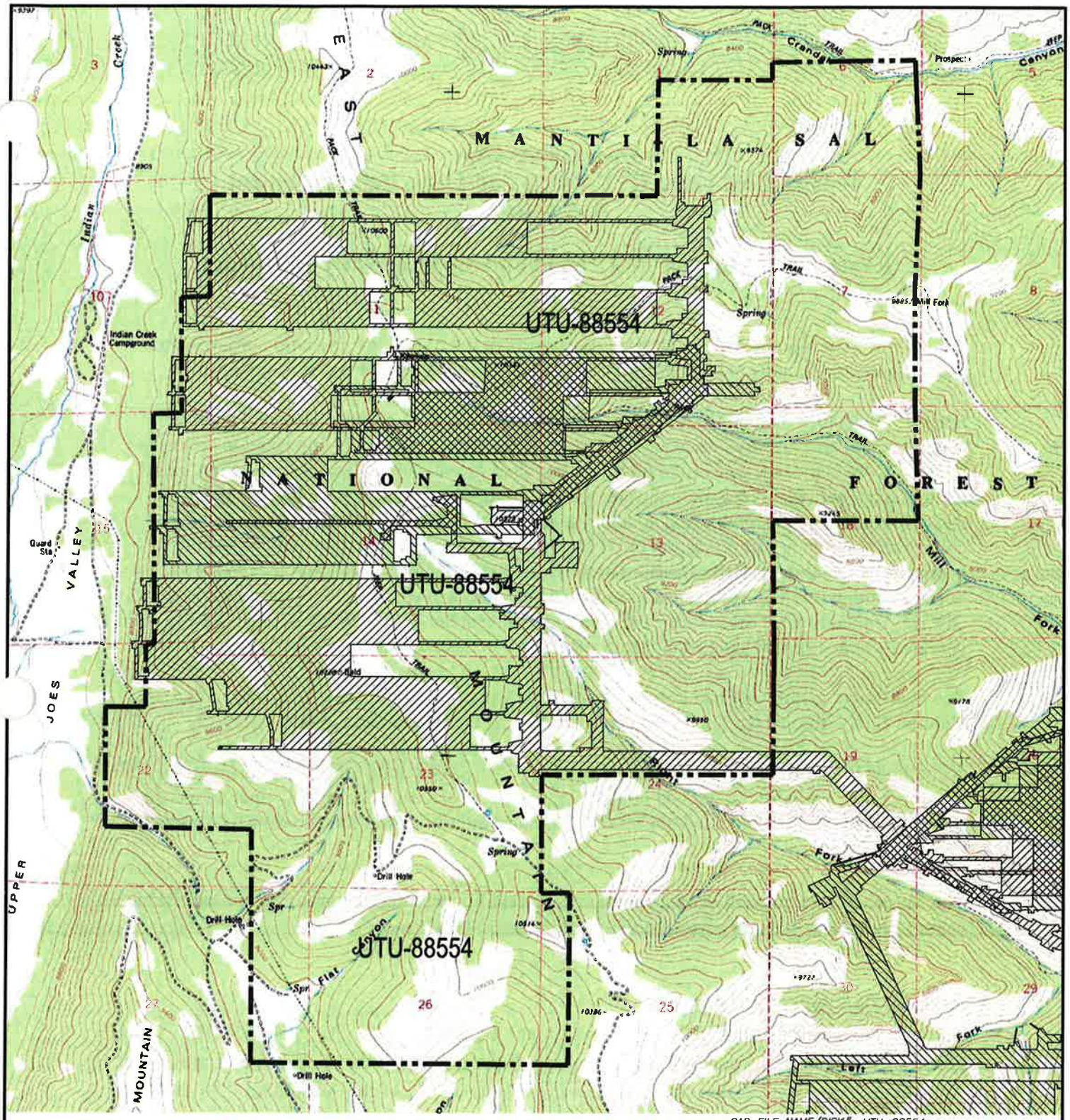
Evaluation of impacts to Surface Topography

PacifiCorp has demonstrated that subsidence is substantially complete and that the surface has stabilized; refer to Appendix A. Based on the aerial observations and supporting data, the relinquishment area of Lease UTU-88554 is stable and subsidence is substantially complete. No effects from subsidence were noted at the surface. No surface facilities or installations were affected within UTU-88554. No restoration and/or mitigation efforts are required for Lease UTU-88554. Please refer to the Appendix B - Topographic Surface Map. This map shows the relationship between the topographic surface, the mine workings, and the UTU-88554 lease boundary.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: UTU-88554

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

HIAWATHA SEAM MINE WORKINGS

BLIND CANYON SEAM MINE WORKINGS

FEDERAL COAL LEASE RELINQUISHMENT AREA

N

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
TOPOGRAPHIC BASE MAP

DRAWN BY:	K. LARSEN	*APPENDIX B*	
SCALE:	1" =3000'	DRAWING #:	
DATE:	APRIL 16, 2018	SHEET 1 OF 1	REV.

Deer Creek Mine
Federal Coal Lease UTU-88554 Full Lease Relinquishment
Appendix C

Evaluation of Impacts to Ground and Surface Water Hydrology

The following section provides a detailed description of the hydrology, including groundwater and surface water quality and quantity, of the land within UTU-88554 and surrounding area.

Since 1979 detailed data on the hydrology of the East Mountain area have been collected, compiled, and analyzed by PacifiCorp and several government agencies. Information collected by PacifiCorp is the result of exploratory drilling, field investigations, geologic mapping, aerial photography, spring surveys, groundwater tests, monitoring of numerous wells and stream stations, climatological monitoring, and investigations by independent consultants. The data collection program is part of a complete Hydrologic Monitoring Program which has been approved by the State of Utah, Division of Oil, Gas and Mining (DOGM) and the Office of Surface Mining (OSM). All data collected have been and will continue to be submitted to OSM, DOGM, United States Forest Service (USFS), and the Bureau of Land Management (BLM) each year in the annual Hydrologic Monitoring reports.

The hydrologic monitoring plan for the Deer Creek Mine Mill Fork Lease Area is specified in Volume 12 Hydrologic Section in the approved Mining and Reclamation Plan (MRP).

As outlined by the BLM, the interested parties have agreed that under normal circumstances, the minimum time period for continued monitoring will be three years. During this time period the operator/lessee will establish that the surface has substantially stabilized according to Appendix "A".

The following sections will describe and provide detail concerning the groundwater and surface water resources within and adjacent to Federal Lease UTU-88554.

Regional Groundwater Hydrology

The characteristics of a groundwater resource are dependent upon the geology of the water bearing strata and on the geology and hydrology of the recharge area. Groundwater movement and storage characteristics are dependent on the characteristics of the substratum. To facilitate an understanding of groundwater of the Mill Fork Area, a discussion of pertinent regional geologic features is presented below.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Regional Geology

The Mill Fork Area is located in the central portion of the Wasatch Plateau Coal Field in Emery County, Utah. Generally, this area is a flat-topped mesa surrounded by heavily vegetated slopes which extend to precipitous cliffs dropping steeply to the valley below. Relief of up to 5,000 feet is measured from Castle Valley lowland to the plateau above. The following discussion summarizes the structural geology and stratigraphy of the region and the mining areas located within the Mill Fork Area.

The regional geology of the Colorado Plateau in which the Wasatch Plateau coal field is situated is fairly simple. Sedimentary rocks have been accumulating in this region since Permian time. A broad, high, flat region that encompasses southeastern Utah, southwestern Colorado, northwestern New Mexico, and northern Arizona, the Colorado Plateau has been an area of relative stability while mountain-building episodes have occurred in surrounding regions. The thick accumulations of sedimentary rocks in this region are being deeply dissected by erosion, leaving the most recent coal reserves in the higher plateaus, where they are now being mined. The PacifiCorp mining area covers portions of East Mountain and Trail Mountain, which are separated by Cottonwood Canyon, a deep, partially glaciated valley.

The geologic formations exposed in the PacifiCorp mining area range from Upper Cretaceous (100 million years old) to Tertiary and Recent in age. These formations, in ascending order from oldest to youngest, are the Masuk Shale member of the Mancos Shale, the Star Point Sandstone, the Blackhawk Formation, the Castlegate Sandstone, the Upper Price River Formation (all Cretaceous), and the North Horn Formation, and the Flagstaff Limestone (Tertiary). The coal deposits are restricted to the lower portion of the Blackhawk Formation, about 2,500 feet below the top of the Plateau. Recent geologic deposits include numerous stream terrace gravels along streams and rivers, glacial till deposits in the upper reaches of Cottonwood Canyon, and alluvial and colluvial fills in all of the significant drainages.

The Masuk Shale is the upper member of the Mancos Shale and consists of light to medium gray marine mudstones. The marine Masuk Member of the Mancos Shale was deposited in an open marine environment (Mayo and Peterson, 2001). The Masuk Member is a highly erodeable calcareous, gypsiferous, and carbonaceous dark gray colored shale. It is continuously exposed along the eastern edge of the Wasatch Plateau, but is not exposed in the Mill Fork Area. The Masuk Member is approximately 1,300 feet thick. Westward thinning wedges of the Masuk inter-finger with tongues of the Star Point Sandstone. Usually this formation weathers readily, forming slopes which are often covered by debris. It is generally devoid of water.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Overlying and inter-tonguing with the Masuk Shale is the Star Point Sandstone. In the East Mountain area the Star Point Sandstone consists of three or more massive sandstones totaling about 400 feet in thickness.

The Star Point Sandstone forms massive cliffs where exposed at the surface. The sandstone was deposited as seaward thinning (east), marine, shoreface blanket sands that are laterally continuous (Mayo and Peterson, 2001). Landward (west), these sandstones terminate abruptly into the mud- and organic-rich backshore facies (Van Wagoner and others, 1990). Because many of the organic-rich facies are now mineable quality coal, locally the Star Point Sandstone has immediate contact with coal seams. Elsewhere sandstone bodies of the Star Point Sandstone are overlain and underlain by lower shoreface and open marine shales of the Mancos Formation. What this means is that the marine shoreface sandstones are three dimensionally encased by low-permeability marine shales and fine-grained carbonaceous backshore coal-bearing facies (Mayo and Peterson, 2001).

The Star Point Sandstone thins eastward and merges with the underlying Masuk Member of the Mancos Shale. Three prominent tongues of the Star Point Sandstone inter-finger with the Mancos Shale. These three sandstone members, from top to bottom, are the Spring Canyon, Storrs, and Panther Sandstones. In the Mill Fork Area, the Spring Canyon tongue is approximately 100 feet thick, lies about 80 feet above the Storrs tongue, and consists of massive, fine- to medium-grained sandstone. The Storrs tongue lies about 120 feet above the Panther tongue and consists of 50 feet of soft, friable sandstone. The basal Panther tongue is approximately 100 feet thick and consists of massive, cross-bedded delta front sandstones Mayo and Peterson, 2001).

Even though the Star Point Sandstone exists throughout the entire East Mountain property, the low permeability and lack of recharge limit its usefulness as a water producing aquifer. Permeability and the limiting factors of recharge, i.e., very little outcrop exposure and limited vertical groundwater migration caused by the mudstone layers of the North Horn and Blackhawk formations, will be discussed in detail in the section entitled REGIONAL GROUNDWATER CHARACTERISTICS. Locally, the Star Point Sandstone exhibits aquifer characteristics. These are isolated occurrences where regional faults have created secondary permeability and have been intersected by major canyons with perennial streams. An example is Little Bear spring located in Huntington Canyon.

The Blackhawk Formation consists of alternating mudstones, siltstones, sandstones, and coal. Although coal is generally found throughout the Blackhawk Formation, the economic seams are

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

restricted to the lower 150 feet of the formation. The total thickness of the Blackhawk Formation in the East Mountain area is about 750 feet.

The upper portion of the Blackhawk Formation was deposited in an alluvial-plain/suspended-load fluvial channel environment (Mayo and Peterson, 2001). In these delta and flood-plain environments layers of mud are more abundant than channel sands. Sandstone channels are generally isolated from each other both laterally and vertically by mud-rich overbank and inter-fluvial rocks (Galloway, 1977). The upper portion of the Blackhawk Formation also contains some thin carbonaceous shale layers and thin coal seams that are not of economic interest.

The lower portion of the Blackhawk Formation contains the mineable coal deposits and consists of more thinly bedded sandstone and shale layers (Johnson, 1978). The coal-bearing units of the lower Blackhawk Formation overlie and are laterally juxtaposed to marine shoreface sandstones of the Blackhawk Formation and Star Point Sandstone (Mayo and Peterson, 2001). On a large scale, these sandstone bodies are laterally continuous but terminate abruptly into the mud- and organic-rich backshore faces in a landward direction (Van Wagoner and others, 1990). However, individual rock layers are lenticular and discontinuous, with abundant shaley interbeds. The fine to medium grained sandstones occur as thin- to massively-bedded paleochannel deposits. The paleochannels increase in frequency, thickness, and lateral extent upward in the formation. There is also a vertical repetition of erosional scours within the upper sandstones (Marley, 1979).

The Castlegate Sandstone, the lower member of the Price River Formation, generally caps the escarpment which surrounds the eastern limit of the property. The Castlegate Sandstone consists of approximately 250 to 350 feet of coarse-grained, light gray, fluvial sandstones; pebble conglomerates; and subordinate zones of mudstones.

The formation was deposited from bed-load fluvial channel systems. The Castlegate Sandstone is made up of coarse-grained, often conglomeratic, fluvial sandstone. Thin inter-beds of siltstone and claystone occur in lower portion the formation. Sandstone dominates over mudstone and individual sand channels may be thin, wide, or interpenetrating. Although the primary porosity is high, the existence of mudstone drapes and pervasive carbonate and silica cement greatly reduces the overall porosity (Mayo and Peterson, 2001, Appendix B).

The Upper Price River Formation, which overlies the Castlegate Sandstone, is about 350 feet thick and forms steep slopes which extend upward from the Castlegate Sandstone.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas &

The Price River Formation was deposited from mixed-load fluvial channel systems that have sandstone/mudstone ratios intermediate between bed-load and suspended-load channel systems (Mayo and Peterson, 2001). Sandstones and mudstones occur in about equal proportions. Point bars that develop in this type of system are larger than those in suspended-load channel systems. Mudstone drapes created during low flow stages of the active fluvial system separate the sandstones from each other both horizontally and vertically (Mayo and Peterson, 2001).

The North Horn Formation forms the cap rock for much of East and Trail mountains where the Flagstaff Limestone has been eroded away. Mudstones dominate the rock types present and are generally gray, light brown, to purple in color. Localized, lenticular sandstone channels are present throughout the formation. The sandstone beds are more common near the upper and lower contacts of the formation. The North Horn Formation is approximately 850 to 1,000 feet thick in the Mill Fork Area.

The North Horn Formation was deposited in an alluvial-plain/suspended-load fluvial channel environment (Mayo and Peterson, 2001, Appendix B). In such environments layers of mud are more abundant than sands, which occur in sandstone channels. The sandstone channels are generally isolated from each other, both laterally and vertically, by mud-rich overbank and inter-fluvial rocks (Galloway, 1977). In the study area the formation consists primarily of shale with discontinuous sandstone channels, minor lenses of limestone, and conglomerate. Highly bentonitic mudstones, which swell when wetted, are common in the lower two-thirds of the formation.

The Flagstaff Limestone caps the uppermost portions of East Mountain is the youngest formation exposed in the Mill Fork Area. It typically forms small exposures on top of the plateau. A thickness of 105 feet was measured on Trail Mountain immediately south of the study area (Davis and Doelling, 1977). Maximum thickness in the Mill Fork Area is approximately 80-100 feet.

The Flagstaff Limestone consists of carbonates, marls, and some thin sandstone stringers deposited in lacustrine, marginal lacustrine, and alluvial plain depositional environments (Garner and Morris, 1996). It primarily consists of light- to medium-gray colored limestone containing abundant secondary fractures produced during uplift and subaerial exposure (Mayo and Peterson, 2001, Appendix B).

Regional Groundwater Characteristics

Waters entering the groundwater system are mostly from snow melt. The amount of water which enters the groundwater system is highly variable from one site to another. The low surface relief

INCORPORATED

AUG 1 / 2013

Div. of Oil, Gas

on the top of East Mountain encourages the infiltration of melting snow. Conversely, the many areas with steep slopes have a much more limited infiltration opportunity. All of the geologic formations which surface in the area have relatively low permeability which further reduces the amount of water entering the groundwater system. Probably less than five percent of the annual precipitation recharges the groundwater supply (Price and Arnow, 1974; U. S. Geological Survey, 1979).

Geology controls the movement of groundwater. Because of the low permeability of the consolidated sedimentary rocks in the East Mountain area, groundwater movement is primarily "through fractures, through openings between beds, and, in the case of the Flagstaff Limestone, through solution openings" (Danielson et al., 1981, p. 25).

The majority of the groundwater which infiltrates the Flagstaff Limestone flows down vertical fractures which intersect sandstone channel systems in the North Horn Formation. The majority of the groundwater reaching this point intersects the surface in springs located in the North Horn Formation. Very little recharge intersects the Price River Formation and Castlegate Sandstone; consequently, they are not water saturated where intersected in the numerous drill holes penetrating those units. The remaining water then flows downdip (to the southeast) from the northern reaches of East Mountain until it discharges in the form of springs.

Data have been collected from numerous coal exploration drill holes, from within the adjacent mine workings, from surface drainages, and from the springs in the area. The data have identified two separate isolated aquifer systems on the East Mountain property; the first is localized perched water tables in the North Horn and the Price River formations, and the second is a combination of localized perched water tables in the Blackhawk Formation and the Star Point Sandstone which exhibits some limited potential as a regional aquifer. Stratigraphy is the main controlling factor restricting groundwater movement and development of regional and perched aquifer systems within the East Mountain property. The following is a description of the various formations and how they influence the groundwater systems. The description is in descending order, which parallels the general groundwater flow.

Flagstaff Limestone

This formation displays a strong joint pattern which permits good groundwater movement both vertically and horizontally through the formation. Exposures of the Flagstaff Limestone are limited to a narrow north-south trending ridge located in the western half of the Mill Fork Area.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas &

North Horn Formation

This formation is comprised of a variety of rock types which range from highly calcareous sandstone to mudstone. Its permeability is variable.

Lenticular sandstone channels are oftentimes present in the upper and lower portions of the formation. Water which percolates down fractures from the overlying Flagstaff Limestone works its way into the sandstones, forming the perched water tables. The actual lateral extent, or correlation, between the perched water tables has not been identified; and it is not practical to do so because the tables are limited in extent and variable in stratigraphic location. Many springs have been identified where the sandstone channels intersect the land surface.

The lower two thirds (upper Cretaceous in age) of the formation is generally highly bentonitic mudstone which is impermeable. It is likely that this material is acting as an aquiclude, preventing adequate recharge from reaching the Upper Price River Formation or Castlegate Sandstone below. The mudstones present swell when they come in contact with water. Therefore, vertical migration of water along fractures through this material is limited because the fractures are sealed by the swelling clays.

The depth of the aquifers in the North Horn Formation is variable due to the rugged topography. The localized perched water tables may either intersect the surface of the ground or be covered by as much as 1,000 feet of overburden. They are located at least 1,400 feet above the coal seam to be mined. Communication of water between the perched aquifers in the North Horn Formation and the water flowing into the mine is limited in quantity and occurs very slowly. The monitoring of the numerous springs located on East Mountain gives PacifiCorp the ability to assess any effects that mining might have on the North Horn Formation perched aquifers.

With the data available it is not possible to compile a piezometric map of the waterbearing strata in the North Horn Formation because the channels are discontinuous and not interconnected.

Upper Price River Formation

The Upper Price River Formation is comprised predominantly of sandstone but commonly contains mudstone beds between the point bar deposits. It is generally devoid of water because it lacks adequate recharge.

Castlegate Sandstone

INCORPORATED

AUG 1 / 2018

Div. of Oil, Gas & Mining

The formation is thought to be fairly permeable but, where it has been intersected by drill holes, has never been found to be water saturated. It is often dry or slightly damp in some zones. It is devoid of significant water because it lacks.

Blackhawk Formation

The Blackhawk Formation contains only perched or limited aquifers which exist within the strata overlying the coal seams and the upper portion of the Star Point Sandstone Formation. The perched aquifers exist as fluvial channels (ancient river systems) which overlie and scour into the underlying strata. Channel systems were part of a deltaic depositional setting active during and after the coal forming peat accumulation. The largest influx of water encountered during the mining process occurs beneath the fluvial channels. The sandstone channels are mainly composed of a fine to medium grained sand with similar characteristics to the Star Point Sandstone Formation. The semi-permeable and porous nature of the channels allows an effective route for water transport. Other constituents of the Blackhawk Formation (i.e., non-permeable mudstone, carbonaceous mudstone, coal seams, and inter-bedded mudstones/siltstones and sandstones) generally act as aquicludes which impede vertical groundwater flow to the lower stratigraphic units. In areas other than where faulting and fracturing have created secondary permeability, the migration of water from the perched aquifers-sandstone channel systems of the Blackhawk Formation to the Star Point Sandstone Formation is limited. Extensive mining in the Cottonwood/Wilberg complex, which produces coal from the Hiawatha seam, is stratigraphically located directly on top of the upper member of the Star Point Sandstone. Only minor quantities of groundwater have been produced from the Star Point Sandstone. The coal seams of the Blackhawk Formation are effective in impeding vertical groundwater movement. In many areas in the adjacent mines where roof coal was left in place because of abundant thickness or as an additional effort to support the immediate roof, production of groundwater occurred only when roof support was installed or when a roof failure occurred exposing the overlying sandstone channel systems. Listed below are hydrologic characteristics of individual rock types reported by the USGS, Open File 84067.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Lithology: Sh, shale; Slt, siltstone; Ss, sandstone; f, fine grained; m, medium grained.
Hydraulic Conductivity: I, impermeable to water even at pressures of 5,000 pounds per square inch (psi).

				Hydraulic Conductivity (feet per day)	
Geologic Unit	Lithology	Depth below land surface	Porosity %	Horizontal	Vertical
Blackhawk Formation	Ss, f	1,521	14	1.5x10-2	3.7x10-3
	Slt	1,545	3	9.3x10-8	1.2x10-7
	Sh	1,786	2	I	I
	Ss, f	1,792	14	1.1x10-2	3.9x10-3
	Sh	2,170	4	1.1x10-8	---
	Slt	2,265	2	2.0x10-7	2.2x10-6
Star Point Sandstone	Ss, m	2,466	17	3.1x10-2	1.1x10-2
	Ss,	2,493	11	1.5x10-2	6.6x10-3

In the adjacent Cottonwood and Deer Creek mines, the majority of the water flowing into the mines comes from within the limited fluvial channel aquifers; however, water is also transmitted into the mine workings by way of faults, joints or fractures, and in-mine drill holes. Many locations within the mines have been monitored in the past, but a limited number of accessible long term water monitoring locations now exists because most water-producing areas of the mines are dewatered and stop flowing shortly after initial mining in the area.

In several locations in the Deer Creek and Wilberg/Cottonwood mines, such as retreated longwall panels, water is being produced but cannot be measured because the workings are inaccessible. The water entering these areas flows into numerous low areas in the mine which act as temporary sumps. The water is then pumped to the main sump located near the mine portal. Because the pumping system in the mine is ever changing (i.e., portable pumps being moved to various locations within the mine as the need arises), it is not possible to collect meaningful data from specific areas of the mine that can be compared with data collected from years or even months past.

Based on data from the adjacent mines, several observations have been made concerning the Blackhawk water-bearing strata. The sandstone, which is semi-permeable and porous, affords an effective route of water transport; while relatively impervious shale in the Blackhawk Formation prevents significant downward movement of the percolating water. Of the water-producing areas, those closest to the active mining face exhibit the greatest flows. As mining advances the area adjacent to the active face continues to be

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

excessively wet, and previously mined wet areas experience a decrease in flow. It appears that the water source is being dewatered since mined out areas of the mine do not continue to produce water indefinitely. The water source must be either of limited extent, e.g., a perched aquifer, or have a limited recharge capacity. In an attempt to quantitatively evaluate saturated sandstone channels, a dripping channel in the 6th West area of the Deer Creek Mine was investigated. The channel, located near a minor fault with very limited displacement, has the dimensions of >2,000 feet in length, 150 feet in width and a maximum thickness of 25 feet. An array of uphole monitoring wells was installed across the width of the channel. The wells were 15 to 25 feet deep and were open along their entire depth. Each well was equipped with a shutoff valve and pressure gauge. The idea was to conduct a pump test by letting selected wells gravity drain and simultaneously measuring pressure change in nearby wells. Because a maximum of about 2 psi was recorded in the well (i.e. (5 feet of water) we were unable to conduct the test. What the well did demonstrate was that the sandstone channel was not fully saturated and it was a perched, unconfined groundwater system.

Although much of the water transfer within the Blackhawk Formation is through fractures or faults, data indicate that recharge to the Blackhawk is limited because of the above confining formations and many of the fractures become sealed by swelling bentonitic clays which stop or limit the water transfer, confirmation of which exists along the numerous faults and fractures over the area. A measurable flow of water along a fault existed at only one location in the Wilberg/Cottonwood Mine - along the Pleasant Valley Fault in Main West, Wilberg. This location produced an estimated average flow of 5 gpm from the time it was encountered to 1980 when the flow stopped. The fractures sealed readily because of the ability of the shaley layers to swell and decompose to form an impervious clay, preventing significant downward percolation, collection, or conveyance of water along faults in the Blackhawk Formation.

Significant quantities of groundwater were also encountered in the Deer Creek Mine, 4th South area, where development entries intersected fractures/faults associated with the Roans Canyon Fault system. As with other areas where groundwater has been intercepted, the flow from the 4th South/2nd Right area has decreased rapidly, from approximately 2000 gpm in March 1990 to approximately 120 gpm in December 1990. Exploratory drilling was utilized in the development entries to locate and map the extent of the water producing fracture. The water producing zone was isolated utilizing an inflatable packer and a pressure gauge was installed to monitor the head differential. Pressure readings recorded were similar to those of Roans Canyon Fault crossing at 3rd North, with readings varying from 80-90 pounds per inch. This calculates out to approximately 200 feet of head. The amount of overburden in the area where the water

INCORPORATED
AUG 17 2018
Div. of Oil, Gas

producing fracture was encountered is approximately 1800-2000 feet. In reviewing the dewatering curve and the initial head differential, groundwater produced from the interception of the water producing fracture was a function of storage and recharge to the fault is limited. To monitor the potential impact of mine dewatering, PacifiCorp installed a series of wells in both the Deer Creek and Cottonwood/Wilberg mines (refer to Volume 9 Hydrologic Section Maps HM-2 and HM-3). These wells were incorporated in the hydrologic monitoring program in 1989. Well development information was detailed in the 1989 Annual Hydrologic Monitoring Report and in Volume 9 - Hydrologic Support Information). Only the wells in the Deer Creek Mine along the axis of the Straight Canyon Syncline revealed a change which could possibly be related to mine dewatering. In addition to the in-mine monitoring PacifiCorp installed a series of surface wells to monitor the potential impacts in Cottonwood Canyon located to the south of Mill Fork and in Rilda Canyon located to the east of Mill Fork. To evaluate the effects on the surface springs and surface drainage systems PacifiCorp maintains an extensive monitoring program. Data collected will be reported annually in the Hydrologic Monitoring reports.

Long-term water producing areas do exist within the current mine workings. Four types of occurrences have been recognized and will be monitored by the applicant and include 1) structural rolls with overlying fluvial channels, 2) Pleasant Valley and Roans Canyon Fault systems, 3) fractures and joints (lineaments), and 4) surface and in-mine drill holes.

Star Point Sandstone

The Star Point Sandstone overlies and inter-tongues with the Masuk Shale. The formation is approximately 350 to 400 feet in thickness and consists of at least three upward coarsening sandstone units. Mudstone units of the Masuk Shale are present above the lower two sandstone members of the Star Point Sandstone due to the inter-fingering nature of the contact between the two units.

The Star Point Sandstone, which immediately underlies the Hiawatha Coal Seam, exhibits some characteristics of an aquifer but experiences little recharge. Studies conducted by the USGS indicate that the Star Point Sandstone is of low permeability, thus limiting its usefulness as a water-producing aquifer. Most of the water discharge from the Star Point Sandstone is where it has been intersected by the major canyons in the plateau or where faulting has caused secondary permeability. This, plus the fact that the Star Point Sandstone is only slightly to moderately permeable, allows only limited flow of groundwater through the formation. Drill holes completed in the Deer Creek, Wilberg/Cottonwood and Genwal mines have defined the piezometric gradient in the lower Blackhawk/Star Point Sandstone system in isolated areas and confirmed the

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

groundwater flow conforms with the topographic relief and structural features, i.e., regional dip, Straight Canyon Syncline, and regional faulting.

The overall pattern of groundwater flow and surface water-groundwater interactions in the Mill Fork Area and adjacent areas can be described by a fairly simple conceptual model involving both active and inactive groundwater flow regimes (Mayo and Morris, 2000). Inactive zone groundwater systems contain old groundwater (i.e. 2,000 to 19,000 radiocarbon years), have very limited hydraulic communication with the surface and with other active groundwater flow systems, and are not influenced by either annual recharge events or short term climatic variability as evidenced by the decline in roof drip rates and lack of fluctuations of in-mine monitoring wells.

Solute chemistry in the Spring Canyon Member is not uniform beneath existing mines suggesting that there is a partitioning of groundwater systems in the member. This condition is likely the result of inter-bedded lower-permeability layers in the Star Point Sandstone which partition individual sandstone bodies. These findings are substantiated by monitoring well data from 6 wells in the Trail and East Mountain areas and are significant in that they strongly suggest that the Spring Canyon Member does not act as a single regionally continuous aquifer, but rather it supports a series of smaller, discrete groundwater systems.

Water in most of the Blackhawk/Star Point aquifer is confined under pressure between shale and siltstone beds within the aquifer (USGS, Lines, Open File Report 84067). Water is released from storage from confined aquifers mainly by compression of the sandstones and less permeable, confining beds as pressure in the aquifer declines. The quantity of water that can be released from storage is dependent on the storage coefficient, which is about 1x10-6 per foot of thickness for most confined aquifers (USGS Lines, Open File Report 84067). Data collected by PacifiCorp on the Roans Canyon Fault System in 1988, 3rd North fault crossing, confirmed the USGS storage coefficient estimations, with values ranging from 1.6x10-4 to 7.0x10-6. Transmissivity values computed for pump tests conducted by the USGS on Trail Mountain on semi-penetrating wells in the Blackhawk/Star Point aquifer ranged from 0.7 to 100 ft^2/day with a majority of the two results ranging from 1 to 10 ft^2/day. The computed transmissivity of 100 ft^2/day was greater than the laboratory data (listed early in this section) and was believed to be due to secondary permeability in the form of fractures. Transmissivity results ranging from 0.7 to 10 ft^2/day are indicative of the low permeability rock in most of the Cretaceous and Tertiary strata within the Wasatch Plateau.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas

Structural Hydrologic Features

Several important structural features, the Straight Canyon Syncline, Flat Canyon Anticline and Huntington Anticline, the Roans Canyon Fault Graben, Mill Fork Fault Graben, Left Fork Fault Graben, Pleasant Valley Fault, and the Deer Creek Fault, have been identified adjacent to and within the Mill Fork Area.

Folding:

Strata in the Mill Fork area are gently folded in two broad structural features. The Flat Canyon Anticline crosses the southeastern portion of the lease area. This anticline trends southwest to northeast, and plunges to the southwest. Dips in the anticline range from two to six degrees with the south limb dipping the steepest.

To the north, the north limb of the Flat Canyon Anticline becomes the south limb of the Crandall Canyon Syncline, a flat-bottomed syncline. This syncline also trends southwest to northeast. Dips on the northwest side are much steeper than on the southeast side.

Faulting:

The only known fault within the Mill Fork Area is the Joes Valley Fault, which forms the western limit of the coal reserves in this area. The Joes Valley Fault is the largest and most prominent of several north south trending fault zones within the Wasatch Plateau coal field. Displacement of the fault is approximately 1,500 feet, downthrown on the western side. The fault creates a continuous north-south escarpment on the east side of Joes Valley. Several side canyons are cut into this escarpment on the western side of the lease area, all of which drain into Joes Valley. The fault zone itself is not visible along this escarpment, but the fault has been intercepted underground in the Genwal Mine to the north. Where the fault has been intercepted in the Genwal mine workings, a drag fold is present, indicated by a gentle downward folding of the strata along the fault zone, extending for a few hundred feet to the east of the fault.

The nearest known faulting outside of the lease area is the Mill Fork fault graben. The Mill Fork fault graben passes to the southeast of the lease area. This fault graben was crossed in ARCO's Huntington Canyon #4 Mine in Mill Fork Canyon and has a displacement of about twenty five (25) feet on the each side. The trend of this fault zone is approximately N 40° E. Based on projections from maps of #4 Mine, this graben should pass by the southeast corner of the lease area, between the Mill Fork lease and the existing Deer Creek Mine. Where it crosses the northern end of East Mountain, the fault has been mapped to have a displacement of thirty (30) feet down on the northwest side. Deer Creek mine workings have not intercepted this fault zone and exploration drilling in

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

the right fork of Rilda canyon does not show any displacement, indicating that the displacement of the fault zone is too small to measure with exploration drilling, or that it has disappeared in this area. This fault zone does not appear in any surface outcrops.

Springs and Seeps

Prior to coal leasing, lands administrated by the United States Forest Service require sufficient environmental baseline data to be analyzed during the National Environmental Protection Act (NEPA) analysis process. In preparation for coal leasing through the lease-by-application process, Genwal Resources conducted baseline spring and seep surveys from 1994-1996 (northern portions of the lease were surveyed in 1989-90). Data collected by Genwal Resources was determined by the Forest Service to meet the requirements of the Data Adequacy Standards. Information submitted to the Forest Service included: location, flow and quality (data indicates general trends, date of collection generalized and quality limited to field data). With PacifiCorp's acquisition of the Mill Fork State Coal Lease (reverted to the BLM on August 1, 2011 and designated as federal lease UTU-88554), a complete re-evaluation of groundwater resources was initiated in 2000 and continued through 2002. Evaluation of the data revealed similar geologic occurrences to the southern portion of East Mountain, (majority of the groundwater resources discharge from the North Horn Formation in a down-dip configuration), which has been monitored by PacifiCorp for more than thirty years. The water reconnaissance program of the Mill Fork Area was initiated with an aerial survey via helicopter. During the reconnaissance survey, previous baseline survey data was evaluated for field location accuracy. Based upon initial observations, PacifiCorp commenced a field program in 2000 to completely map, field mark and photograph each groundwater source. Previous baseline studies were utilized as a guide of potential groundwater resources. The entire area of the Mill Fork Area (including leases UTU-88554 and UTU-84285) and adjacent area was traversed. During the field reconnaissance process, when water resources were encountered, they were tracked to the source. At the sources, the sites were located utilizing GPS surveying techniques (GPS - equipment: Trimble Asset Surveyor, differentially corrected, horizontal accuracy sub-meter), digitally photographed, field marked with a brass tag and measurements were taken of flow and temperature. PacifiCorp retained identification system established during the previous surveys, except for the Joes Valley area and Mill Fork Ridge. In these two areas, several springs were labeled with multiple tags of different numbers and separate springs were labeled the same identification. In addition to the field measurements, PacifiCorp collected baseline water quality samples. Not all sites were sampled, collection of water quality samples were restricted to sites where representative samples could be obtained. At selected sites, springs were also sampled for isotopic data. These sites were selected based on geographic location, geologic formation, and occurrence.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas &

During the 2000-2002 baseline evaluation, a total of 198 springs were identified within and adjacent to the Mill Fork Area. Each spring site on East Mountain has been studied to determine the geologic circumstances that cause the springs to occur. The mode of occurrence for each spring has been tabulated on the "Springs Geologic Conditions Inventory" sheets included in the Deer Creek Mine MRP. The springs on East Mountain originate in several different ways; however, many springs share the same mode of occurrence and, in some cases, are related.

The most frequent occurrences of springs are those located about 150 to 350 feet below the top of the North Horn Formation. Field observations along with drill hole data show a predominance of fluvial siltstone and sandstone at that stratigraphic interval. These sedimentary rocks represent many isolated fluvial systems which are water-bearing. The springs are formed where the fluvial channels intersect the land surface. Because the fluvial channels within this zone are generally not interconnected, the springs are not interrelated but share the same mode of occurrence.

Numerous springs located in the lower portion of the North Horn Formation occur when water flowing through fluvial sandstones which are underlain by a thin zone of impervious mudstone at the base of the North Horn Formation intersects the land surface. Field observations along with drill hole data indicate that impervious mudstone units occur at the upper and lower portion of the North Horn Formation. Even though these individual mudstone layers are discontinuous, the occurrence of this type of strata exists throughout the East Mountain Property. The springs related to this mode of occurrence are not generally interrelated because they are fed by waters flowing through isolated fluvial channel sandstones and siltstones.

Numerous springs are located along and within the Joes Valley Graben. Generally, the springs are located within the North Horn Formation (Bald Mountain Ridge located west of the Mill Fork Area) along the fault zone and the alluvial valley deposits. Many of the largest springs surveyed for the Mill Fork Area are located along this fault system west of the Mill Fork Area. The springs located along this fault zone are generally interrelated.

A few springs are located within both the Flagstaff and Price River formations; however, their occurrence is insignificant in comparison to springs located in the North Horn Formation.

Generally springs with discharges exceeding 50 gpm are associated with faulting where permeability has been increased by fracturing (example: Bald Ridge area). The discharge of the springs varies directly with the amount of precipitation and also varies seasonally. Discharge is greatest during the snow melt period, normally from late April through the month of June. Following periods of groundwater recharge the discharge recedes fairly rapidly at first, then

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

gradually, indicating a double porosity effect. At the end of the water year, the remaining discharge is only twenty to thirty percent (20-30%) of the peak discharge. Seasonal flow variation collected for the Mill Fork Area compares directly to the data collected for the southern portion of East Mountain and data collected by Genwal resources to the north.

The following table provides a breakdown of spring locations by geologic formation and surface drainage:

MILL FORK PERMIT AREA (Energy West 2000-2002 Surveys) SPRINGS by GEOLOGIC FORMATION and SURFACE DRAINAGE						
Drainage System	Geologic Formation					
	Alluvium	Flagstaff	North Horn	Upper Price River	Castle Gate	Blackhawk
Huntington Drainage						
Crandall Canyon	0	0	0	7	1	0
Mill Fork Canyon	0	0	44	10	1	5
Right Fork of Rilda Canyon	0	1	39	1	0	0
Cottonwood Drainage						
Un-Named Drainages of Joes Valley	35		29	19	6	0
Total Number of Springs = 198						

Groundwater Quality

Groundwater chemical quality is very good in strata above the Mancos Shale. The USGS reported a range in dissolved solids from 50 to 750 mg/l for samples from 140 springs in the region issuing from the Star Point Sandstone Formation and overlying formations (Danielson et al., 1981). During the Energy West 2000 - 2002 seep and spring surveys, a total of one hundred twenty-nine (129) samples were collected with a range of dissolved solids from 207 to 390 mg/l. Danielson et al. (1981) identified the regional trends of decreasing water quality from north to south and west to east across the Wasatch Plateau. Waters percolating through the underlying

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Mancos Shale quickly deteriorate, with total dissolved solids concentrations frequently exceeding 3000 mg/l.

Additional studies by PacifiCorp have confirmed the primary findings of the USGS concerning regional trends in quality. Originally, decreasing quality from north to south was believed to depict the groundwater flow direction, and the quality decreased as a function of the time it traveled through the strata. Although the time travel component is probably an important factor, in 1985 a surface exploration program identified the existence of an area of residual heat from an ancient burn on the outcrop throughout the southern extreme of East Mountain. The high temperature was also explored within the mine and a portion of reserves were lost because of the situation. It is now theorized that the high temperature water dissolved the mineral constituents of the formations, thereby altering the water chemistry. The quality also decreases vertically downward because of the influence of marine sediments along with the trend of decreasing quality from north to south.

An examination of the data indicates that a relationship exists between elevation and the total dissolved solids concentration of the springs. The data indicate that concentrations of dissolved materials increase with diminishing elevation for both surface streams and springs. The change in quality is a function of the differences in the chemical character of geologic formations which outcrop at different elevations.

To more closely identify springs which are related, water samples are analyzed to determine the percentage of cations and anions in solution. The purpose of the diagrams is to identify groups of related springs by water chemistry. The diagrams clearly show the similarity of water quality of springs originating in the same geologic formation. Historical data from PacifiCorp's on-going East Mountain Hydrologic Program has demonstrated is that, even though the quality varies slightly from individual sites as well as from different formations, seasonal variations do not exist. Data collected in 2000-2001 confirms the trends historical in data collected for southern East Mountain, i.e., despite the seasonal variability in discharge rates, the solute concentrations of active region ground waters do not exhibit significant seasonal variability.

PacifiCorp began in-mine quality monitoring in 1977 (Cottonwood/Wilberg and Deer Creek mines). With the collection of numerous samples throughout the extent of the mine workings, the quality has remained relatively constant. As with the springs the quality varies from individual sites, but quality from the individual sites remains constant versus time.

The predominant dissolved chemical constituents of the groundwater from both surface springs and samples collected in the mine are calcium, bicarbonate, magnesium, and sulfate.

UNCORRECTED

AUG 17 2018

Div. of Oil, Gas & Mining

Concentrations of magnesium are normally about one-half the concentration of calcium. Sulfate concentrations are typically higher in water from springs issuing from the Star Point Sandstone-Blackhawk aquifer zone or confined aquifers intersected by mine workings. As mentioned earlier, water quality degrades from the north to the south and also vertically.

PacifiCorp contracted Mayo & Associates in 1996 to conduct comprehensive study to characterize the hydrology and hydrogeology of the East and Trail Mountains. The hydrogeology of the PacifiCorp leases were evaluated by analyzing: 1) solute and isotopic composition of surface and ground waters, 2) surface and groundwater discharge data, 3) piezometric data, and 4) geologic information. The following lists the key points and conclusions from the 1996 study:

Conclusions from the 1996 Mayo & Associates Hydrologic Investigation

1. The $\delta 2H$ and $\delta 18O$ compositions demonstrate that all ground waters are of meteoric origin (i.e. snow and rain).
2. Active and inactive groundwater regimes occur in the mine lease area.
3. The active regime includes alluvial groundwater, groundwater in the Flagstaff Formation, and all near surface exposures of the other bedrock formations except, perhaps, the Mancos Shale. The near surface extends about 500 to 1,000 feet into cliff faces. Ground waters in the active regime contain abundant 3H and anthropogenic 14C.
4. Comparison of long-term discharge hydrographs with precipitation records demonstrates that active regime ground waters: 1) are in direct hydraulic communication with the surface, 2) are recharged by modern precipitation, and 3) have large fluctuations in spring discharge rates which can be attributed to seasonal and climatic variability. High-flow/low-flow discharge rates vary as greatly as 600 gpm to nearly dry; however, most high flow rates are less than 50 gpm.
5. Despite the seasonal variability in discharge rates, the solute concentrations of active region ground waters do not exhibit significant seasonal variability.
6. The inactive regime includes groundwater in sandstone channels in the North Horn, Price River, and Blackhawk Formations which are not in direct hydraulic communication with the surface (i.e. greater than about 500 to 1,000 feet from cliff faces). Mine workings are largely part of the inactive regime. The sandstone channels are vertically and horizontally isolated from each other and when encountered in mine workings are usually drained quickly. Coal seams are hydraulic barriers to groundwater flow. The blanket sands of the Star Point Sandstone are also largely in the inactive zone. Except where exposed near cliff faces, faults encountered in mine workings are part of the inactive regime. Except

INCORPORATED

AUG 17 2018

Div. of Oil, Gas ing

near cliff faces, faults are not conduits for vertical hydraulic communication between otherwise hydraulically isolated pockets of groundwater.

7. Inactive region groundwater systems contain old groundwater (i.e. 2,000 to 12,000 years), and are not influenced by annual recharge events or short term climatic variability.
8. In-mine inactive regime ground waters occur in nearly stagnant, isolated zones which have extremely limited hydraulic communication with other inactive regime ground waters in the vicinity of mine workings and with near-surface active regime ground waters as evidenced by the following:

    a) Ground waters discharging into mine openings have 14C ages ranging from 2,000 to 12,000 years
    b) Roof drip rates rapidly decline when water is encountered in the mine indicating that the saturated zone above the coal seam is not hydraulically continuous and has a limited vertical and horizontal extent.
    c) Unsaturated conditions have been identified in boreholes drilled vertically into sandstone channels located above coal seams.

9. The fact that inactive region ground waters encountered in mine openings do not have an infinite age means that, at some time, there has been some hydraulic communication with the surface. This communication is extremely limited as illustrated by calculated steady state recharge-discharge rates of faults and sandstone channels in the inactive zone which range from 0.001 to 1.23 gpm.
10. Groundwater in the Star Point Sandstone is part of the inactive regime as evidenced by the 6,000 year 14C age of the sample from well TM-3. In the down dip direction along the axis of the Straight Canyon Syncline, potentiometric pressures in the Spring Canyon member results in upwelling of groundwater into Hiawatha seam mine openings. Such upwelling may locally reduce the pressure in the Spring Canyon member.
11. Aerially extensive groundwater regimes in the lower Blackhawk Formation and Star Point Sandstone do not exist within the lease area. Therefore, it is not meaningful to create piezometric surface maps of these systems.
12. Stream flow is dependent on snow melt, precipitation and thunderstorm activity. There is no apparent hydraulic communication between stream flow and groundwater encountered in mine openings.
13. The groundwater discharging into the Rilda Canyon alluvial collection system is of modern origin and is closely tied to seasonal recharge. This is evidenced by its modern radiocarbon and 3H contents and by the discharge hydrographs. The alluvial groundwater is not related to the groundwater encountered in the mines.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

14. The groundwater discharging in Cottonwood Canyon near Cottonwood Spring and Roans Spring discharges from glacial deposits and is of modern origin. The radiocarbon and 3H contents of this water indicate a modern origin. The water in the shallow glacial deposits is not related to the groundwater encountered in the mines.

In addition to the study conducted in 1996, Mayo & Associates were retained in 2000 to investigate hydrologic resources of the Mill Fork Area and adjacent areas. The purpose of this investigation is to 1) characterize the groundwater and surface water systems in the Mill Fork Area, and 2) determine the probable hydrologic consequences of underground coal mining to surface waters and ground waters within the Mill Fork Area. The hydrology and hydrogeology of the Mill Fork Area area have been evaluated by analyzing: 1) solute and isotopic compositions of surface waters and ground waters, 2) surface water and groundwater discharge data, 3) piezometric data, and 4) geologic information (refer to Appendix B for complete details).

Chemical Evolution of Groundwater (excerpt from Mayo & Associates Study)

a. Chemical Reactions

Solute compositions of groundwaters are the result of interactions between groundwater and bedrock lithology and between groundwater and atmospheric and soil gases. The general reactions responsible for the chemical evolution of groundwaters in the vicinity of the study area and inside the coal mines are described below:

Groundwater acquires most of its CO2(g) in the soil zone where the partial pressure of CO2 greatly exceeds atmospheric levels. This CO2 combines with water to form carbonic acid according to

$$CO2(g) + H2O = H2CO3 \quad (1)$$

Carbonic acid dissociates into H+ and HCO3- as

$$H2CO3 = HCO3^- + H+ \quad (2)$$

The H+ ions temporarily decrease the pH of the water but are quickly consumed by the dissolution of carbonate minerals that are abundant in the soil zone and in most aquifers. Carbonate mineral dissolution is represented as

$$2H+ + CaMg(CO3)2 = Ca2+ + Mg2+ + 2HCO3^-, \text{ and} \quad (3)$$
(dolomite)

$$H+ + CaCO3 = Ca2+ + HCO3^- \quad (4)$$

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

(calcite)

The net effect of reactions 2 through 4 is to increase the pH and the Ca^{2+}, Mg^{2+}, and HCO_3^- contents of waters. Dissolution of gypsum, which is present in minor amounts in many formations in the region, can elevate the Ca^{2+} and SO_4^{2-} contents in the absence of additional $CO_{2(g)}$ and H^+ according to

$$CaSO_4 \cdot 2H_2O = Ca^{2+} + SO_4^{2-} + 2H_2O \quad (5)$$

(gypsum)

Elevated Na^+ concentrations may result from either the dissolution of halite or from ion exchange on clay particles or on sodium zeolites (Mayo and others, 2000). Halite dissolution will increase the overall solute concentration (i.e. TDS) and will yield equal Na^+ and Cl^- contents when the solute compositions are reported in the meq/l units. Halite is not abundant in the study area. Ion exchange will not directly elevate the overall solute content, but will result in increased Na+ concentrations with corresponding decreases in $Ca2^+$ and/or Mg^{2+} concentrations. Halite dissolution may be represented as

$$NaCl = Na+ + Cl^- \quad (6)$$

And the ion exchange may be represented by reactions involving the sodium zeolite analcime,

$$2NaAlSi_2O_6 \cdot H_2O + Ca2+ = Ca(AlSi_2O_6)2 \cdot H_2O + 2Na^+, \quad (7)$$

$$2NaAlSi_2O_6 \cdot H_2O + Mg^{2+} = Mg(AlSi_2O_6)2 \cdot H_2O + 2Na^+, \quad (8)$$

or clay mineral exchange which may be represented as

$$Ca^{2+} + Na\text{-clay} = 2Na^+ + Ca\text{-clay} \quad (9)$$

$$Mg^{2+} + Na\text{-clay} = 2Na^+ + Mg\text{-clay} \quad (10)$$

Solute Compositions

a. Streams

(1) Crandall Canyon Drainage

Water quality samples taken below the confluence of the north and south forks of Mill Fork Creek have a mean TDS of about 300 mg/l and are of the Ca^2+-Mg^2+-HCO^{3-} type with lesser amounts of SO_4^{2-}. This water includes drainage from the Mill Fork Area as well as the area to the north.

INCORPORATED
AUG 1 / 2013
Div. of Oil, Gas & Mining

(2) Mill Fork Canyon Drainage

Water quality samples taken below the confluence of the north and south forks of Crandall Creek have a mean TDS of about 480 mg/l and are of the Ca^{2+}-Mg^{2+}-HCO_3^- type with lesser amounts of SO_4^{2-}. Most of this water originates in the Mill Fork Area.

(3) Rilda Canyon Drainage

Water quality samples taken below the confluence of the north and south forks of Rilda Creek have a mean TDS of about 400 mg/l and are of the Ca^{2+}-Mg^{2+}-HCO_3^- type. This water is mostly drainage from the Mill Fork Area.

b. Springs

The solute compositions of ground waters from nearly all of the springs in the Mill Fork Area are of similar chemical type. This is seen in the similarity of the shapes of the Stiff diagrams and the clustering of the data points on the Piper plot. All of the springs in the Mill Fork Area for which chemical analyses are available are of the Ca^{2+}-Mg^{2+}-HCO_3^- type with variable amounts of SO_4^{2-}. This chemical type is consistent with the dissolution of carbonate minerals in the presence of soil zone CO_2(gas) according to equations 1-4 above.

Mineral saturation calculations indicate that most of the springs and streams in the study area are at or above saturation with respect to the carbonate minerals calcite and dolomite. What this means is that the chemistry of the spring water is near equilibrium with respect to these minerals, and thus there is not a thermodynamic tendency to dissolve additional carbonate minerals if these are encountered in the groundwater system. Waters with saturation indices less than log = -0.1 have a thermodynamic tendency to dissolve the mineral species should they be encountered in the groundwater system and waters with a saturation indices greater than log = 0.1 have a thermodynamic tendency to precipitate the mineral species.

For additional dissolution of carbonate minerals to occur, an influx of $CO_{2(g)}$ into the groundwater system must occur. Common sources of $CO_{2(g)}$ in this environment include CO_2 produced by root respiration and organic decay in the soil zone and bacteriological processes resulting in the oxidation of CH_4 (methane). No surface or groundwater in the study area is near saturation with respect to gypsum. What this indicates is that, if gypsum is encountered along a waters flow path, dissolution of the gypsum will occur, resulting in elevated Ca^{2+} and SO_4^{2-} concentrations. Groundwater from the Blackhawk Formation and Star Point Sandstone encountered in nearby mine environments is

INCORPORATED
AUG 17 2018
Div. of Oil,

supersaturated with respect to both calcite and dolomite indicating that the water has the thermodynamic tendency to precipitate these minerals.

TDS concentrations of springs in the study area fall in the narrow range of 207 to 390 mg/l. A probability plot of the ordered ranking of the TDS of ground waters collected during the 2000-2001 spring and seep survey indicate a single population with a normal distribution. The fact that all of the Mill Fork Area springs discharging from alluvial systems, the North Horn Formation, Price River Formation, Castlegate Sandstone, and Blackhawk Formation have the same chemical character is of particular significance. In other areas in the Wasatch Plateau, bedrock springs commonly have a broader range of TDS and chemical type, which is related to the bedrock formation from which the springs discharge (Danielson and others, 1981; Mayo and Associates, 1997d; Mayo and Morris, 2000).

The mean TDS for each geologic formation ranges from 253 mg/l in the North Horn Formation to 322 mg/l in the Price River Formation. That there is not a greater variability in TDS, or a greater number of groundwater types represented in the springs in the study area implies that there is not a great deal of variation in the soil zone processes or mineralogy of the matrix of the groundwater systems from which these springs emanate. We believe that the lack of variability in groundwater solute chemistry occurs because the groundwater systems that support springs in the area flush large quantities of groundwater through the thick soil zone and shallow fractured bedrock. Over thousands of years, some of the soluble minerals which were once present in the shallow bedrock and in the soil have been leached away. Because these groundwater systems do not come into contact with rocks deeper in the geologic formations (which vary substantially in their soluble mineral contents) there is little variation in the chemical type of groundwater.

Although there is little variability in the chemical type and TDS of groundwater discharging from springs in the Mill Fork Area, there is considerable variability in the TDS and solute compositions of spring discharge waters and the solute composition of spring discharging from the Blackhawk Formation in the nearby Trail and Cottonwood Mine areas. We interpret the overall greater TDS and degree of chemical variability in the Blackhawk Formation in the Trail and Cottonwood Mine waters as a result of great precipitation variability in the Trail and Cottonwood Mine areas. Except for Joes Valley Alluvium, Mill Fork Area ground waters recharge and discharge from very wet upland areas. Trail and Cottonwood Mine groundwater recharge and discharge from a variety of elevations and recharge domains.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

In-Mine Groundwater

Because the Mill Fork State Lease (now UTU-88554) was a new lease area that did not have existing underground workings, the solute compositions of in-mine groundwater can only be inferred from compositions of in-mine waters in nearby mines. Extensive in-mine samples of Blackhawk Formation roof drip water are available from Energy West's mines which include Cottonwood, Wilberg, Trail Mountain, and Deer Creek. A limited number of in-mine samples from the Star Point Sandstone are also available from the Deer Creek and Cottonwood Mines (Mayo and Associates, 1997d) and from public documents for the Crandall Canyon Mine (Mayo and Associates, 1997a).

(1) Blackhawk Formation

In-mine roof drips from the Blackhawk Formation are of the Ca^{2+}- Mg^{2+} -HCO_3- -SO_4^{2-} type with appreciable amounts of Na^+. These ground waters have elevated TDS contents relative to Blackhawk spring waters in the Mill Fork Area and are generally chemically dissimilar to springs in the Mill Fork Area. The two spring samples from the Deer Creek and Cottonwood Mine areas have similar solute contents as the in-mine samples. Mayo and others (2000) found the elevated TDS in coal mine roof drip water to be the result of a cascading series of chemical reactions involving the oxidation of pyrite which increases the SO_4^{2-} concentration and releases H^+ ions. The H^+ ions are consumed by dissolution of additional carbonate minerals (i.e., calcite and dolomite) elevating the Ca^{2+} and Mg^{2+} contents. In the process acid mine drainage (AMD) is prevented. Ion exchange of Ca^{2+} and Mg^{2+} on the sodium zeolite analcime increases the Na^+ contents. We anticipate similar in-mine processes will occur in the Mill Fork Area.

(2) Spring Canyon Member

The solute chemical composition of groundwater in the Spring Canyon Member beneath existing mine workings is highly variable (Appendix B Table 4). Conductivities range from 500 to 2,287 µS/cm. Ca^{2+} concentrations range from 5.5 to 64 mg/l and Mg2+ concentrations range from 5.1to 41 mg/l. Na^+ concentrations range from 14 to 550.6 mg/l and Cl^- concentrations range from 5.0 to 221.3 mg/l. The large spatial variations in solute chemistry are attributed to the influence of inter-bedded Mancos Shale tongues which are present in some locations and not in others and are known to contain soluble minerals. The variations in Na^+ are likely the result of the presence or absence of clays with ion exchange capacity. Ion exchange commonly results in elevated Na^+ concentrations at the expense of decreased Ca^{2+} or Mg^{2+} concentrations.

That the solute chemistry in the Spring Canyon Member is not uniform beneath existing mines suggests that there is a partitioning of groundwater systems in the member. This

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

condition is likely the result of inter-bedded lower-permeability layers in the Star Point Sandstone which partition individual sandstone bodies. These findings are substantiated by monitoring well data from 6 wells in the Trail and East Mountain areas and are significant in that they strongly suggest that the Spring Canyon Member does not act as a single regionally continuous aquifer, but rather it supports a series of smaller, discrete groundwater systems.

(3) Joes Valley Fault System

Ground waters in the Joes Valley Fault system and associated sympathetic faults and fractures have been observed in the Crandall Canyon Mine. Data from a public domain document (Mayo and Associates, 1997a, c) indicate the water is of the Ca^{2+} -Mg^{2+} - HCO_3^- type. This water type is consistent with the dissolution of carbonate minerals in the presence of soil zone CO_2 (gas). Slightly elevated SO_4^{2-} concentrations are consistent with dissolution of minor amounts of gypsum. The relatively low mean Na+ concentration (3.7 mg/l; 0.17 meq/l) indicates that appreciable ion exchange has not occurred. Na^+ and Cl^- contents, in meq/l, are essentially the same, indicating halite dissolution as the Na^+ source.

δ^2H and $\delta^{18}O$

The δ^2H and $\delta^{18}O$ composition of a water molecule falling as precipitation is determined by the temperature at which nucleation of the water droplet occurs. However, other effects related to the bulk composition of the water vapor phase, such as cloud rainout and orographic effects, also can affect the isotopic composition of precipitation.

The stable isotopic compositions of waters are usually analyzed relative to the Meteoric Water Line (MWL). The MWL is empirically derived from the worldwide plotting locations of coastal zone precipitation and is defined by the equation $\delta^2H = 8\ \delta^2O + 10$). Precipitation that forms under cooler conditions will plot lower (i.e. more negatively) along the MWL than will precipitation that forms under warmer conditions.

Except for unusual conditions such as geothermal heating above about 100°C, the δ^2H and $\delta^{18}O$ composition of a groundwater is set at the time of recharge and is not affected by subsurface conditions such as groundwater residence time and mineral dissolution and precipitation reactions. In other words, the recharge and flow history of a groundwater can be evaluated independently of the solute content of the water using stable isotopic compositions.

INCORPORATED
AUG 1 / 2018
Div. of Oil, Gas & Mining

All ground waters in the study area plot near the meteoric water line indicating a meteoric recharge origin (i.e. rain and snow).

Based on their stable isotopic compositions, ground waters from within both the Energy West and Crandall Canyon Mines are readily distinguishable from each other and from springs and creeks in the Mill Fork Area. These three populations are statistically different from each other at the 95% confidence level. The Mill Fork Spring samples tend to plot more positively relative to the meteoric water line than do the in-mine waters, indicating that the near-surface ground waters recharged under different climatic conditions. The more negative composition of the in-mine ground waters is probably the result of paleo-recharge during cooler, wetter times. The stable isotopic composition of water seldom changes significantly after infiltration into the groundwater system. What this suggests is that modern groundwater systems in the upland areas overlying the mine area are not the primary source of recharge to the groundwater systems encountered in the mines.

Groundwater Ages (^{3}H and ^{14}C)

The concept of groundwater age is difficult to define because water arriving at a well or spring seldom travels via pure piston flow. Instead it is usually a mixture of water molecules that recharged at different locations and at different times, thus water has no unique age. It is therefore best to think of a groundwater "age" as the mean residence time of the water sampled at the well or spring.

In this investigation, two unstable isotopes, tritium (^{3}H) and carbon-14 (^{14}C) have been used to evaluate mean residence times. Tritium is a qualitative tool indicating if groundwater has a component of water that recharged since about 1954. Groundwater that recharged prior to about 1954 will contain essentially no tritium. Carbon-14 provides information regarding the number of years that have elapsed since the groundwater became isolated from soil zone gases and near-surface waters. Like tritium, ^{14}C can indicate if groundwater has a component that recharged since the 1950s. Ground waters with ^{14}C contents greater than about 50 percent modern carbon (pmc) contain anthropogenic (i.e., human-induced) carbon associated with atmospheric nuclear weapons testing. It is not uncommon for groundwater issuing from a spring or occurring in a well to be a mixture of old (i.e. containing no ^{3}H) and modern water.

Groundwater ages have been calculated for 27 springs, 14 in-mine locations, and 6 Star Point Sandstone wells. All spring waters, except for spring 18-4-1 which is located in the southwestern portion of Trail Mountain, contain anthropogenic carbon and appreciable amounts of ^{3}H and are, therefore, modern. These springs issue from alluvial systems, the North Horn Formation, the Price River Formation, the Castlegate Sandstone, and Blackhawk Formation.

INCORPORATED

AUG 17 2018
Div. of Oil, Gas & Mining

Spring 18-4-1 issues from the Blackhawk Formation-Castlegate Sandstone contact at the down plunge end of the Straight Canyon Syncline and is not in the Mill Fork Area. The spring water does not contain water that recharged since 1954; however, the water was likely recharged less than a few hundred years ago as is indicated by its ^{14}C content.

Most groundwaters collected inside the Cottonwood/Wilberg and Deer Creek Mines contain essentially no tritium (Appendix B Table 5) and have mean ^{14}C ages ranging from 2,000 to 12,000 years. Roof drip waters associated with faults (i.e., 1.5N X 29, 6W X 20, and MN-ME) contain waters 2,000 to 7,000 years old and are not in hydraulic communication with the surface. Both roof drip (i.e. Blackhawk Formation) and wells in the Spring Canyon Member of the Star Point Sandstone in the Crandall Canyon Mine generally have groundwater ages of 13,000 – 19,000 years. These waters contain essentially no tritium and thus represent groundwater systems that are essentially hydraulically isolated from modern near surface hydrologic phenomena.

Two in-mine roof drip samples associated with faults, TW-10 (Roans Canyon) in the Deer Creek Mine and 5th West (Joes Valley Fault) in the Crandall Canyon mine, have ^{3}H contents indicating a component of modern recharge.

Active and Inactive Groundwater Zones

The overall pattern of groundwater flow and surface water-groundwater interactions in the Mill Fork Area and adjacent areas can be described by a fairly simple conceptual model involving both active and inactive groundwater flow regimes (Mayo and Morris, 2000).

Active zone groundwater flow systems contain abundant ^{3}H, have excellent hydraulic communication with the surface, are dependent on annual recharge events, and are affected by short term climatic variability. Tritium and carbon-14 "age" dating of spring waters in the study area demonstrate that all springs, except 18-4-1, issue from active zone groundwater systems and are of modern origin. Groundwater in the active zone generally circulates shallowly and has short flow paths. Because the springs in the Mill Fork Area and adjacent areas are not part of large, regional groundwater systems, hydrographs of their discharge rates show both seasonal and climatic fluctuations. During drought cycles, it is not uncommon for discharge from some springs in the active zone to completely cease.

The $\delta^{2}H$ and $\delta^{18}O$ compositions of Mill Fork Area springs relative to in-mine ground waters demonstrate that the Mill Fork Area springs are not part of the same groundwater systems that discharge in the mines.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

The active regime includes alluvial groundwater, all of the Flagstaff Limestone, and the near-surface exposures of all other bedrock formations. The "near surface" extends a few hundred feet vertically into the subsurface, about 500 to 1,000 feet into cliff faces and is controlled by fracturing, weathering, and the surface exposures of fluvial channel sands. Further into the cliff faces the discontinuous character of the channel sands prevents active groundwater flow.

Except for mountain fronts and cliff faces, the coal bearing lower Blackhawk Formation and the Star Point Sandstone are generally not exposed at the surface in the Mill Fork Area and are not part of the active zone. In Cottonwood Canyon, located south of Mill Fork Area, the Star Point Sandstone is within a few hundred feet of land surface and is part of the active zone as evidenced by the tritium content, 1.10 TU, in Well CCCW-1S. Elsewhere Star Point Sandstone samples have groundwater ages of 6,000 to 19,000 years. In the Mill Fork Area the lower Blackhawk Formation and Star Point Sandstone are not exposed near the land surface, except at cliff faces, and are not in the active zone.

Except for mining operations near cliff faces, the in-mine environment is generally not part of the active zone. However, in-mine groundwater containing tritium (i.e., 1 TU or more) in TW-10 (Roans Canyon Fault) and 5th West Fault (Joes Valley Fault-Genwal Mine) indicate that locally the inactive zone extends into the mine environment where fracture zones, that are associated with major faulting, are currently under tensional stress. The extension of the active zone into the mine environment along fractures is localized as evidenced by the absences of tritium and old ^{14}C ages in in-mine groundwater collected elsewhere along the fracture zone.

Inactive zone groundwater systems contain old groundwater (i.e. 2,000 to 19,000 radiocarbon years, have very limited hydraulic communication with the surface and with other active groundwater flow systems, and are not influenced by either annual recharge events or short term climatic variability as evidenced by the decline in roof drip rates. Groundwater in these systems tends to occur in sandstone channels in the North Horn, Price River, and Blackhawk Formations which are not in direct hydraulic communication with the surface (i.e. greater than about 500 to 1,000 feet from cliff faces). These sandstone channels are vertically and horizontally isolated from each other and when encountered in mine workings are usually drained quickly. The blanket sands of the Star Point Sandstone are also largely in the inactive zone.

Except for the immediate vicinity of Joes Valley Fault, we believe that groundwater intercepted in the Mill Fork Area will be part of the inactive zone and will not be in hydraulic communication with either near surface groundwater or surface water systems. Mining within 200 to 300 feet of Joes Valley Fault is problematic in that the area is under tension and deep

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

groundwater may be part of the active zone.

Two fundamentally different groundwater regimes, active (near surface) and inactive (deep subsurface and in-mine) that occur in the vicinity of the Mill Fork Area and elsewhere in the Utah Coal District are due to the vertical and horizontal heterogeneity of the bedrock. The rock formations consist primarily of alternating and interpenetrating layers of somewhat permeable sandstone and impermeable shale and mudstone. Individual rock layers are generally not continuous over great horizontal distances. Rather, one rock facies commonly grades horizontally into another facies. Fluvial deposits consisting of sandstone channels, which locally support groundwater systems, typically interpenetrate with shale and mudstone units. Thus, layers of shale or claystone that have very low permeabilities encase individual sandstone layers both horizontally and vertically. Although the permeability of individual sandstone bodies may locally be relatively high, the ability of these rocks to transmit water horizontally over great distances is low because of the discontinuous nature of the sandstones. Due to the pervasiveness of low permeability shales and mudstones, the potential for vertical groundwater flow is minimal.

Because of the limited potential for groundwater to migrate vertically through the stratigraphic section, active zone recharge waters commonly infiltrate only into the soil zone and shallow, fractured bedrock. Most groundwater moves downward through the shallow subsurface until the first impermeable layer is encountered where it migrates laterally and is discharged at the surface as a spring or seep.

Regional Groundwater Systems

A report by the U.S. Geological Survey (Lines, 1985) states that there exists a regional aquifer in the lower Blackhawk Formation and Star Point Sandstone in the Wasatch Plateau. Lines also postulates that the regional aquifer is recharged by the downward migration of ground waters from overlying perched groundwater systems in the North Horn and Price River Formations. This idea is not correct. Ground waters encountered within mine openings in the lowermost Blackhawk Formation occur primarily within discontinuous sandstone channels. It is not uncommon for some of these channels to be completely dry, while others are partially or completely filled with water. Between these sandstone channels, the surrounding shales and claystones of the Blackhawk Formation are usually dry. The discontinuous nature of the saturated sediments in the lowermost Blackhawk Formation, and the unconfined conditions under which these ground waters exist do not support the idea of a deep, regional system with groundwater flowing from areas of recharge to areas of discharge.

Additionally, radiocarbon and tritium groundwater age dating indicates that groundwater in the

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

shallow perched groundwater systems are modern (post-1954) and in-mine groundwater in the Blackhawk Formation and Star Point Sandstone are thousands of years old.

We believe that the presence of swelling clays and impermeable shales in the rocks in the unsaturated zone between the overlying perched systems and the Blackhawk Formation effectively prohibit downward vertical migration of waters from the perched systems. Lines (1985) analyzed cores taken from well (D-17-6) 27bda-1 and found the hydraulic conductivities of the shales and siltstones to be very low (i.e. 10-7 to 10-8 ft/day). One shale sample was found to be effectively impermeable even when a hydraulic pressure of 5,000 psi was applied.

Because there are no regionally extensive groundwater regimes in the lower Blackhawk Formation or Star Point Sandstone within the lease area, it is not possible to draw meaningful potentiometric surface maps of these systems.

Lines (1985) also reported that water was likely leaking from the Joes Valley Reservoir downward into the "lower Blackhawk / Star Point aquifer" in Straight Canyon. We believe that this is incorrect. Groundwater collected from well TM-3, which is completed in the Star Point Sandstone in Straight Canyon just below the reservoir, has a radiocarbon age of 6,000 years, while water in Joes Valley Reservoir is of modern origin. Water levels in TM-3 do not respond to seasonal fluctuations in the water level in Joes Valley Reservoir, indicating that there is little or no hydraulic communication between the reservoir and water in the Star Point Sandstone. Groundwater was sampled at UG-3 in the lower Blackhawk Formation in the Trail Mountain Mine. This water has a radiocarbon age of 5,500 years, which is likewise not consistent with water from the reservoir.

Summary of 2001 Mayo & Associates Study

In summary, all groundwater encountered in springs monitored in the Mill Fork permit Area discharge from active, shallow groundwater systems. No evidence exists that suggests a large, regional-type aquifer occurs in the area. All of the springs analyzed in the study area exhibit large-scale fluctuations in discharge rates in response to the annual snowmelt event. The springs are also sensitive to longer-term variations in climate. Carbon-14 and tritium dating of spring and stream waters indicate that the springs contain anthropogenic (human-induced) carbon and levels of tritium consistent with recharge in the past 50 years. Stable isotopic δ^2H and $\delta^{18}O$ data from springs and streams at the surface indicate that the recharge sources for these groundwater systems are different from those that recharged the groundwater systems encountered in the mine environment.

Almost all groundwater encountered in in-mine environments is not related to shallow, active zone groundwater systems from which springs and streams discharge. ^{14}C dating indicates that

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

groundwater entering the underground workings in most locations is thousands of years old. When groundwater is encountered in the mine, inflow rates commonly decrease rapidly and most inflows eventually dry up completely. This indicates that the groundwater systems encountered in the mine are not part of large regional groundwater systems. There is no relationship between groundwater inflow rates measured in the mine and the annual snowmelt event or long term climatic trends. This demonstrates a lack of hydraulic communication between the groundwater systems encountered in the mine and active zone groundwater systems near the surface.

Conclusions from 2001 Mayo & Associates Study

- Ground waters discharging from springs are part of active zone groundwater systems. Isotopic analysis indicates that groundwater from the active zone is of modern origin (recharged less than 50 years ago). Seasonal variations in discharge rates from active zone springs indicate that flowpath lengths are short and that groundwater travel times from recharge areas to discharge areas are generally less than one year. The abundance of shale and claystone units in the geologic section prohibits significant downward migration of active zone ground waters into deeper horizons.

- Analysis of the solute chemistry of ground waters discharging from springs and seeps indicate that depths of circulation in these systems are shallow. The modern groundwater ages of shallow ground waters in the study area support this conclusion.

- Groundwater encountered in most locations in the mines is many thousands of years old. Groundwater in the Star Point Sandstone ranges from approximately 1,000 to 19,000 years old. Groundwater in the Blackhawk Formation within the mines ranges in age from about 2,000 to 14,000 years, whereas groundwater in the Joes Valley Fault system ranges in age between about 2,500 and 5,000 years. None of these groundwaters have appreciable tritium concentrations, indicating that no recharge has occurred in the past 50 years.

- Groundwater encountered in the northwest corner of the Crandall Canyon Mine discharges from a series of fractures located near the Joes Valley Fault. Tritium data indicate that a component of this water recharged in the past 50 years, whereas ^{14}C data indicate that another component recharged more than 3,500 years ago. This groundwater appears to originate from a sandstone channel in the mine roof.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

- More than two-thirds of all non-alluvial springs in the Mill Fork Area discharge from the North Horn Formation. The abundance of springs in the North Horn Formation is the result of the large area of exposed North Horn in the upland areas where precipitation is greatest, and the presence of the abundant claystone and shale layers which inhibit significant downward migration of precipitation into the formation.

- The fact that Little Bear Spring discharges modern water and has large variations in discharge rates suggests that it is the discharge location of an active zone groundwater system. Because inactive zone groundwater systems in the Star Point Sandstone beneath the mine are tens of thousands of years old and do not exhibit seasonal variations in discharge, these groundwater systems are precluded as potential contributors to the discharge from Little Bear Spring. The very low permeability in the Star Point Sandstone beneath the mine indicates that diffuse flow through the Star Point Sandstone beneath the mine cannot contribute significant groundwater to the discharge from the spring.

  Limited data suggest the possibility that Little Bear Spring may receive significant recharge where the fracture system from which it emanates crosses streams and active zone groundwater systems in drainages south of Little Bear Canyon. The conditions in Mill Fork Canyon seem favorable for recharge to the spring.

WATER MONITORING – MILL FORK AREA

A. GROUNDWATER

Groundwater within the Mill Fork Area was monitored according to the schedules in established in the Deer Creek MRP. PacifiCorp has conducted baseline and operational monitoring of spring sources in and adjacent to the lease area. The data collected have provided information useful in the understanding of potential hydrologic consequence of mining.

East Mountain Springs - Mill Fork

In preparation for coal leasing, Genwal Resources conducted baseline spring and seep surveys from 1994-1996 (northern portions of the lease were surveyed in 1989-90). With PacifiCorp's acquisition of the Mill Fork State Coal Lease (reverted to the BLM on August 1, 2011 and designated as federal lease UTU-88554), a complete re-evaluation of groundwater resources was initiated in 2000 and continued through 2001. During the 2000-2002 baseline evaluation, a total of 198 springs were identified within and adjacent to the lease plan area. Each spring site on East Mountain has been studied to determine the geologic circumstances that cause the springs to

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

occur. The mode of occurrence for each spring was tabulated on the "Springs Geologic Conditions Inventory" sheets located in the Deer Creek MRP. The springs on East Mountain originate in several different ways (see Springs and Hydrologic Drainage Maps and HM-1A Hydrology Data Map); however, many springs share the same mode of occurrence and, in some cases, are related.

The ground water monitoring plan in Appendix A includes a selection of springs based on the following criteria:

- Stratigraphic position
- Area of potential influence from subsidence
- Aerial distribution
- Established water rights
- Measurable flow based on historical surveys
- Reliable measuring point(s)

The following table outlines the rationale for springs selected for long term monitoring. Selection of the springs to be monitored was based upon the factors listed along with discussions with the water users (CVSSD, Emery Conservancy District, NEWUSSD) and the surface management agency.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

MILL FORK GROUNDWATER MONITORING PLAN - SPRINGS							
Spring	Stratigraphic Position	Projected Subsidence Zone	Regional Location	Water Rights	Historical Measurable Flow	Reliable Measuring Point	Comment
SP1-29	✓	✓	✓		✓	✓	
UJV-213	✓		✓	✓	✓	✓	
UJV-101	✓		✓		✓	✓	
JV-34	✓		✓			✓	Located outside projected zone of subsidence. Monitored to detect impacts to the Joes Valley alluvium
JV-9	✓		✓			✓	Located outside projected zone of subsidence. Monitored to detect impacts to the Joes Valley alluvium
UJV-206	✓	✓	✓	✓	✓	✓	
MF-219	✓	✓	✓	✓	✓	✓	
SP1-26	✓	✓	✓	✓	✓	✓	
MF-10	✓	✓	✓	✓	✓	✓	
MF-19B	✓		✓	✓	✓	✓	
RR-5	✓	✓	✓	✓	✓	✓	
EM-216	✓		✓	✓	✓	✓	Located outside projected zone of subsidence
GRANTS SPRING					✓	✓	Added to the spring monitoring program at the request of the USFS
RR-15	✓	✓	✓		✓	✓	
RR-23A	✓		✓		✓	✓	Large spring within a series of springs located downdip from projected mining
EM POND					✓	✓	Added to the spring monitoring program at the request of the USFS
MFR-30	✓	✓	✓		✓	✓	
MFR-10	✓	✓	✓		✓	✓	Large spring denoted by USGS
MF-7	✓		✓		✓	✓	Located outside projected zone of subsidence
MF-213	✓		✓	✓	✓	✓	Large spring located in the Blackhawk Formation downdip from projected mining
LITTLE BEAR SPRING	✓		✓	✓	✓	✓	Located outside projected zone of subsidence. Added to the spring monitoring program at the request of the DOGM

Water samples were collected and analyzed during the months of July and October. Parameters analyzed are those listed in the "DOGM Guidelines for Groundwater Water Quality." Monitoring of groundwater sites will continued for a minimum of three years after the last date of mining (date of last mining - January 2015). PacifiCorp will submit a formal application to reduce hydrologic monitoring after the minimum three year time period.

INCORPORATED
AUG 17 2018
Div. of Oil, Ga

Surface Hydrology

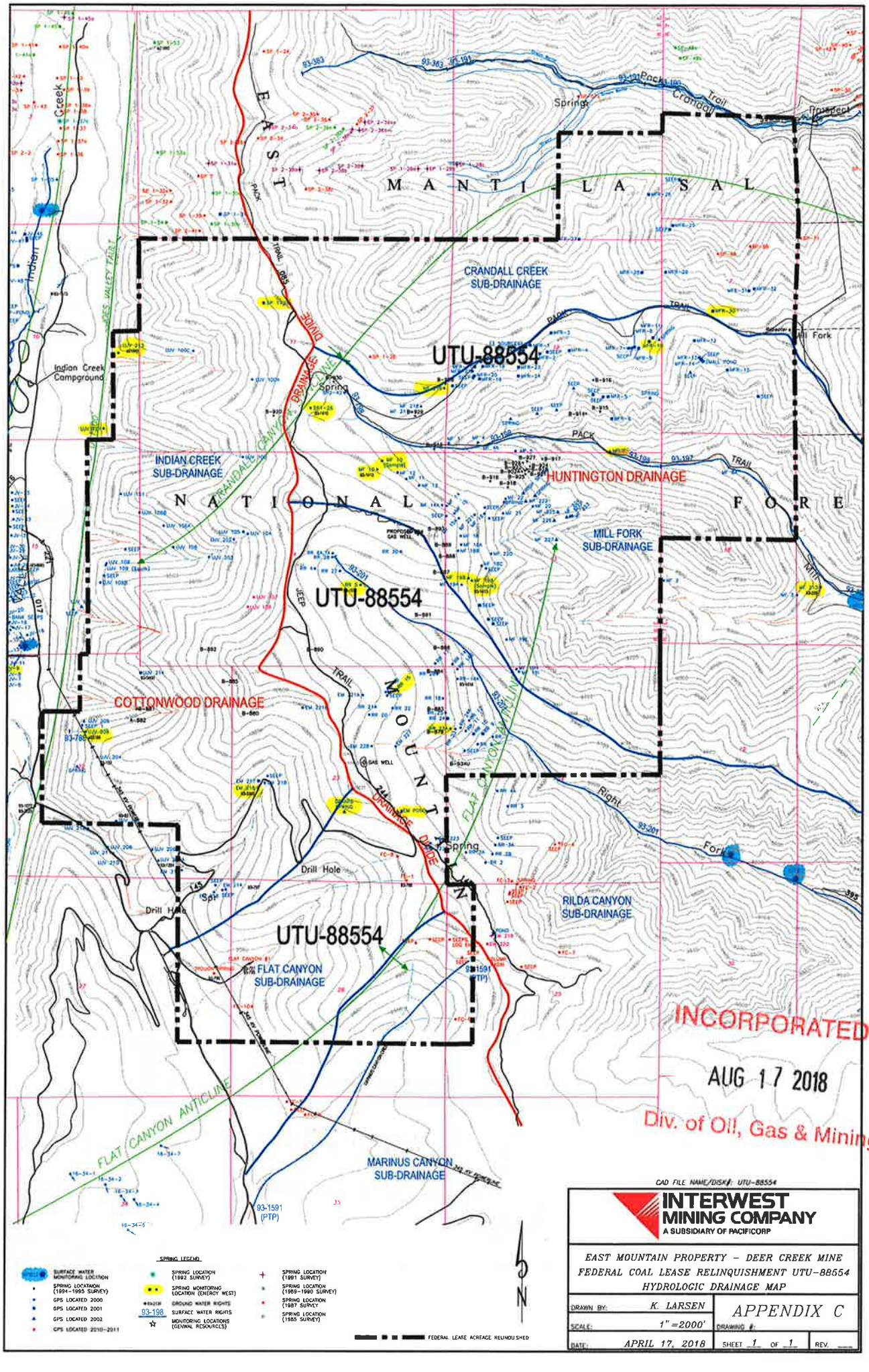
The Deer Creek Mine area is located in the headwater region of the San Rafael River Basin. The surface drainage system of the Federal Lease UTU-88554 forms part of the Huntington Creek drainage.

Most of the drainages in and adjacent to Lease UTU-88554 are ephemeral. The majority of the surface flow from the lease block drains to the east in Crandall, Mill Fork and Rilda Canyons and un-named drainages which report to Huntington Creek. On the west side of the East Mountain drainage divide minor drainages report to the Cottonwood Creek drainage system. As detailed in Appendices A and B, the amount of subsidence is limited and effects of subsidence did not alter surface flow characteristics of the ephemeral drainages.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



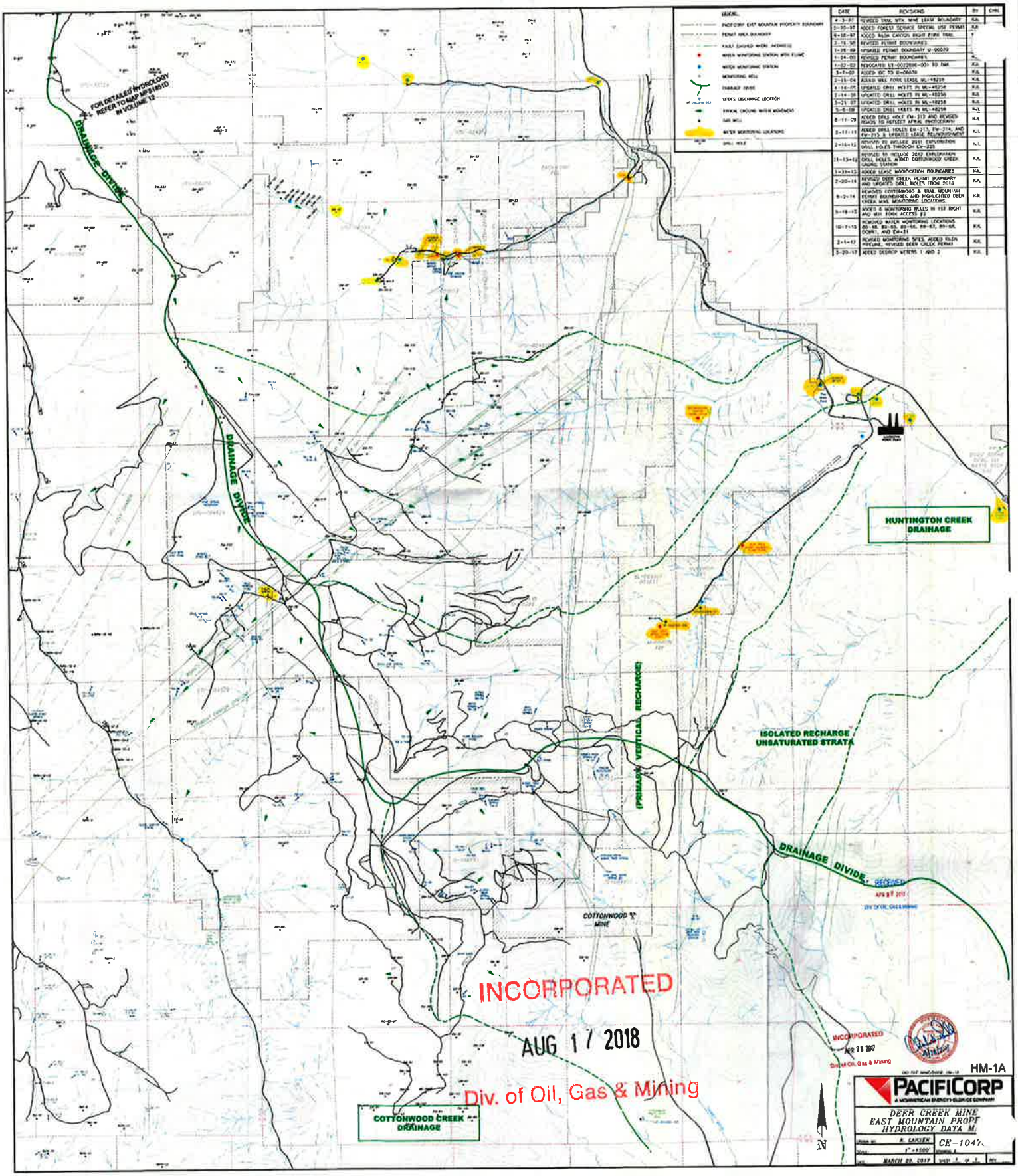
CAD FILE NAME/DISK#: UTU-88554

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
HYDROLOGIC DRAINAGE MAP

DRAWN BY:	K. LARSEN	*APPENDIX C*	
SCALE:	1" = 2000'	DRAWING #:	
DATE:	APRIL 17, 2018	SHEET 1 OF 1	REV.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



LEGEND
PACIFICORP EAST MOUNTAIN PROPERTY BOUNDARY
PERMIT AREA BOUNDARY
FAULT (SHOWED WHERE INFERRED)
WATER MONITORING STATION WITH FLUME
WATER MONITORING STATION
MONITORING WELL
DRAINAGE DIVIDE
LEDES DISCHARGE LOCATION
TYPICAL GROUND WATER MOVEMENT
TAIL WELL
WATER MONITORING LOCATIONS
DRILL HOLE
DATE
REVISIONS
BY
CHK
4-3-97 REVISED TRAIL WITH MINE LEASE BOUNDARY K.R.
5-20-97 ADDED FOREST SERVICE SPECIAL USE PERMIT K.R.
6-18-97 ADDED RILDA CANYON RIGHT FORK TRAIL
2-16-98 REVISED PERMIT BOUNDARIES
1-28-99 UPDATED PERMIT BOUNDARY U-00079
1-24-00 REVISED PERMIT BOUNDARIES
1-02-02 RELOCATED LT-0022896-001 TO TMR K.R.
3-7-02 ADDED IDC TO U-06039 K.R.
2-15-04 ADDED WILL FORK LEASE ML-48258 K.R.
4-14-05 UPDATED DRILL HOLES IN ML-48258 K.R.
2-14-06 UPDATED DRILL HOLES IN ML-48258 K.R.
3-21-07 UPDATED DRILL HOLES IN ML-48258 K.R.
5-6-08 UPDATED DRILL HOLES IN ML-48258 K.R.
8-11-09 ADDED DRILL HOLE EM-213 AND REVISED ROADS TO REFLECT AERIAL PHOTOGRAPHY K.R.
3-17-11 ADDED DRILL HOLES EM-213, EM-214, AND EM-215 & UPDATED LEASE REIMBURSEMENT K.R.
2-16-12 REVISED TO INCLUDE 2011 EXPLORATION DRILL HOLES THROUGH EM-225 K.R.
11-15-12 REVISED TO INCLUDE 2012 EXPLORATION DRILL HOLES, ADDED COTTONWOOD CREEK CASING STATION K.R.
1-23-13 ADDED LEASE MODIFICATION BOUNDARIES K.R.
2-20-14 REVISED DEER CREEK PERMIT BOUNDARY AND UPDATED DRILL HOLES FROM 2013 K.R.
9-2-14 REMOVED COTTONWOOD & TRAIL MOUNTAIN PERMIT BOUNDARIES AND HIGHLIGHTED DEER CREEK MINE MONITORING LOCATIONS K.R.
9-18-15 ADDED 6 MONITORING WELLS IN 1ST RIGHT AND MILL FORK ACCESS #2 K.R.
10-7-15 REMOVED WATER MONITORING LOCATIONS 80-48, 83-65, 83-66, 88-67, 89-68, DOWN1, AND EM-31 K.R.
2-1-17 REVISED MONITORING SITES, ADDED RILDA PIPELINE, REVISED DEER CREEK PERMIT K.R.
3-20-17 ADDED DEDROP METERS 1 AND 2 K.R.
FOR DETAILED HYDROLOGY REFER TO MAP MF81851D IN VOLUME 12
DRAINAGE DIVIDE
DRAINAGE DIVIDE
HUNTINGTON CREEK DRAINAGE
(PRIMARY VERTICAL RECHARGE)
ISOLATED RECHARGE UNSATURATED STRATA
DRAINAGE DIVIDE
RECEIVED
APR 2 8 2017
DIV OF OIL, GAS & MINING
COTTONWOOD MINE
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining
INCORPORATED
APR 2 8 2017
Div. of Oil, Gas & Mining
COTTONWOOD CREEK DRAINAGE
N
HM-1A
PACIFICORP
A MIDAMERICAN ENERGY HOLDINGS COMPANY
DEER CREEK MINE
EAST MOUNTAIN PROPE
HYDROLOGY DATA M
R. LARSEN
1" = 1500'
MARCH 20, 2017
CE-1047

EAST MOUNTAIN SPRING DATA Mill Fork Area							
Federal Lease UTU-88554 and UTU-84285							
SPRING	MINING HISTORY		STATUS	LOCATION			Approximate Subsidence (feet)
	Type of Mining	Date of Mining (Pre/Post water quality analysis based on dates listed for each spring)		Sec.	T.	R.	
UJV-213	First Mining	Hiawatha: 25th West Bleeder Feb. 2012	Within Relinquishment	10	16S	6E	NA
UJV-101	First Mining	Hiawatha: 22nd West Bleeder Mar. 2011	Within ½ mile Offset Within Lease UTU-84285	10	16S	6E	NA
JV-34	Not Undermined	NA Nearest second mining: 2670' Aug. 2008	Within ½ mile Offset	15	16S	6E	NA
JV-9	Not Undermined	NA Nearest second mining: 1940' Jun. 2005	Within ½ mile Offset	22	16S	6E	NA
UJV-206	Not Undermined	NA Nearest second mining: 1825' Dec. 2005	Within Relinquishment	22	16S	6E	NA
MF-219	First Mining - BC Longwall – BC First Mining – Hia.	Blind Canyon: First Mining 7th Left Sep. 2009 Second Mining 7th Left Apr. 2010 Hiawatha: 23rd West Feb. 2011	Within Relinquishment	11	16S	6E	1

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN SPRING DATA
Mill Fork Area

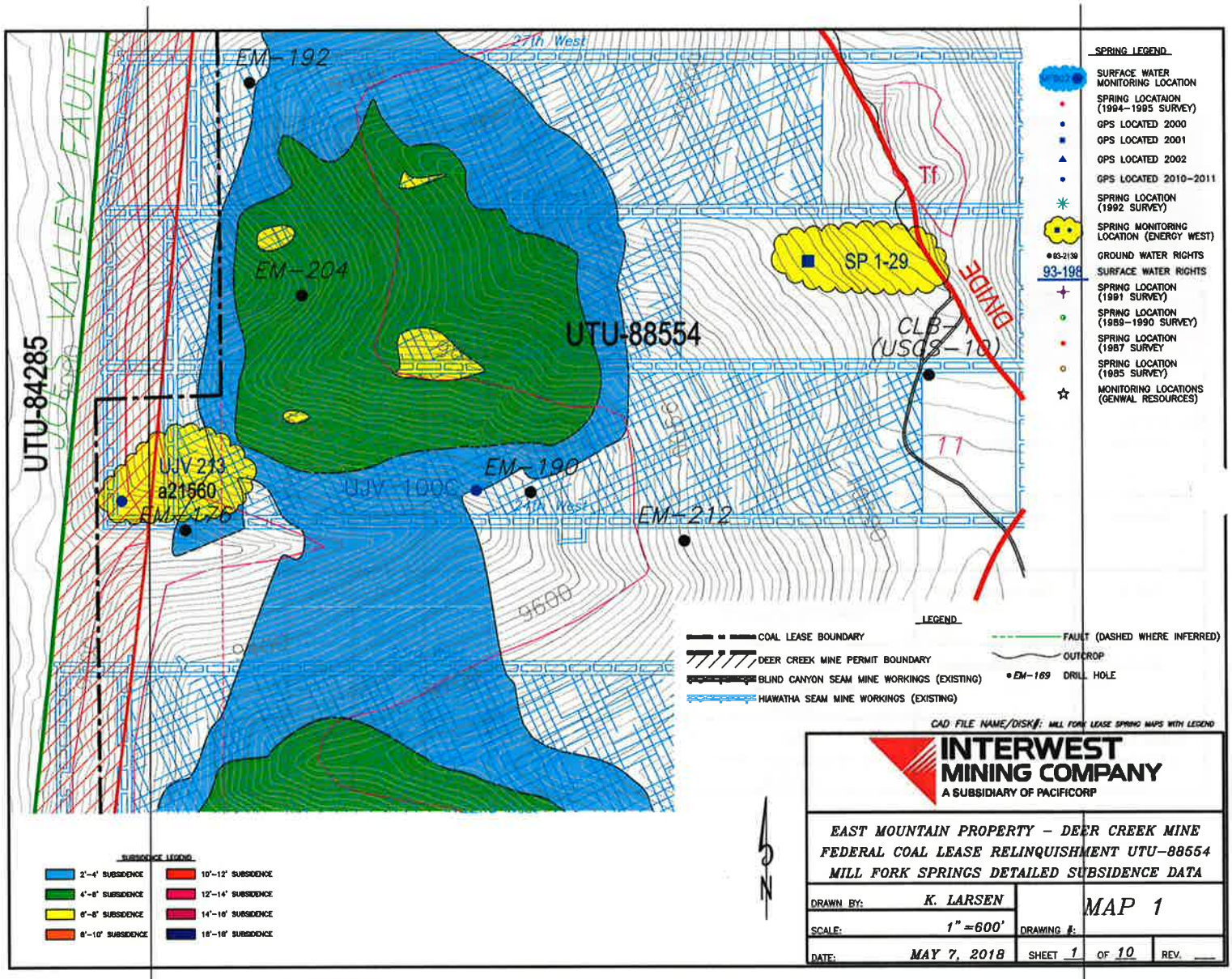
Federal Lease UTU-88554 and UTU-84285

SPRING	MINING HISTORY		STATUS	LOCATION			Approximate Subsidence (feet)
	Type of Mining	Date of Mining (Pre/Post water quality analysis based on dates listed for each spring)		Sec.	T.	R.	
SPI-26	Not Undermined	NA Nearest second mining: 460' Feb. 2010	Within Relinquishment	11	16S	6E	NA
MF-10	Longwall Panels	Blind Canyon: 5th Left Jul. 2009 Hiawatha: 21st West Jan. 2011	Within Relinquishment	14	16S	6E	7
MF-19B	First Mining	Hiawatha: 7th North Sump Feb. 2006	Within Relinquishment	13	16S	6E	0
RR-5	Not Undermined	NA Nearest second mining: 1000' Feb. 2009	Within Relinquishment	14	16S	6E	NA
EM-216	Not Undermined	NA Nearest second mining: 975' Sep. 2005	Within Relinquishment	23	16S	6E	NA
GRANTS SPRING	Not Undermined	NA Nearest second mining: 1560' Nov. 2005	Within Relinquishment	23	16S	6E	NA
RR-15	Not Undermined	NA Nearest second mining: 55' Mar. 2006	Within Relinquishment	14	16S	6E	NA

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN SPRING DATA Mill Fork Area							
Federal Lease UTU-88554 and UTU-84285							
SPRING	MINING HISTORY		STATUS	LOCATION			Approximate Subsidence (feet)
	Type of Mining	Date of Mining (Pre/Post water quality analysis based on dates listed for each spring)		Sec.	T.	R.	
EMPOND	Not Undermined	NA Nearest second mining: 1620' Dec. 2005	Within Relinquishment	23	16S	6E	NA
MFR-30	Not Undermined	NA Nearest second mining: 4000' Mar. 2014	Within Relinquishment	7	16S	7E	NA
MFR-10	Not Undermined	NA Nearest second mining: 2380' Mar. 2014	Within Relinquishment	12	16S	6E	NA
MF-7	Not Undermined	NA Nearest second mining: 1707' Jul. 2010	Within Relinquishment	12	16S	6E	NA
MF-213	Not Undermined	NA Nearest second mining: 7915' Jul. 2010	Within ½ mile Offset	17	16S	7E	NA
LB10/ LB-11 Little Bear	Not Undermined	NA Nearest second mining: 13050' Mar. 2014	Adjacent to Lease	9	16S	7E	NA

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 1	
SCALE:	1"=600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 1 OF 10	REV.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 11, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring SPI-29 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat on February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of SPI-26 in the Hiawatha Seam, 26th West gateroad, on October 2012. Spring SPI-29 is located in barrier pillar south of 26th West. Nearest seconding mining is approximately 295' north, 27th West longwall panel.

Subsidence: No subsidence has been detected near SPI-29. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. SPI-29 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring SPI-29. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - SPI-29 is a low volume spring/seep located below trail in a small clearing on west facing slope surrounded with conifers and aspens. Spring drains to small shallow basin adjacent to source. Crandall Canyon Mine developed the trail into an access road during the 2007 mine collapse. Roadway reclaimed in 2013. Flow from spring SPI-29 generally ranges from 0.0/seep to a maximum of <3.0 gpm. Area near and spring site disturbed/re-developed post Crandall Canyon mine collapse. Wet area developed on nearby access road, flow from original source dissipated (see following Geologic Occurrence – photos).

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring SPI-29:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 150' below top.

Justification for removal from monitoring: SPI-29 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site SPI-29 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **SP1-29**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1630' S.	3070' E.	NW	11	16S	6E	10360

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	1 ½ " Steel Pipe Non-functioning post Crandall Canyon drill hole disturbance	None	150' below top

Location Comments: Spring located below trail in a small clearing on west facing slope surrounded with conifers and aspens.

Probable Recharge Area: Areas of higher elevation located to the east (recharge limited).

Relationship to Adjacent Springs: This spring occurs in the same manner as SP1-31.

INCORPORATED

AUG 17 2018

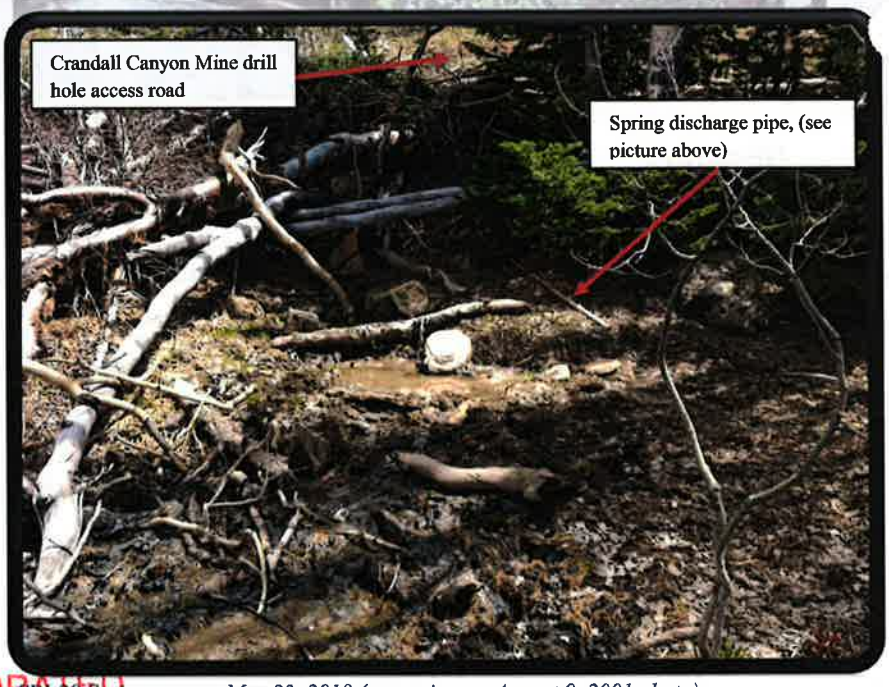
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

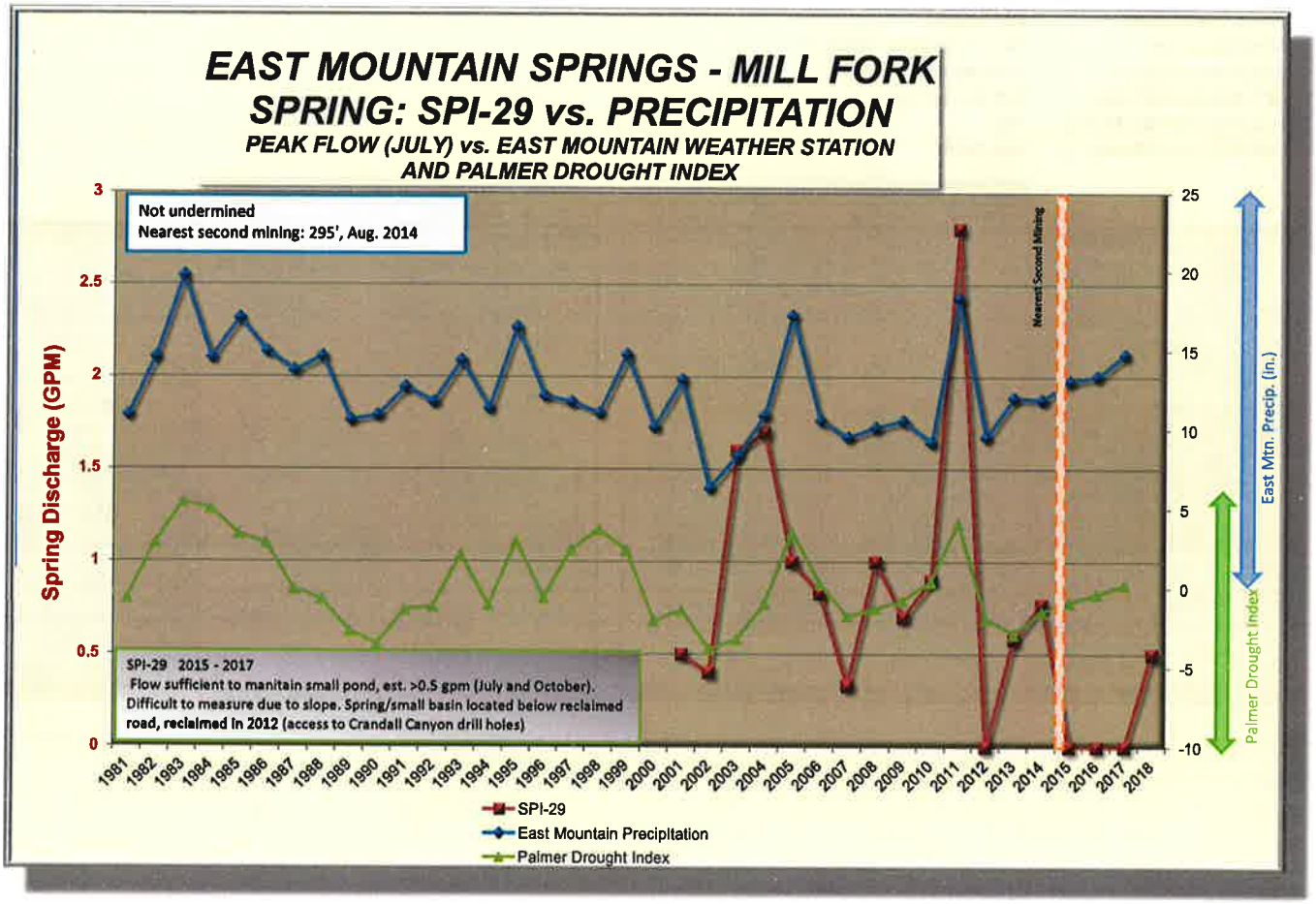
SPI-29 spring source, August 9, 2001

Small basin below SPI-29 post Crandall Canyon drill hole disturbance. View from reclaimed road, May 23, 2018



SPI-29 Spring source, May 23, 2018 (same view as August 9, 2001 photo)

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: SP1-29
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 295'
Date of Nearest Mining: Aug. 2014

	Pre-Mining Data: 20000101 THROUGH 20140701				Post-Mining Data: 20140701 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	322	238	271	18	- No Sample Data -				BICARBONATE
CALCIUM	76.6	64	69.1122	18					CALCIUM
CARBONATE	0	0	0	8					CARBONATE
CHLORIDE	3	2	2.17222	18					CHLORIDE
CONDUCTIVITY	555	457	501.777	18					CONDUCTIVITY
DISSOLVED OXYGEN	0								DISSOLVED OXYGEN
FLOW	2.8	0.09	0.89444	18					FLOW
HARDNESS	288	246	268.277	18					HARDNESS
TOTAL IRON	0.06	0	0.0075	8					TOTAL IRON
DISSOLVED IRON	0	0	0	8					DISSOLVED IRON
MAGNESIUM	24.78	20.7	22.7277	18					MAGNESIUM
DISSOLVED MANGANESE	0.015	0	0.00225	8					DISSOLVED MANGANESE
MANGANESE	0.012	0	0.0015	8					MANGANESE
OIL AND GREASE	0								OIL AND GREASE
PH	7.96	7.24	7.64611	18					PH
POTASSIUM	2	0.98	1.35277	18					POTASSIUM
SET SOLIDS	0								SET SOLIDS
SODIUM	7.41	2.57	3.34333	18					SODIUM
SULFATE	9	5	6.74444	18					SULFATE
SUSPENDED SOLIDS	255	255	255	1					SUSPENDED SOLIDS
TEMPERATURE	8.8	3.6	5.04444	18					TEMPERATURE
TOTAL DISSOLVED SOLIDS	315	249	269.555	18					TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Location: Section 10, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring UJV-213 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat on February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of UJV-213 in the Hiawatha Seam, 25th West Bleeder, in February 2012.

Subsidence: No subsidence has been detected near **UJV-213. Maximum subsidence in area 400' east of UJV-213 has stabilized at approximately 2 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2012. UJV-213 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring UJV-213. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 – 2001 and 2007 – 2017 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - UJV-213 is a low volume spring/seep located above drainage near Joes Valley Fault on south facing slope covered with aspens and mountain brush. Spring not identified during previous surveys. Below spring, drainage diverted through 1" poly pipe to trough located approximately 300' to the west. Flow from spring UJV-213 generally ranges from 0.0/seep to a maximum of 3.0 gpm. Spring flow dissipates rapidly below spring source.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring UJV-213:

- Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Castle Gate (refer to Geologic Occurrence sheet).

- Stratigraphic Position: Mid-formation.

Justification for removal from monitoring: UJV-213 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-213 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **UJV-213**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
261' N.	889' W.	SW	10	16S	6E	8960

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Castle Gate	None	a21560 Change application is to allow the applicant the right to develop the 3 unnamed springs to draw a portion of the stock away from the Spoon Creek riparian area.	Middle

Location Comments: Spring located above drainage near Joes Valley Fault on south facing slope covered with aspens and mountain brush. Spring not identified during previous surveys. Below spring, drainage diverted through 1" poly pipe to trough located approximately 300' to the west.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Probable Recharge Area: Areas of higher elevation located to the east.

Relationship to Adjacent Springs: This spring is not related to other springs within the immediate area

Geologic Occurrence of Spring:

Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

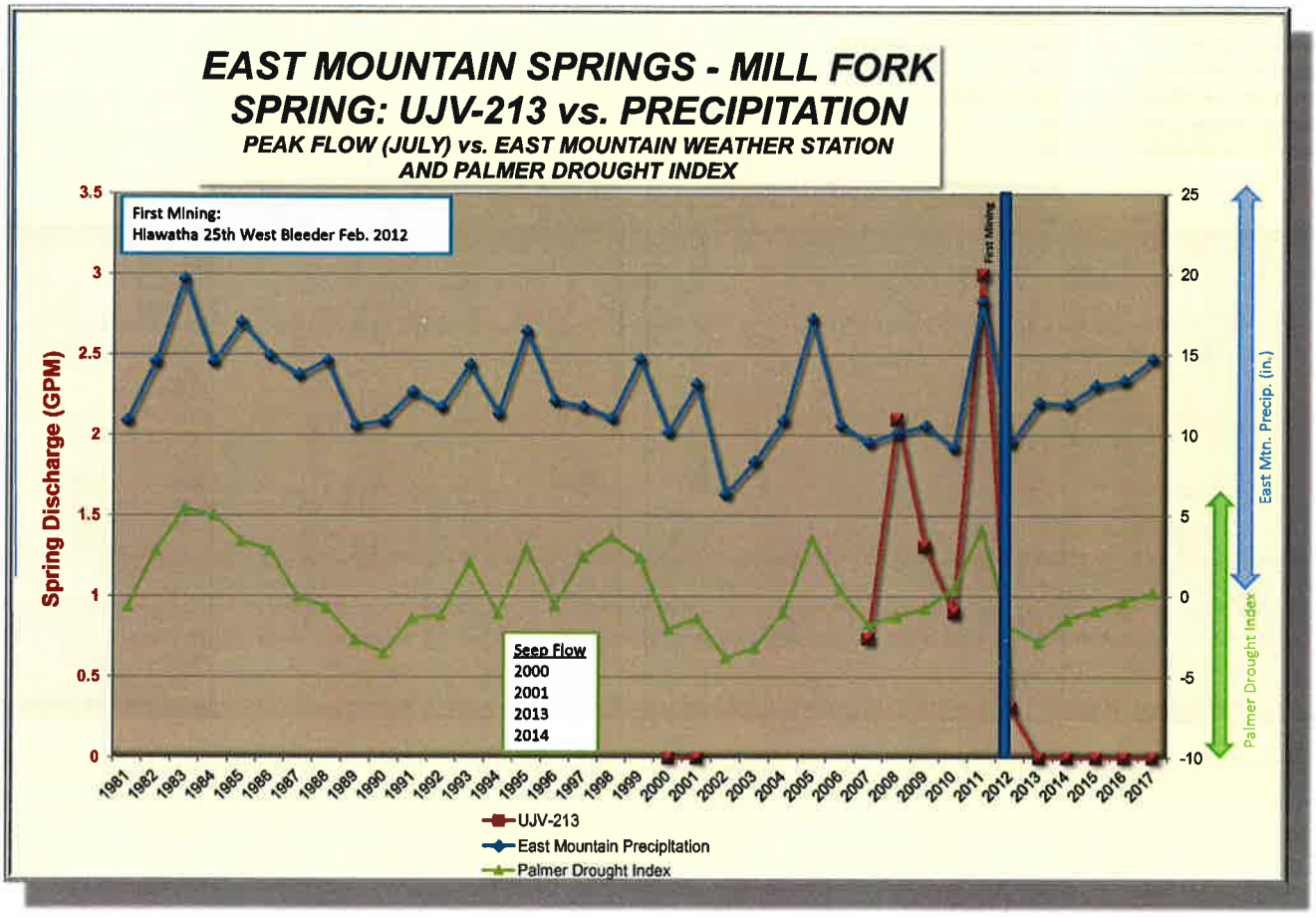
INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Non-functioning drainage diversion, un-named drainage near UJV-213

Non-functioning trough below UJV-213, source from un-named drainage



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

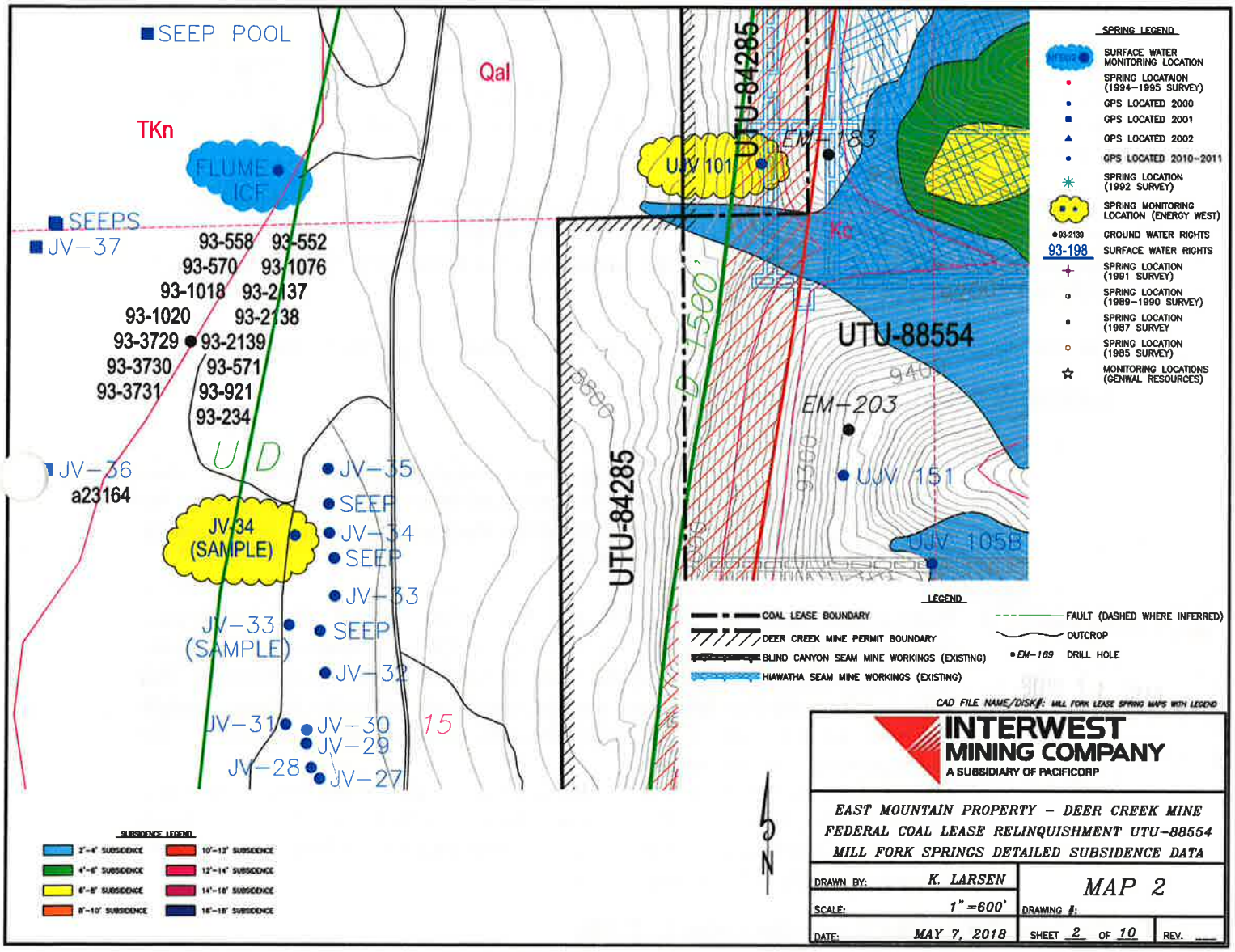
East Mountain Spring: UJV-213
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Feb. 2012
Date of Second Mining: Not undermined
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20120131				Post-Mining Data: 20120201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	241	220	227.888	9	220	217	218.5	2	BICARBONATE
CALCIUM	71.32	62.92	68.4644	9	67.09	62.63	64.86	2	CALCIUM
CARBONATE	0	0	0	7	0	0	0	2	CARBONATE
CHLORIDE	4	3	3.66666	9	4	4	4	2	CHLORIDE
CONDUCTIVITY	583	478	511.222	9	489	467	478	2	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	3	0.21	1.12777	9	0.31	0.16	0.235	2	FLOW
HARDNESS	275	240	263.777	9	262	241	251.5	2	HARDNESS
TOTAL IRON	0.44	0	0.19333	9	0.97	0.15	0.56	2	TOTAL IRON
DISSOLVED IRON	0	0	0	7	0	0	0	2	DISSOLVED IRON
MAGNESIUM	23.81	20.15	22.5577	9	23.01	20.47	21.74	2	MAGNESIUM
DISSOLVED MANGANESE	0.011	0	3.44444	9	0.031	0.019	0.025	2	DISSOLVED MANGANESE
MANGANESE	0	0	0	7	0.003	0	0.0015	2	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.17	7.68	7.90888	9	8.18	7.64	7.91	2	PH
POTASSIUM	1.52	0.97	1.15555	9	1.3	1.11	1.205	2	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8.94	5.78	7.00222	9	5.85	5.77	5.81	2	SODIUM
SULFATE	40	33	36.5555	9	33	31	32	2	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	9.9	6.5	7.94444	9	10.3	9.5	9.9	2	TEMPERATURE
TOTAL DISSOLVED SOLIDS	320	284	298.222	9	277	273	275	2	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

PROPOSAL TO REMOVE SITE FROM WATER MONITORING PROGRAM	Mill Fork Spring UJV-101

Location: Section 10, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-84285.

Lease Association: Spring UJV-101 is located within Federal Coal lease UTU-84285 adjacent to UTU-88554. The lease was originally acquired from Bureau of Land Management on November 1, 2006. Mining in Lease UTU-84285 was prohibited to first mining only. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in April 2006 under the provisions of a Federal Exploration License. Blind Canyon seam development began in November 2007. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production in Lease UTU-84285 occurring in August 2013. First mining occurred in vicinity of UJV-101 in the Hiawatha Seam, 23rd West Bleeder, in March 2011.

Subsidence: **An area of minor subsidence occurs adjacent to spring** UJV-101. **Maximum subsidence in area 200' south of UJV-101 has stabilized at approximately 2 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2013. UJV-101 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring UJV-101. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1993 through 1995 by Genwal Resources and 2000 through 2017 by PacifiCorp. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - UJV101 is a low volume spring/seep located above drainage near Joes Valley Fault on south facing slope covered with aspens and mountain brush. Flow from spring UJV-101 generally ranges from 0.0/seep to a maximum of < 4.0 gpm. Spring flow dissipates rapidly below spring source.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring UJV-101:

- Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Castle Gate (refer to Geologic Occurrence sheet).
- Stratigraphic Position: Mid-formation.

PROPOSAL TO REMOVE SITE FROM WATER MONITORING PROGRAM	Mill Fork Spring UJV-101

Justification for removal from monitoring: UJV-101 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-101 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **UJV-101**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
261' N.	889' W.	SW	10	16S	6E	8960

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Castle Gate	None	None	Middle

Location Comments: Spring located above small cliff (Joes Valley Fault) overlooking Joes Valley on west facing slope covered with aspens and mountain brush.

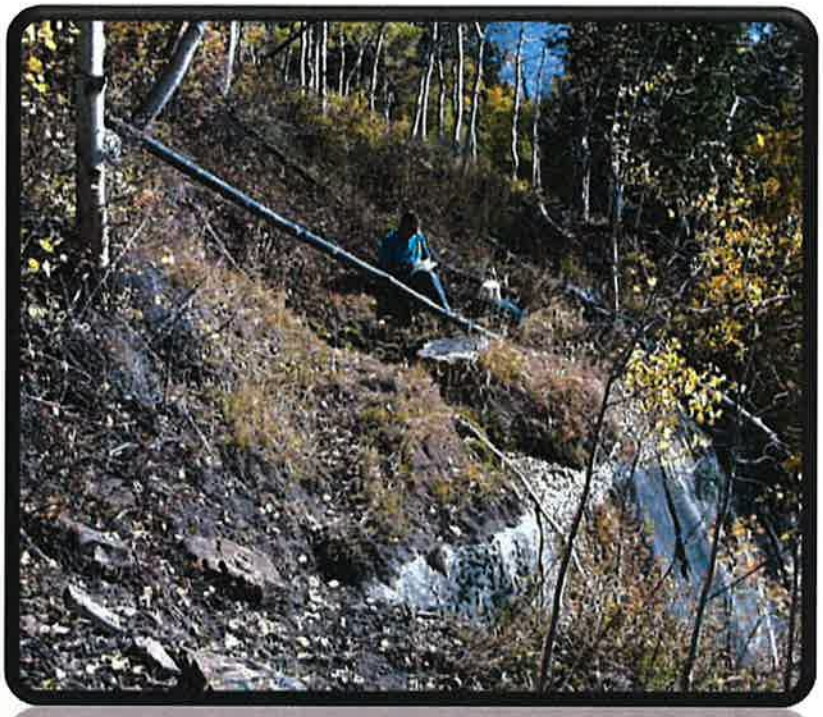
Probable Recharge Area: Areas of higher elevation located to the east.

Relationship to Adjacent Springs: This spring is not related to other springs within the immediate area

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

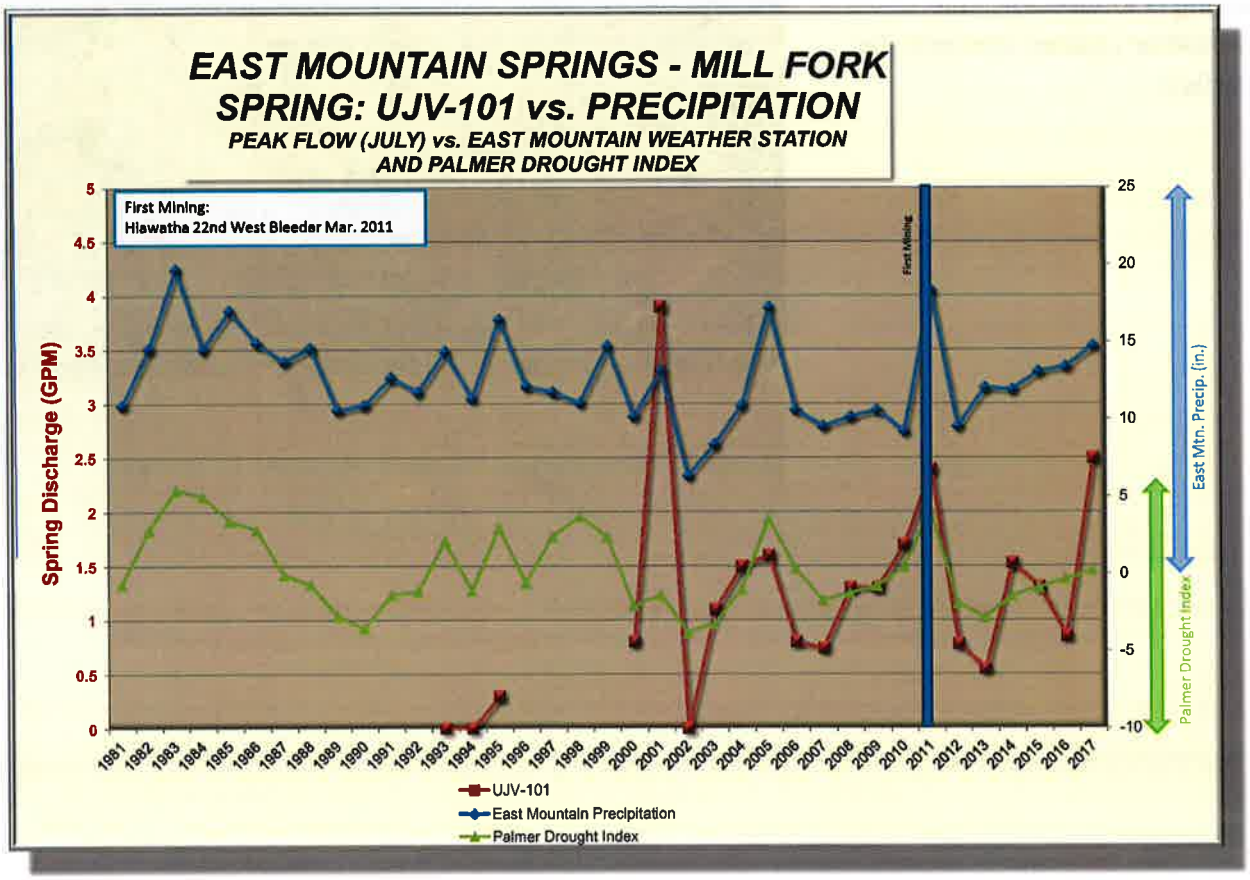
Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.



INCORPORATED

AUG 17 2018

Div. of Oil, Gas



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: UJV-101
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Mar-11
Date of Second Mining: Not undermined
Location of Nearest Mining: NA
Date of Nearest Mining: NA

	Pre-Mining Data: 20000101 THROUGH 20110228				Post-Mining Data: 20110228 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	295	212	259.5625	16	249	216	230.428	14	BICARBONATE
CALCIUM	74.22	64.9	70.0581	16	81.82	66.61	72.7107	14	CALCIUM
CARBONATE	0	0	0	6	0	0	0	14	CARBONATE
CHLORIDE	6	4	4.525	16	4	3	3.92857	14	CHLORIDE
CONDUCTIVITY	690	475	593.0625	16	570	494	537.571	14	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	1.69	0.2	1.049375	16	2.5	0.38	1.04285	14	FLOW
HARDNESS	286	253	269.9375	16	317	257	285.571	14	HARDNESS
TOTAL IRON	0.88	0	0.28788	9	1.98	0	0.9	14	TOTAL IRON
DISSOLVED IRON	0	0	0	6	0	0	0	14	DISSOLVED IRON
MAGNESIUM	24.68	21.8	23.0556	16	27.32	22.04	25.2585	14	MAGNESIUM
DISSOLVED MANGANESE	0.019	0	6.11111	9	0.088	0	1.25714	14	DISSOLVED MANGANESE
MANGANESE	0.002	0	2.85714	7	0	0	0	14	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.98	7.5	7.9275	16	8.41	8.12	8.25142	14	PH
POTASSIUM	2	0.92	1.24875	16	1.82	1.17	1.37571	14	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	6.45	5.22	5.73625	16	6.66	5	6.085	14	SODIUM
SULFATE	51	27	39.34375	16	65	39	52.4285	14	SULFATE
SUSPENDED SOLIDS	293	293	293	1	0				SUSPENDED SOLIDS
TEMPERATURE	9.6	5.2	6.9125	16	10.6	4.1	7.38571	14	TEMPERATURE
TOTAL DISSOLVED SOLIDS	330	259	303.0625	16	365	289	325.142	14	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 15, Township 16 South, Range 6 East, SLB&M. This site is located within the ½ mile offset of the Deer Creek mine permit boundary adjacent to Federal Coal leases UTU-84285 and UTU-88554.

Lease Association: Spring JV-34 is located adjacent to Federal Coal leases UTU-84285 and UTU-88554. The lease UTU-88554 was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Lease UTU-84285 was originally acquired from Bureau of Land Management on November 1, 2006. Mining in Lease UTU-84285 was prohibited to first mining only. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began the Hiawatha Seam in April 2006 under the provisions of a Federal Exploration License. Blind Canyon seam development began in November 2007. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production in Lease UTU-84285 occurring in August 2013. No mining occurred in the vicinity of JV-34.

Subsidence: No subsidence has been detected near JV-34. For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring JV-34. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - JV-34 spring located in Joes Valley alluvial basin near the 345 kV powerline. A series of springs emerge vertically through the alluvium creating marsh/wetland area. Flow from spring JV-34 varies dramatically based on winter pack on spring runoff, generally ranges from 0.0/seep to a maximum of 80.0 gpm.

Geologic Mode of Occurrence for spring JV-34:

- Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.
- Geologic Formation: Joes Valley Alluvium (refer to Geologic Occurrence sheet).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

- Stratigraphic Position: NA.

Justification for removal from monitoring: UJV-34 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-34 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **JV-34**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1565' S.	1860' E	NW	15	16S	6E	8692

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Joes Valley Alluvium	None	None	NA

Location Comments: Spring with multiple sources located near power line. Measured flow at confluence of several sources near road. Brass tag attached to brush.

Probable Recharge Area: Areas of higher elevation located to the north and east.

Relationship to Adjacent Springs: This spring occurs in the same manner as numerous springs in the immediate vicinity.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

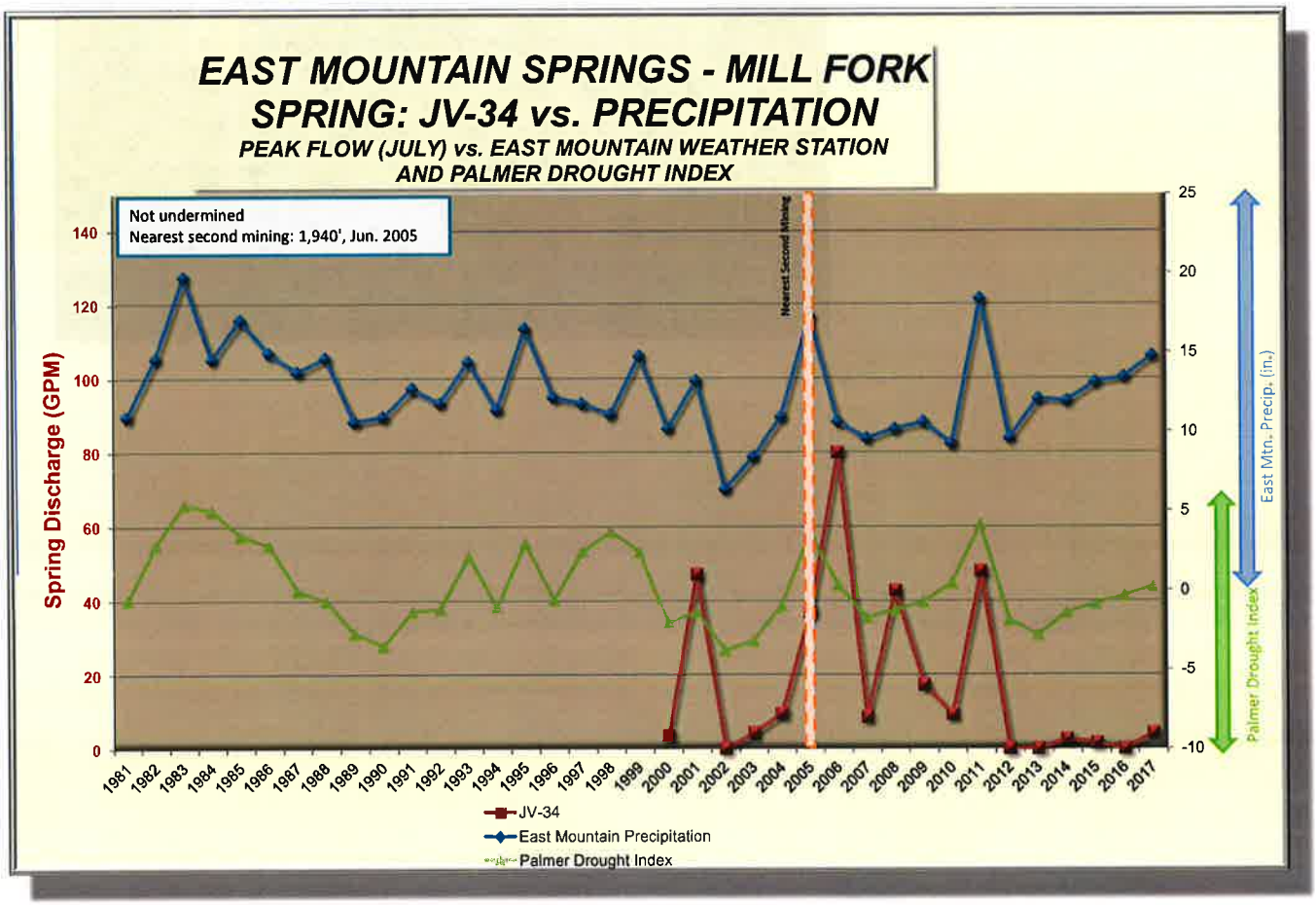
Geologic Occurrence of Spring:

Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

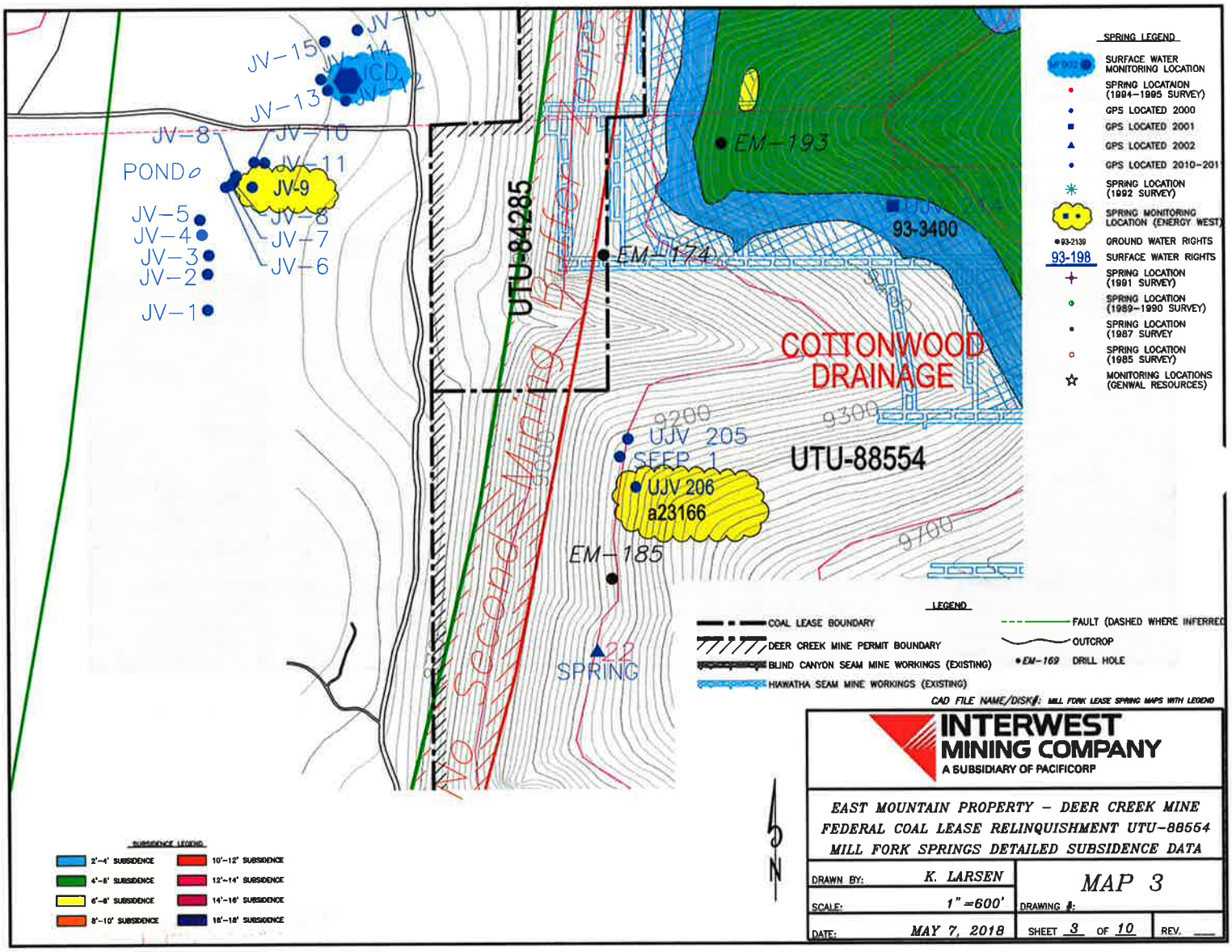
East Mountain Spring:	**JV-34**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**2670'**
Date of Nearest Mining:	**Aug-08**

	Pre-Mining Data: 20000101 THROUGH 20080801				Post-Mining Data: 20080831 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	400	282	323.285	14	351	278	310.538	13	BICARBONATE
CALCIUM	96.8	77	85.2414	14	101.05	79.99	87.9284	13	CALCIUM
CARBONATE	0	0	0	1	0	0	0	13	CARBONATE
CHLORIDE	5	1	3.02142	14	6	2	2.92307	13	CHLORIDE
CONDUCTIVITY	706	599	602.5	14	708	533	608.769	13	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	80	2.9	19.5071	14	48	0.23	8.82461	13	FLOW
HARDNESS	350	281	308.928	14	366	276	324.907	13	HARDNESS
TOTAL IRON	2.45	0.2	0.59161	13	1.36	0	0.23384	13	TOTAL IRON
DISSOLVED IRON	0.008	0	0.004	2	0	0	0	13	DISSOLVED IRON
MAGNESIUM	28.6	21	24.5685	14	28.54	22.51	25.83	13	MAGNESIUM
DISSOLVED MANGANESE	0.131	0.005	0.0495	10	0.074	0.004	2.56923	13	DISSOLVED MANGANESE
MANGANESE	0.052	0.003	0.0128	10	0.098	0	9.30769	13	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.26	7.84	8.06428	14	8.36	7.9	8.11615	13	PH
POTASSIUM	3.5	0.26	1.98615	13	2.1	0.4	1.19384	13	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8.75	6	7.41	14	8.78	6.65	7.88461	13	SODIUM
SULFATE	30	8	17.15	14	51	10	21.3846	13	SULFATE
SUSPENDED SOLIDS	304	304	304	1	0				SUSPENDED SOLIDS
TEMPERATURE	20.3	5	8.68571	14	20	3.8	11.9153	13	TEMPERATURE
TOTAL DISSOLVED SOLIDS	377	255	325.071	14	403	310	354.846	13	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Location: Section 22, Township 16 South, Range 6 East, SLB&M. This site is located within the ½ mile offset of the Deer Creek mine permit boundary adjacent to Federal Coal leases UTU-84285 and UTU-88554.

Lease Association: Spring JV-9 is located adjacent to Federal Coal leases UTU-84285 and UTU-88554. Lease UTU-88554 was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Lease UTU-84285 was originally acquired from Bureau of Land Management in November 1, 2006. Mining in Lease UTU-84285 was prohibited to first mining only. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in April 2006 under the provisions of a Federal Exploration License. Blind Canyon seam development began in November 2007. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production in Lease UTU-84285 occurring in August 2013. No mining occurred in the vicinity of JV-9.

Subsidence: No subsidence has been detected near **JV-9.** For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring JV-9. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - JV-9 spring is located in Joes Valley alluvial basin south of the Joes Valley cutoff road. A series of springs emerge vertically through the alluvium creating marsh/wetland area. Flow from spring JV-9 varies dramatically based on winter pack on spring runoff, and generally ranges from 0.0/seep to a maximum of 3.0 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring JV-9:

- Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.

- Geologic Formation: Joes Valley Alluvium (refer to Geologic Occurrence sheet).
- Stratigraphic Position: NA.

Justification for removal from monitoring: JV-9 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-9 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **JV-9**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
299' S.	1836' E	NW	22	16S	6E	8618

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Joes Valley Alluvium	None	None	NA

Location Comments: Spring (boiling up from small hole) located in Joes Valley south of FDR 040.

Probable Recharge Area: Areas of higher elevation located to the north and east.

Relationship to Adjacent Springs: This spring occurs in the same manner as numerous springs in the immediate vicinity.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

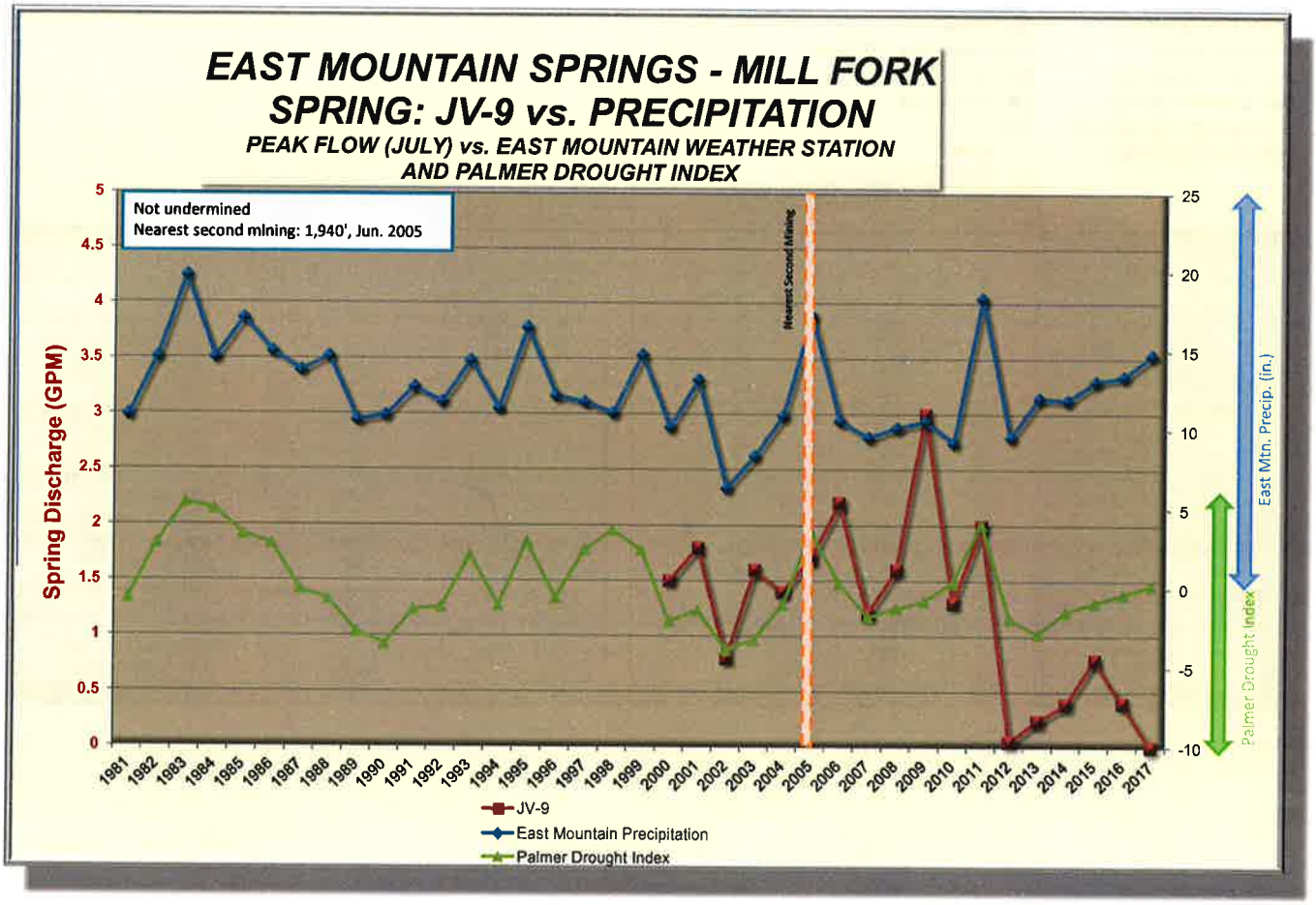
Geologic Occurrence of Spring:

Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.

Field reconnaissance October 19, 2000

Field reconnaissance May 9, 2018

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: JV-9
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1940'
Date of Nearest Mining: Jun-05

	Pre-Mining Data: 20000101 THROUGH 20050601				Post-Mining Data: 20050630 THROUGH 201712311				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	395	318	371.444	9	330	293	310.3	20	BICARBONATE
CALCIUM	89.7	80	86.0333	9	91.7	81.62	87.961	20	CALCIUM
CARBONATE	0				0	0	0	14	CARBONATE
CHLORIDE	5	4	4.36666	9	9	4	4.85	20	CHLORIDE
CONDUCTIVITY	750	639	676.333	9	762	516	677.95	20	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	1.8	0.8	1.29222	9	3	0.24	1.206	20	FLOW
HARDNESS	371	262	345.888	9	377	344	362.45	20	HARDNESS
TOTAL IRON	0.298	0.298	0.298	1	0.51	0	9.88235	17	TOTAL IRON
DISSOLVED IRON	0				0	0	0	14	DISSOLVED IRON
MAGNESIUM	35.8	33	34.5111	9	36.7	31.88	34.671	20	MAGNESIUM
DISSOLVED MANGANESE	0.014	0.002	0.008	2	0.054	0	0.01	18	DISSOLVED MANGANESE
MANGANESE	0.005	0.005	0.005	1	0.02	0	4.61111	18	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	7.64	7.22	7.35888	9	8.06	6.88	7.4085	20	PH
POTASSIUM	1.5	1	1.17888	9	2.66	1.22	1.4985	20	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8	6.83	7.14222	9	8.42	6.71	7.4575	20	SODIUM
SULFATE	59	48	52.0888	9	58	38	50.05	20	SULFATE
SUSPENDED SOLIDS	387	387	387	1	0				SUSPENDED SOLIDS
TEMPERATURE	6.9	4.9	6.13333	9	12.3	5.6	8.095	20	TEMPERATURE
TOTAL DISSOLVED SOLIDS	404	357	380	9	411	241	378	20	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Location: Section 22, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring UJV-206 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred near spring UJV-206.

Subsidence: No subsidence has been detected near UJV-206. **The 2017 Annual Subsidence Report reported that the subsidence north of the spring has been stable since at least 2009. UJV-206 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring UJV-206. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1993 through 1995 by Genwal Resources and by PacifiCorp from 2000 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - UJV-206 is located along power line corridor on a west facing slope overlooking Joes Valley surrounded by aspens and conifers. Spring drains to a trough adjacent to the spring. In 2003, Division of Water Rights approved a Change Application (a23166) was approved allowing the right to develop UJV-206 for use in recreational cabin and stock watering from a trough in the vicinity of the cabin.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring UJV-206:

- Water flowing down through fractures in the lower section of the Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Upper Price River (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 80' above base.

Justification for removal from monitoring: UJV-206 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-206 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN
MILL FORK SPRING & SEEP SURVEY
GEOLOGIC OCCURRENCE

Spring Name/Number: **UJV-206**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
3567' N.	3604' W	SE	22	16S	6E	9200

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Upper Price River	Developed With Vertical CMP, Diverted To Trough (not functioning)	93-3400 A23166	80' above base

Location Comments: Spring located along power line corridor on west facing slope overlooking Joes Valley surrounded with aspens and conifers.

Probable Recharge Area: Areas of higher elevation located to the east.

Relationship to Adjacent Springs: This spring occurs in the same manner as UJV-204 and UJV-205.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Occurrence of Spring: Water flowing down through fractures in the lower section of the Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

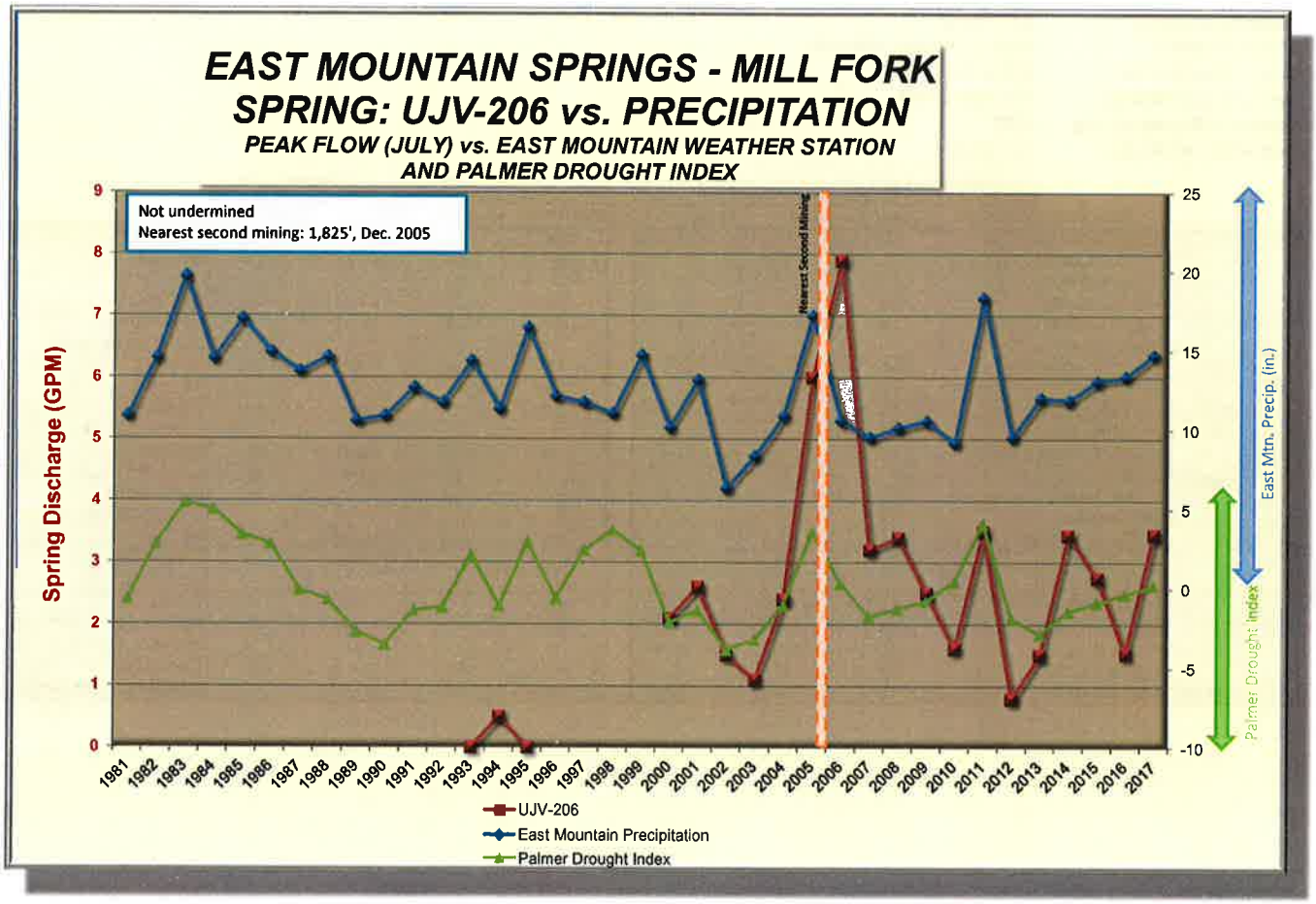
Spring UJV-206

UJV-206 Trough

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED

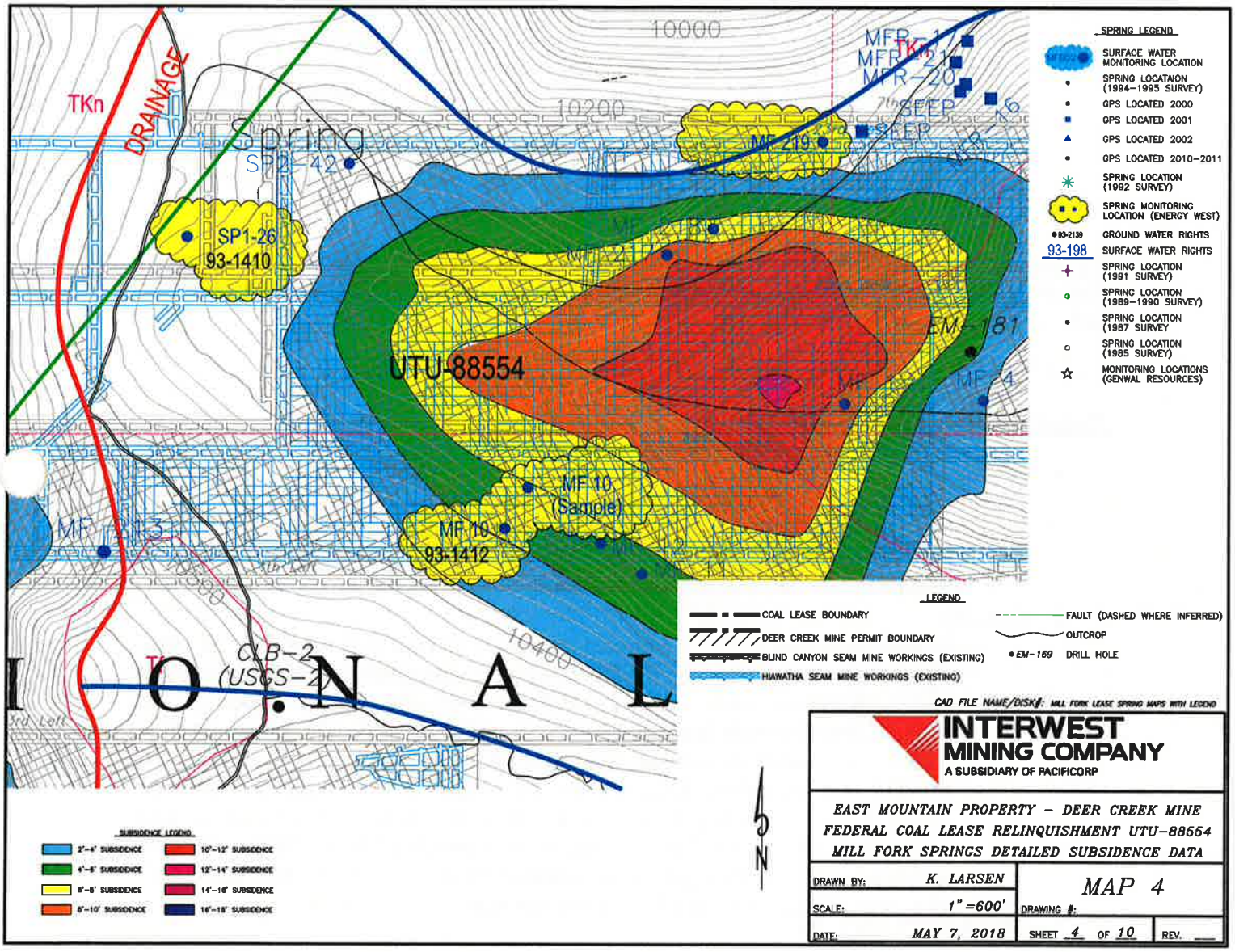
AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: UJV-206
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1825'
Date of Nearest Mining: Dec. 2005

	Pre-Mining Data: 20000101 THROUGH 20051130				Post-Mining Data: 20051201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	294	239	270.545	11	259	221	235.086	23	BICARBONATE
CALCIUM	69.7	61	66.5727	11	76.27	61.98	67.7221	23	CALCIUM
CARBONATE	0				0	0	0	20	CARBONATE
CHLORIDE	6	4	4.5	11	6	4	4.7826	23	CHLORIDE
CONDUCTIVITY	615	490	521.727	11	672	438	521.26	23	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	6	0.5	2.33181	11	8.5	0.38	2.58608	23	FLOW
HARDNESS	271	243	262	11	303	243	267.086	23	HARDNESS
TOTAL IRON	0.11	0.1	0.105	2	0.06	0	2.85714	21	TOTAL IRON
DISSOLVED IRON	0				0	0	0	20	DISSOLVED IRON
MAGNESIUM	24.9	22	23.2636	11	27.45	21.31	23.796	23	MAGNESIUM
DISSOLVED MANGANESE	0				0.006	0	0.0003	20	DISSOLVED MANGANESE
MANGANESE	0				0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.33	7.79	8.04363	11	8.1	7.35	7.88956	23	PH
POTASSIUM	2	1	1.49	11	2.03	1.42	1.68434	23	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8	5.83	6.37909	11	6.73	5.16	6.29652	23	SODIUM
SULFATE	42	23	31.809	11	46	21	33.6956	23	SULFATE
SUSPENDED SOLIDS	290	290	290	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.4	4.7	5	11	8.2	4.6	6.26956	23	TEMPERATURE
TOTAL DISSOLVED SOLIDS	309	257	288	11	328	246	297.217	23	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 11, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MF-219 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First and second mining occurred in vicinity of MF-219 in both the Blind Canyon and Hiawatha seams, (Blind Canyon, second mining 7th Left longwall panel April 2010 and Hiawatha, first mining 23rd West gateroad, on February 2011).

Subsidence: No subsidence has been detected near MF-219. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. MF-219 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-219. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-219 is a spring/seep located along the reclaimed access road to Mill Fork Ridge originally developed as a fire access road and later used to access coal exploration sites for ARCO Coal. Access road reclaimed in the 1980's. MF-219 is located on a south facing slope surrounded with conifers. Flow from spring MF-219 generally ranges from 0.0/seep to a maximum of <15.0 gpm.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-219:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 260' below top.

Justification for removal from monitoring: MF-219 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-219 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-219**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1508' N.	47' W.	SE	11	16S	6E	10220

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	None	260' below top

Location Comments: Spring located above reclaimed road on south facing slope covered with conifers. Seep located between MF-218 and MF-219.

Probable Recharge Area: Areas of higher elevation located to the northwest.

Relationship to Adjacent Springs: This spring occurs in the same manner as MF-217 and MF-218.

INCORPORATED

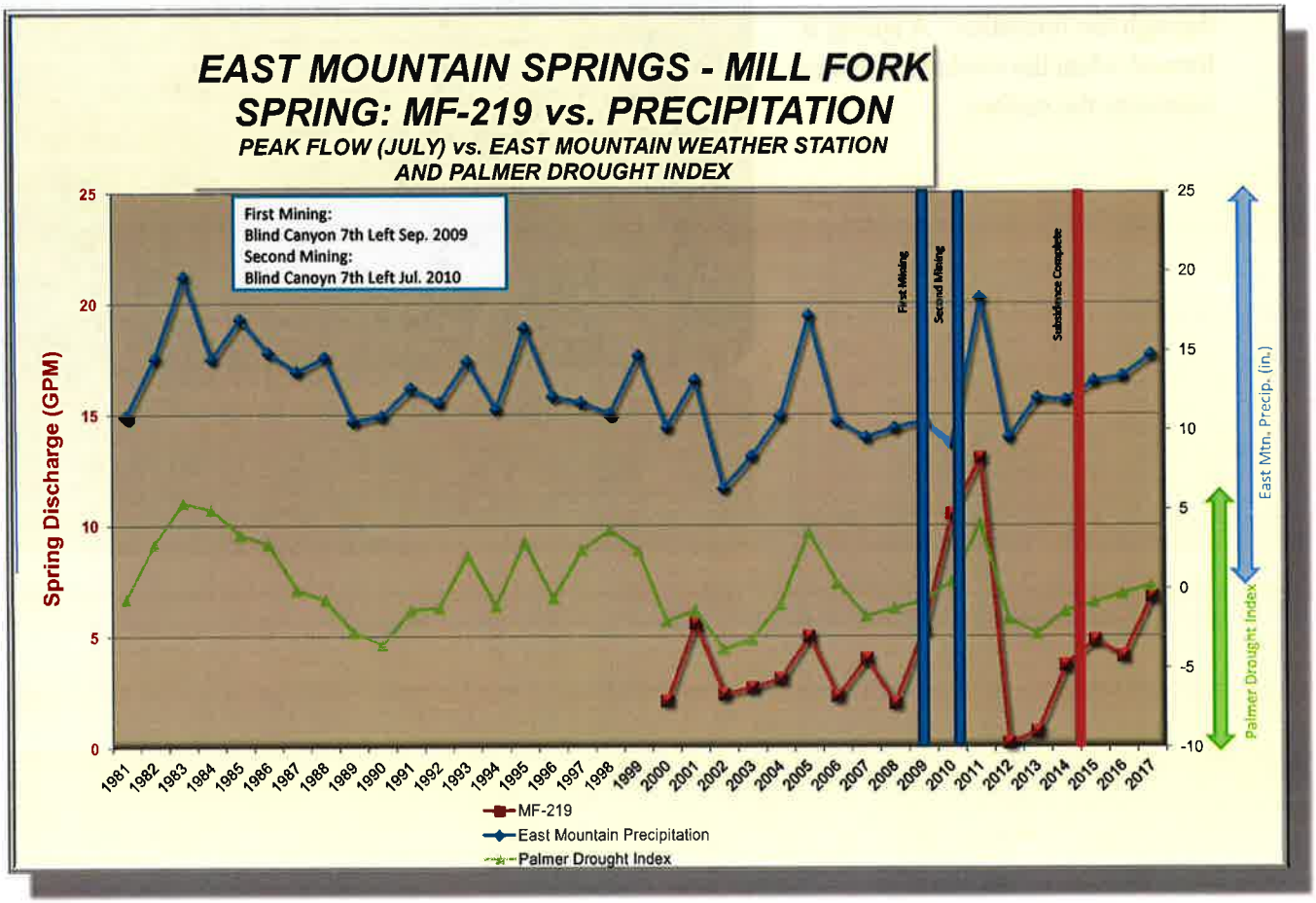
AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: MF-219
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Feb-11 Hiawatha 23rd West
Date of Second Mining: Apr-10 Blind Canyon 7th Left
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20110201 THROUGH 201712311				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	292	210	240.833	18	258	207	226.857	14	BICARBONATE
CALCIUM	70.7	59	66.1916	18	75.08	55.59	63.0285	14	CALCIUM
CARBONATE	0	0	0	4	0	0	0	14	CARBONATE
CHLORIDE	3	1	1.98333	18	3	1	1.85714	14	CHLORIDE
CONDUCTIVITY	557	417	500.611	18	574	410	479.714	14	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	5.5	2	3.24277	18	13.04	0.09	4.04	14	FLOW
HARDNESS	285	224	261.666	18	320	239	262.571	14	HARDNESS
TOTAL IRON	1.04	0.06	0.285	12	0.09	0	0.01	14	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0	0	0	14	DISSOLVED IRON
MAGNESIUM	26.4	16.4	23.4016	18	32.29	22.14	25.5328	14	MAGNESIUM
DISSOLVED MANGANESE	0.134	0.002	1.94166	12	0.009	0	2.64285	14	DISSOLVED MANGANESE
MANGANESE	0.04	0	8.22222	9	0.004	0	5.71428	14	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.15	7.45	7.88888	18	8.52	7.82	8.11	14	PH
POTASSIUM	1.6	1	1.17352	17	2.52	1.34	1.69357	14	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	1.7	2.40333	18	3.01	1.99	2.44071	14	SODIUM
SULFATE	36	8	27.65	18	65	19	32.5	14	SULFATE
SUSPENDED SOLIDS	268	268	268	1	0				SUSPENDED SOLIDS
TEMPERATURE	8.7	2	5.41666	18	48.4	2.9	11.9928	14	TEMPERATURE
TOTAL DISSOLVED SOLIDS	331	205	272.555	18	322	204	279.714	14	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 11, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring SPI-26 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of SPI-26 in both the Blind Canyon and Hiawatha seams, (Blind Canyon, 7th Left longwall panel bleeder June 2009 and Hiawatha, 23rd West inter-panel barrier, in November 2010).

Subsidence: No subsidence has been detected near SPI-26. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. SPI-26 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring SPI-26. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - SPI-26 is a spring located near the main Mill Fork ridge road. SPI-26 is located on east facing slope surrounded with conifers. **Site crudely developed with 1" PVC** diverting flow to old steel bath tub. Flow from spring SPI-26 generally ranges from ~ 2 gpm to a maximum of 55.0 gpm.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring SPI-26:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 260' below top.

Justification for removal from monitoring: SPI-26 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site SPI-26 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **SP1-26**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1041' N.	3349' W.	SE	11	16S	6E	10340

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	1" PVC Pipe Feeds Old Bath Tub	93-1410	170' below top

Location Comments: Spring near main reclaimed road on east facing slope covered with conifers. Flow measured below multiple sources.

Probable Recharge Area: Areas of higher elevation located to the west (recharge limited).

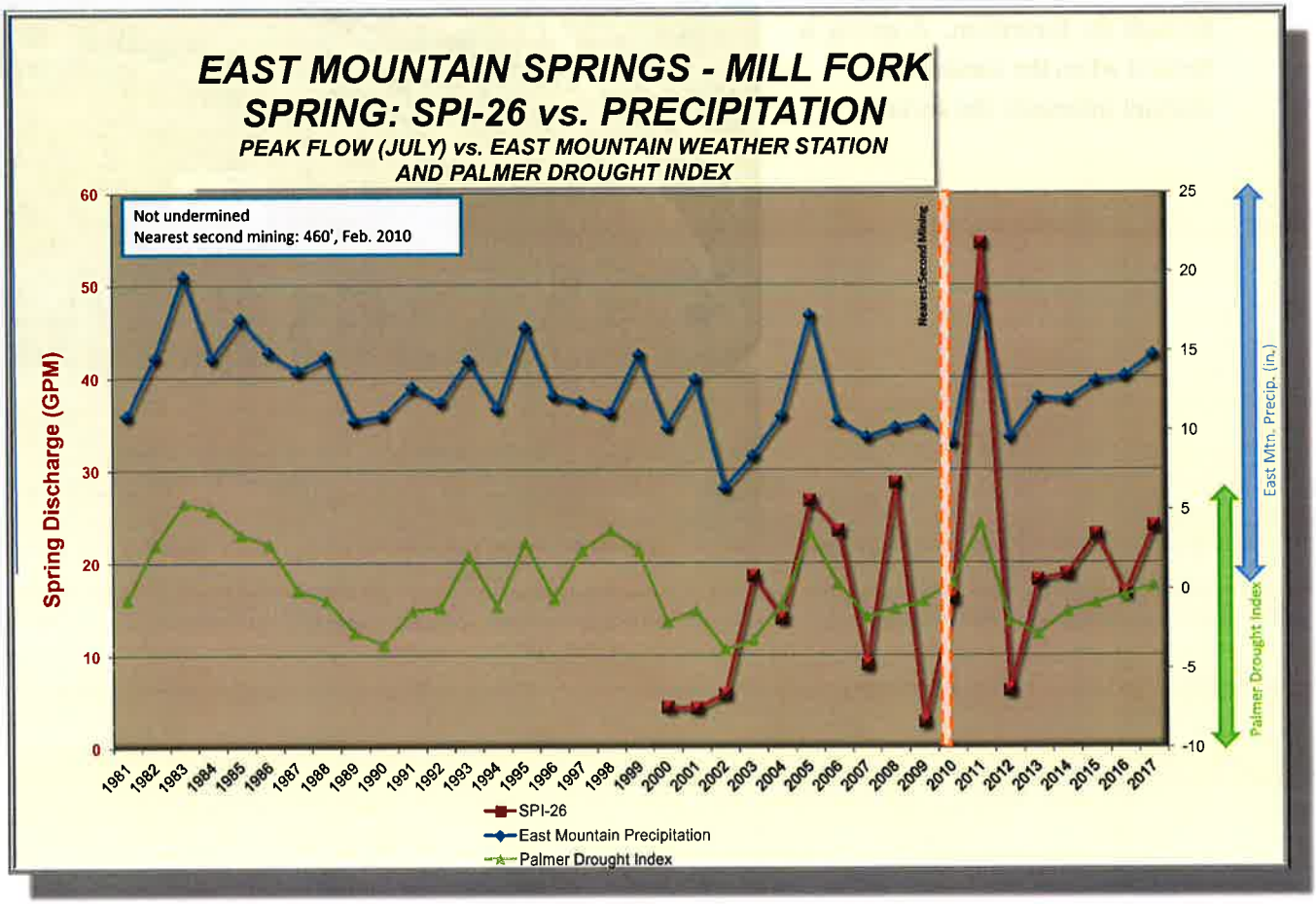
Relationship to Adjacent Springs: This spring occurs in the same manner as SP2-42.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**SP1-26**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**460'**
Date of Nearest Mining:	**Feb. 2010**

	Pre-Mining Data: 20000101 THROUGH 20100131				Post-Mining Data: 20100201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	258	185	213.21	19	226	184	203.588	17	BICARBONATE
CALCIUM	66	55	60.2105	19	72.65	49.56	59.9947	17	CALCIUM
CARBONATE	0	0	0	4	0	0	0	17	CARBONATE
CHLORIDE	4	1	2.57368	19	3	1	2.17647	17	CHLORIDE
CONDUCTIVITY	525	391	431.157	19	530	378	419.176	17	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	28.6	2.5	9.41666	18	54.5	0.7	12.85875	16	FLOW
HARDNESS	238	199	213.789	19	282	204	217.058	17	HARDNESS
TOTAL IRON	1.63	0	0.44571	7	0.31	0	0.11058	17	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0.04	0	2.35294	17	DISSOLVED IRON
MAGNESIUM	17.8	14	15.4068	19	24.68	14.09	16.3558	17	MAGNESIUM
DISSOLVED MANGANESE	0.07	0	1.95714	7	0.047	0	9.7647	17	DISSOLVED MANGANESE
MANGANESE	0.008	0	0.0018	5	0	0	0	17	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.4	7.44	7.79526	19	8.57	7.69	8.04117	17	PH
POTASSIUM	1.06	0.566	0.71464	14	1.51	0.51	0.79829	17	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3	1.79	2.22	19	6.43	1.61	2.47235	17	SODIUM
SULFATE	10	5	7.06842	19	58	5	9.11764	17	SULFATE
SUSPENDED SOLIDS	214	214	214	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.5	3.8	4.67894	19	12.6	4.1	5.85882	17	TEMPERATURE
TOTAL DISSOLVED SOLIDS	278	206	233.052	19	396	217	239	17	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 14, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MF-10 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred in vicinity of MF-10 in both the Blind Canyon and Hiawatha seams, (Blind Canyon, 5th Left longwall panel, July 2009 and Hiawatha, 21st West panel, January 2011).

Subsidence: Approximately 4' of subsidence has been detected near MF-10. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2013.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-10. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-10 is a spring located along natural bench directly below a massive sandstone channel on north facing slope covered with conifers. Flow from spring MF-10 generally ranges from ~ 5 gpm to a maximum of 60 gpm.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-10:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 200' below top.

Justification for removal from monitoring: MF-10 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-10 be removed from the monitoring program.

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-10**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
282' S.	1572' W.	NE	14	16S	6E	10250

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-1412	200' below top

Location Comments: Spring located along natural bench directly below a massive sandstone channel on north facing slope covered with conifers.

Probable Recharge Area: Areas of higher elevation located to the southwest.

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity.

INCORPORATED

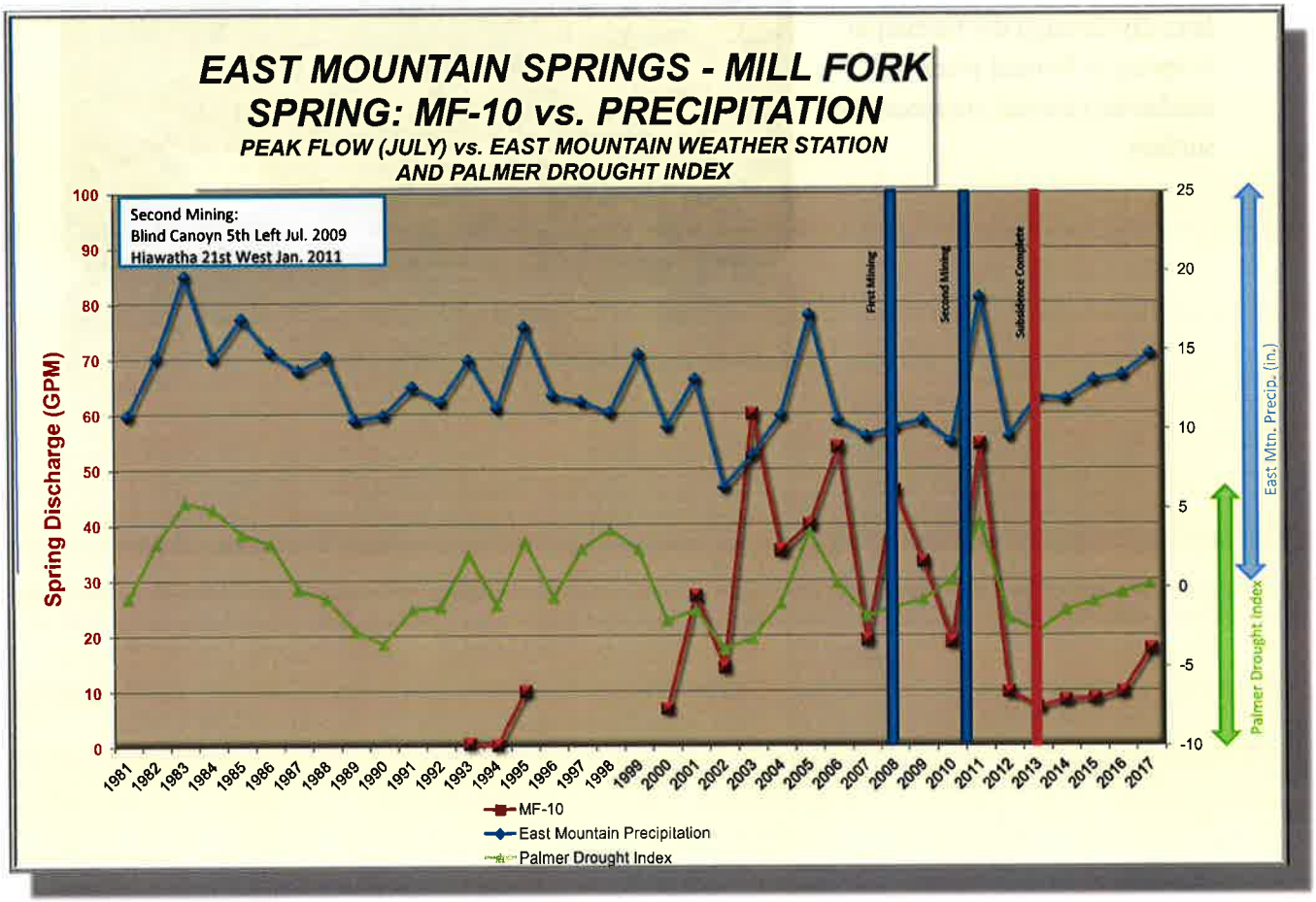
AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

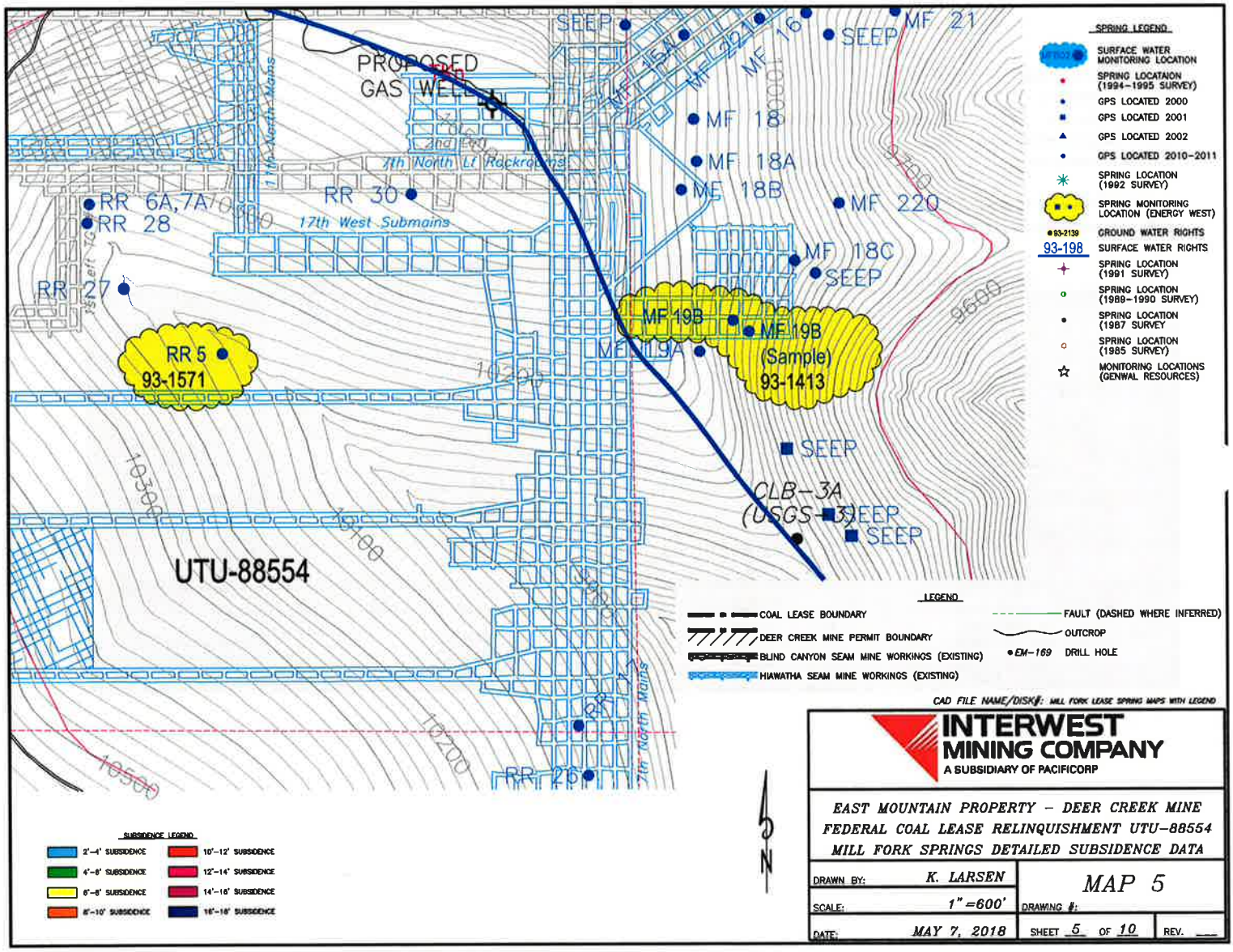
AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: MF-10
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Na
Date of Second Mining: Jul-09 Blind Canyon 5th Left
Jan-11 Hiawatha 21st West
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20090630				Post-Mining Data: 20090701 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	256	181	217.882	17	228	178	193.941	17	BICARBONATE
CALCIUM	61.3	50	55.6664	17	60.96	46.7	51.0194	17	CALCIUM
CARBONATE	5	0	1.66666	3	10	0	0.58823	17	CARBONATE
CHLORIDE	4	1	1.7125	16	2	0	0.7647	17	CHLORIDE
CONDUCTIVITY	464	394	423.882	17	412	352	388.882	17	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	60	6.8	21.8647	17	54.5	0.41	10.6289	15	FLOW
HARDNESS	234	206	218.411	17	221	193	207.705	17	HARDNESS
TOTAL IRON	0	0	0	2	0	0	0	17	TOTAL IRON
DISSOLVED IRON	0	0	0	2	0	0	0	17	DISSOLVED IRON
MAGNESIUM	21	16.9	19.2717	17	22.17	16.43	19.5064	17	MAGNESIUM
DISSOLVED MANGANESE	0.006	0	0.002	3	0.01	0	8.23529	17	DISSOLVED MANGANESE
MANGANESE	0.006	0	0.002	3	0.01	0	5.88235	17	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.46	7.41	8.09764	17	8.46	7.76	8.18829	17	PH
POTASSIUM	2.18	0.49	0.9065	12	1.89	0.49	0.91	17	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	1.57	2.28295	17	2.66	1.64	2.13176	17	SODIUM
SULFATE	9	5	7.45294	17	11	4	6.94117	17	SULFATE
SUSPENDED SOLIDS	216	216	216	1	0				SUSPENDED SOLIDS
TEMPERATURE	23	1.6	4.15294	17	8.4	0.2	3.9	17	TEMPERATURE
TOTAL DISSOLVED SOLIDS	254	199	229.764	17	241	193	221.47	17	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Location: Section 13, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MF-19B is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of MF-19B in the Hiawatha seam, (7th North Sump, January 2006).

Subsidence: No subsidence has been detected near MF-19B. **The 2017 Annual Subsidence Report reported that the subsidence north of the spring has been stable since at least 2013. MF-19B is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-19B. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-19B is located along natural bench directly below a massive sandstone channel on an east facing slope covered with conifers. Sampled approximately 100' below spring source. Flow from spring MF-19B generally ranges from 0 gpm to a maximum of 2.5 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-19B:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 400' below top.

Justification for removal from monitoring: MF-19B has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-19B be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-19B**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2136' N.	529' E.	SW	13	16S	6E	10111

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-1413	400' below top

Location Comments: Spring located along natural bench directly below massive sandstone channel on east facing slope covered with conifers. Sampled approximately 100' below spring source.

Probable Recharge Area: Areas of higher elevation located to the west.

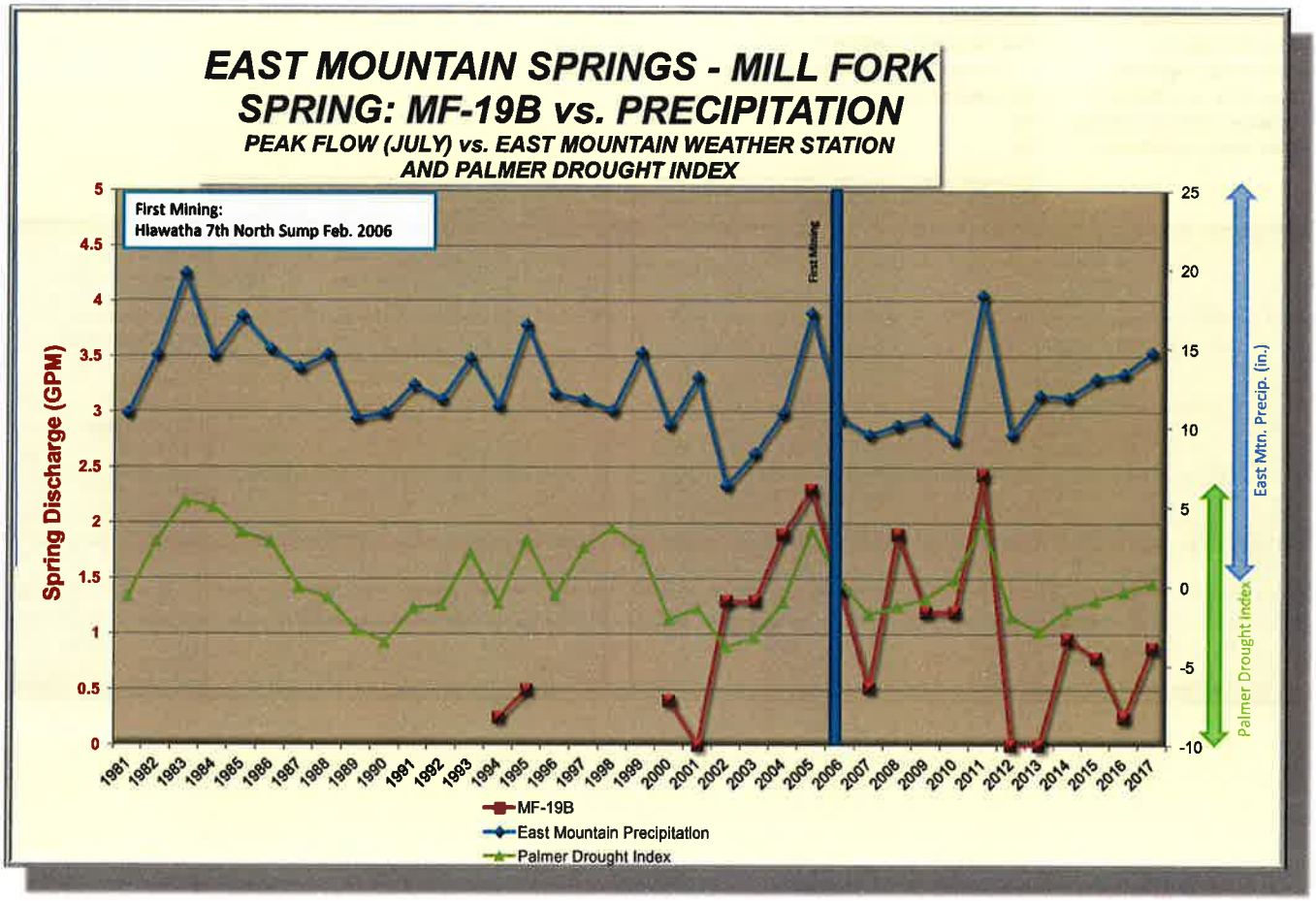
Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity.

RECEIVED
AUG 17 2018
Div. of Oil, Gas &

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MF-19B
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Feb-10 Hiawatha 7th North Sump
Date of Second Mining: Not undermined
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20060131				Post-Mining Data: 20060201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	286	215	245.857	7	246	209	226.944	18	BICARBONATE
CALCIUM	67.3	58	64.7285	7	78.71	62.6	66.6505	18	CALCIUM
CARBONATE	0				19	0	2.86666	15	CARBONATE
CHLORIDE	2	1	1.16666	6	6	0	2	18	CHLORIDE
CONDUCTIVITY	462	420	431.428	7	551	430	460.944	18	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	2.3	0.52	1.26142	7	2.48	0.22	0.92588	17	FLOW
HARDNESS	245	231	238.428	7	287	232	246.055	18	HARDNESS
TOTAL IRON	4.59	0.18	1.1488	5	0.31	0	0.088125	16	TOTAL IRON
DISSOLVED IRON	0				0	0	0	14	DISSOLVED IRON
MAGNESIUM	21	17.5	18.6428	7	21.99	17.2	19.325	18	MAGNESIUM
DISSOLVED MANGANESE	0.055	0.005	0.02275	4	0.02	0	7.26666	15	DISSOLVED MANGANESE
MANGANESE	0.293	0.002	0.10366	3	0.003	0	3.33333	15	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.39	8.06	8.27857	7	8.52	8	8.29611	18	PH
POTASSIUM	1.28	0.92	0.6372	5	2.1	0.81	0.97222	18	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3	1.59	1.83571	7	4.44	1.09	1.95888	18	SODIUM
SULFATE	7	4	6.14285	7	12	4	6.38888	18	SULFATE
SUSPENDED SOLIDS	237	237	237	1	0				SUSPENDED SOLIDS
TEMPERATURE	9.6	3.9	6.18571	7	12.8	3.7	8.16666	18	TEMPERATURE
TOTAL DISSOLVED SOLIDS	252	211	235.571	7	287	222	258.444	18	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 14, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring RR-5 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of RR-5 in the Hiawatha seam, (17th West gateroad development, December 2006).

Subsidence: No subsidence has been detected near RR-5. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2011. RR-5 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring RR-5. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - RR-5 is located in a clearing on an east facing slope surrounded by conifers. Flow from spring RR-5 generally ranges from 0/seep to a maximum of 34 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring RR-5:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 360' below top.

Justification for removal from monitoring: RR-5 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site RR-5 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **RR-5**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1952' N.	2140' W.	SE	14	16S	6E	10160

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-1571	360' below top

Location Comments: Spring located in clearing on east facing slope surrounded with conifers.

Probable Recharge Area: Areas of higher elevation located to the west (recharge limited).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity (RR-28, RR-6, RR-7A, RR-27, RR-4).

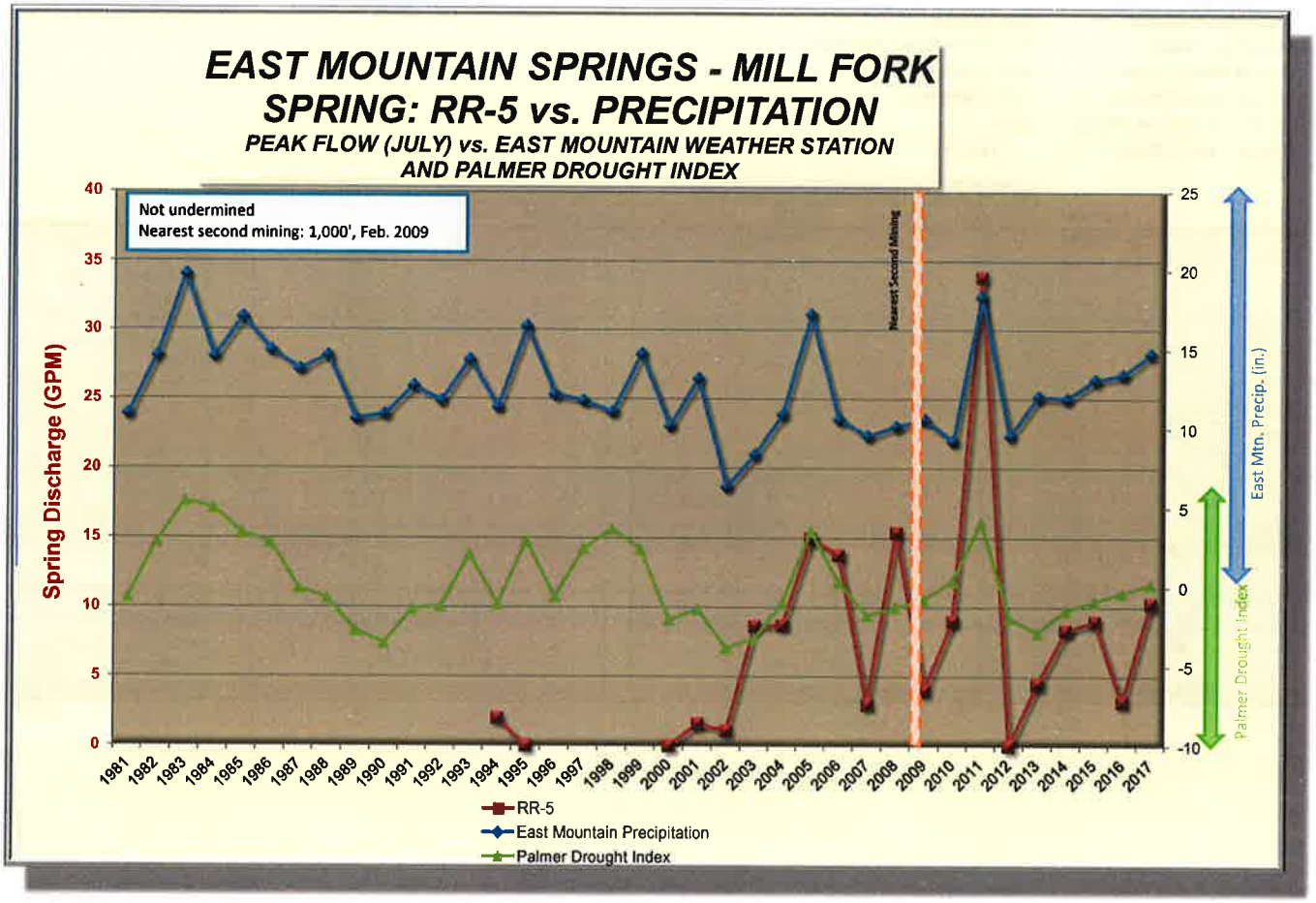
Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

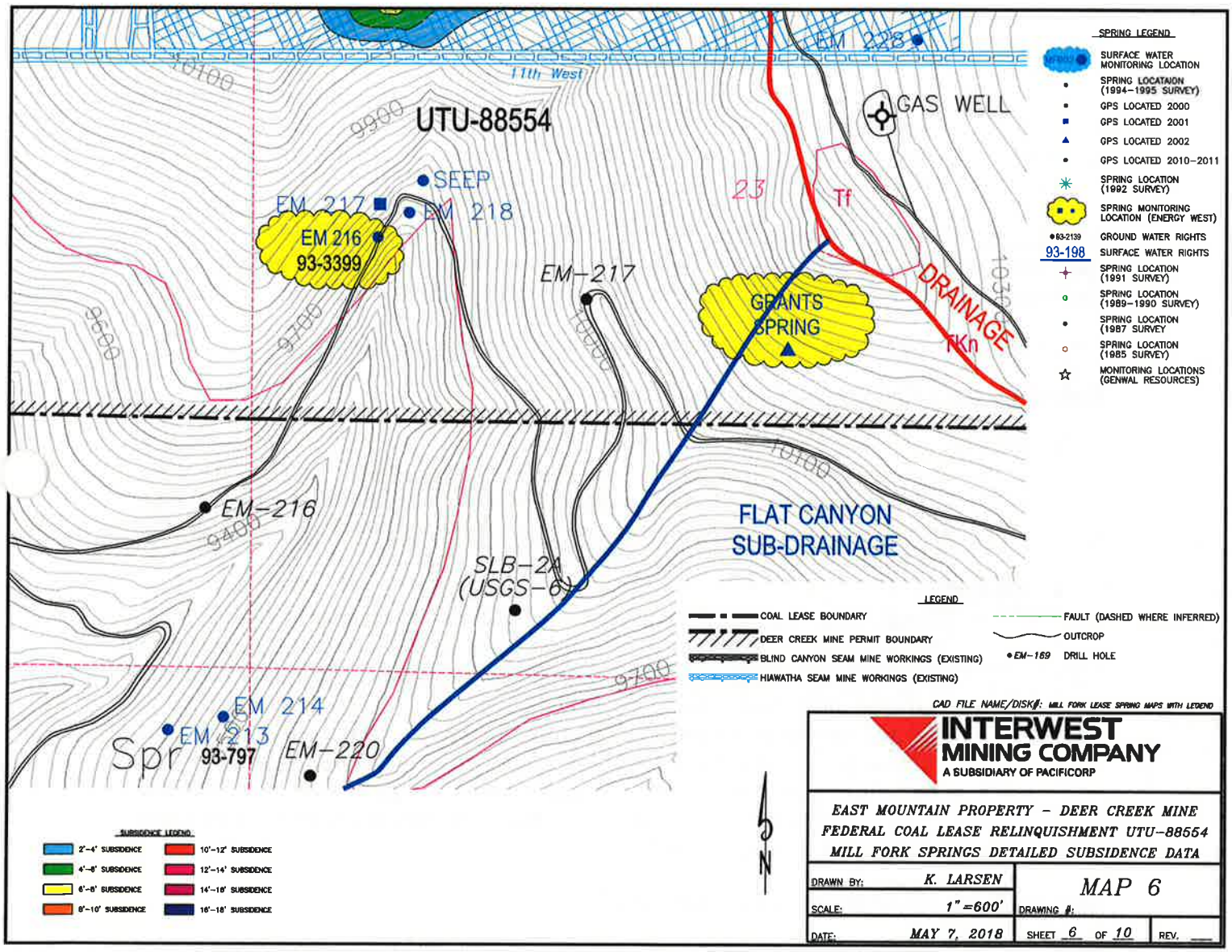
East Mountain Spring: RR-5
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1000'
Date of Nearest Mining: Feb-09

	Pre-Mining Data: 20000101 THROUGH 20090131				Post-Mining Data: 20090228 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	286	192	216.181	11	221	192	205.25	12	BICARBONATE
CALCIUM	74.99	61.7	64.5018	11	66.55	52.85	60.9233	12	CALCIUM
CARBONATE	0	0	0	2	0	0	0	12	CARBONATE
CHLORIDE	2	1	1.72727	11	2	0	0.75	12	CHLORIDE
CONDUCTIVITY	504	407	442.818	11	432	386	409.833	12	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	15.4	0.5	7.22909	11	33.8	0.42	7.58083	12	FLOW
HARDNESS	249	220	229.454	11	235	205	220.933	12	HARDNESS
TOTAL IRON	0.78	0.1	0.300125	8	1.65	0	0.24166	12	TOTAL IRON
DISSOLVED IRON	0	0	0	2	0	0	0	12	DISSOLVED IRON
MAGNESIUM	17.3	15.44	16.6818	11	17.89	14.53	16.62	12	MAGNESIUM
DISSOLVED MANGANESE	0.045	0.002	1.27142	7	0.055	0	1.20833	12	DISSOLVED MANGANESE
MANGANESE	0.018	0	0.0094	5	0.012	0	0.001	12	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.23	7.83	7.8009	11	8.4	7.55	7.96583	12	PH
POTASSIUM	0.99	0.91	0.50444	9	0.99	0.95	0.5675	12	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3	1.52	1.81	11	2.16	1.52	1.8325	12	SODIUM
SULFATE	10	7	8.72727	11	10	6	8.08333	12	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	5.6	3	4.17272	11	10.4	3.7	5.425	12	TEMPERATURE
TOTAL DISSOLVED SOLIDS	274	209	243.363	11	255	223	238	12	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring EM-216 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred 975' north of EM-216 in the Hiawatha Seam on September 2005.

Subsidence: Maximum subsidence in area 975' north of EM-216 has stabilized at approximately 6 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2008. EM-216 is outside of the subsided area.

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring EM-216. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected since 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. EM-216 is a low volume spring/seep located along the Mill Fork access road. Flow from spring EM-216 generally ranges from 0.0 gpm to a maximum of 1.3 gpm. Flow from EM-216 normally occurs early in the year and dissipates rapidly with recordable flow rarely existing after the month of July.

Geologic Mode of Occurrence for spring EM-216:

- Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 75' above base.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Justification for removal from monitoring: EM-216 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site EM-216 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **EM-216**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2250' N.	651' E.	SW	23	16S	6E	9740

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-3399	75' above base

Location Comments: Spring located on south facing slope adjacent to East Mountain Access Road.

Probable Recharge Area: Highlands area to the north.

Relationship to Adjacent Springs: This spring occurs in the same manner as EM-218.

INCORPORATED

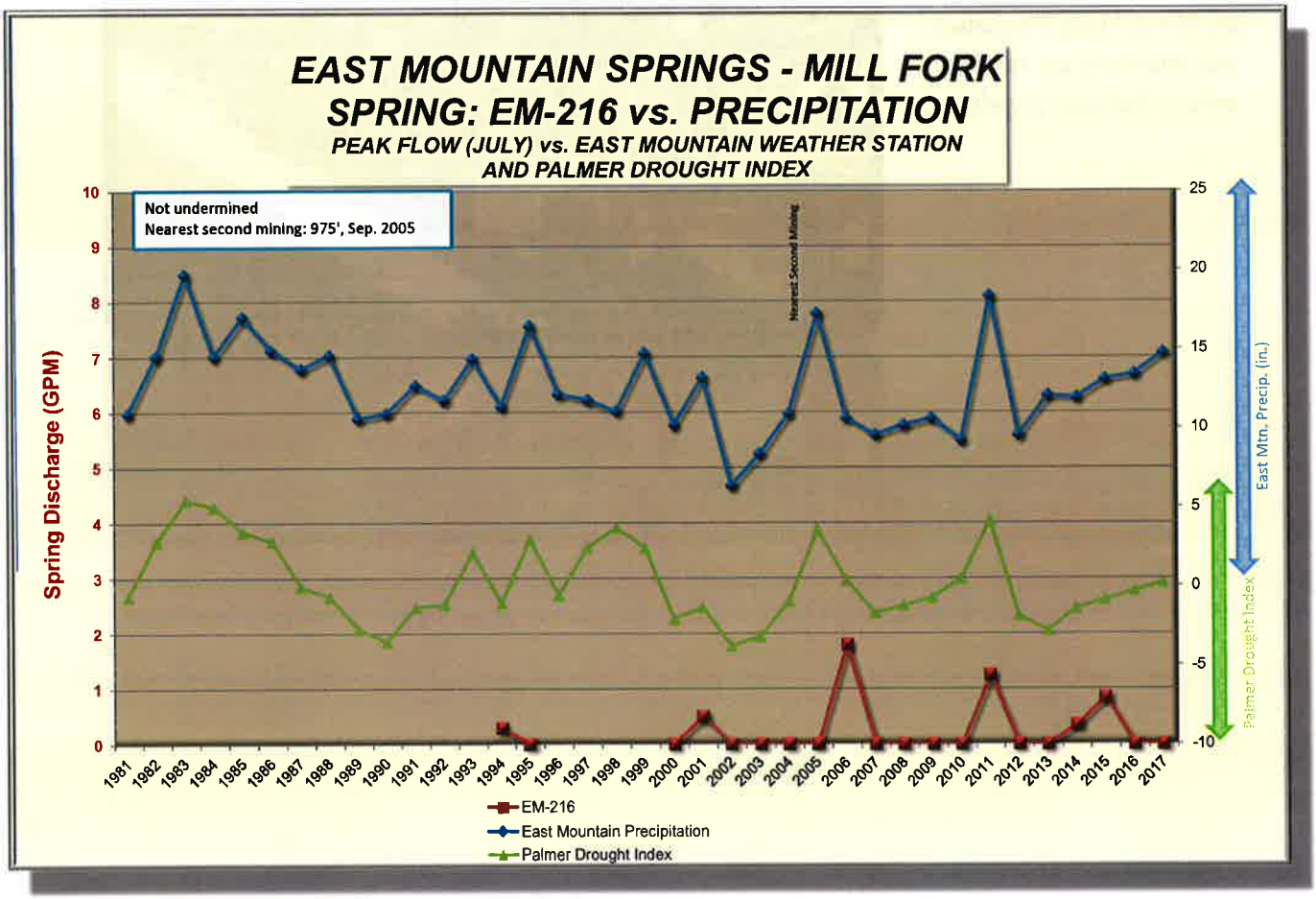
AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: EM-216
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 975'
Date of Nearest Mining: Sep-05

	Pre-Mining Data: 2000101 THROUGH 20050801				Post-Mining Data: 20050831 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	- No Sample Data -				298	240	272.75	4	BICARBONATE
CALCIUM					94.6	70.16	81.235	4	CALCIUM
CARBONATE					0	0	0	3	CARBONATE
CHLORIDE					3	2	2.5	4	CHLORIDE
CONDUCTIVITY					663	502	579.25	4	CONDUCTIVITY
DISSOLVED OXYGEN					0				DISSOLVED OXYGEN
FLOW					1.8	0.35	1.06	4	FLOW
HARDNESS					344	273	304.25	4	HARDNESS
TOTAL IRON					0.19	0	8.66666	3	TOTAL IRON
DISSOLVED IRON					0	0	0	3	DISSOLVED IRON
MAGNESIUM					26.2	22.52	24.6675	4	MAGNESIUM
DISSOLVED MANGANESE					0.022	0	0.00825	4	DISSOLVED MANGANESE
MANGANESE					0.012	0	0.0055	4	MANGANESE
OIL AND GREASE					0				OIL AND GREASE
PH					8.36	7.66	7.965	4	PH
POTASSIUM					0.89	0.57	0.75	4	POTASSIUM
SET SOLIDS					0				SET SOLIDS
SODIUM					4.31	3.76	4.025	4	SODIUM
SULFATE					31	19	22.75	4	SULFATE
SUSPENDED SOLIDS					0				SUSPENDED SOLIDS
TEMPERATURE					17.7	9.3	13.575	4	TEMPERATURE
TOTAL DISSOLVED SOLIDS					319	278	304	4	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Grants Spring is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred 1,560' north of Grants Spring in the Hiawatha Seam in November 2005.

Subsidence: Maximum subsidence in area 1,560' north of Grants Spring has stabilized at approximately 6 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2008. Grants Spring is outside of the subsided area.

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring Grants Spring Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected since 2002 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Grants Spring is a low volume spring/seep located below ridge on west facing slope above main Mill Fork access road vegetated with conifers and aspens. Flow from spring Grants Spring generally ranges from 0.5 gpm to a maximum of <3 gpm.

Geologic Mode of Occurrence for spring Grants Spring:

- Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 160' below top.

Justification for removal from monitoring: Grants Spring has been monitored by PacifiCorp since 2002. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site Grants Spring be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **GRANTS SPRING**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1692' N.	2542' W.	SE	23	16S	6E	10280

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	Developed With Steel Pipe Diverted to Trough (not functioning)	None	160' below top

Location Comments: Spring located below ridge on west facing slope above main access road. Area surrounding the spring source vegetated with conifers and aspens.

Probable Recharge Area: Highlands area to the northeast (recharge limited).

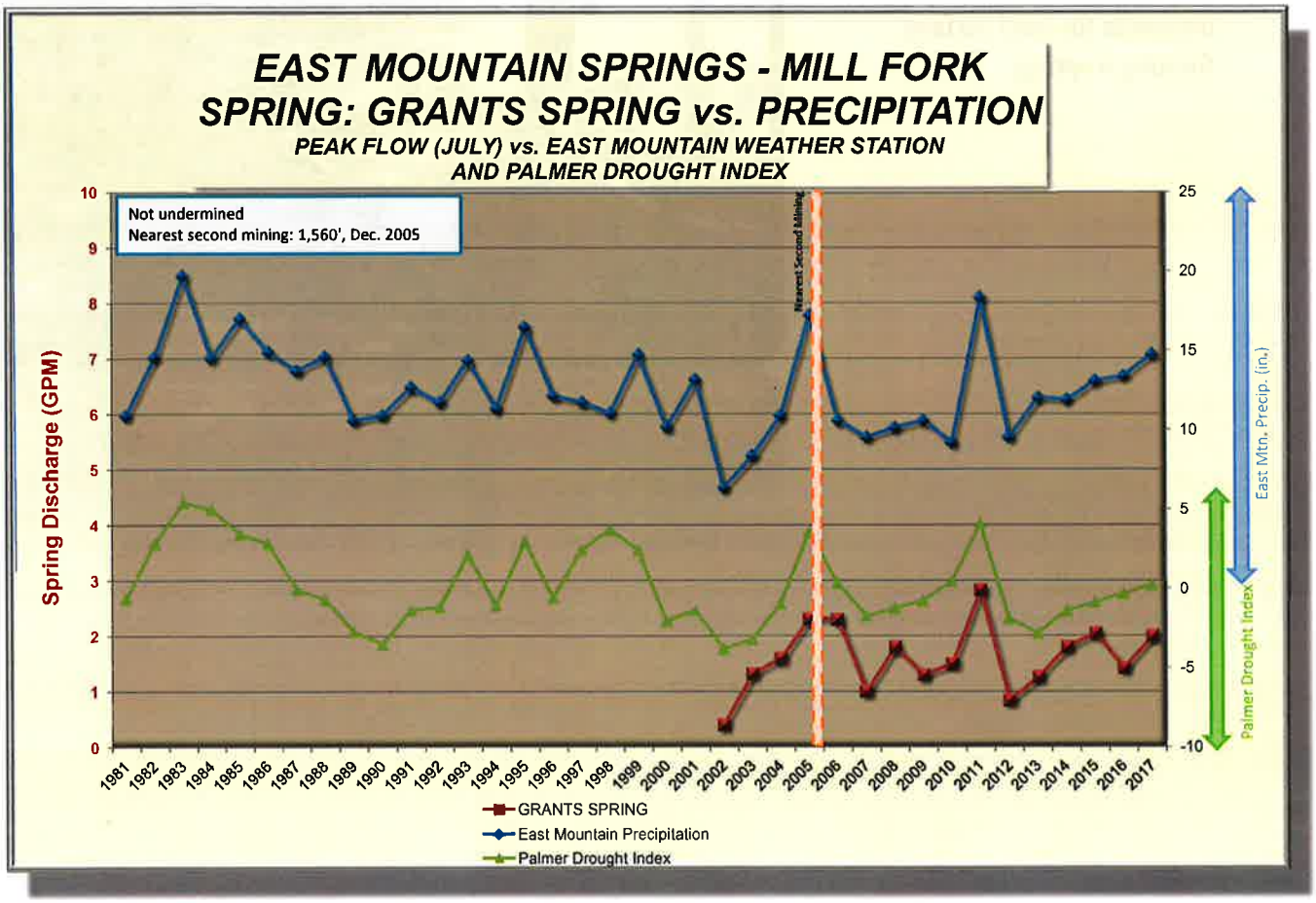
RECEIVED
AUG 17 2018
DIV. OF OIL, GAS & MINING

Relationship to Adjacent Springs: This spring occurs in the same manner as EMPOND.

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

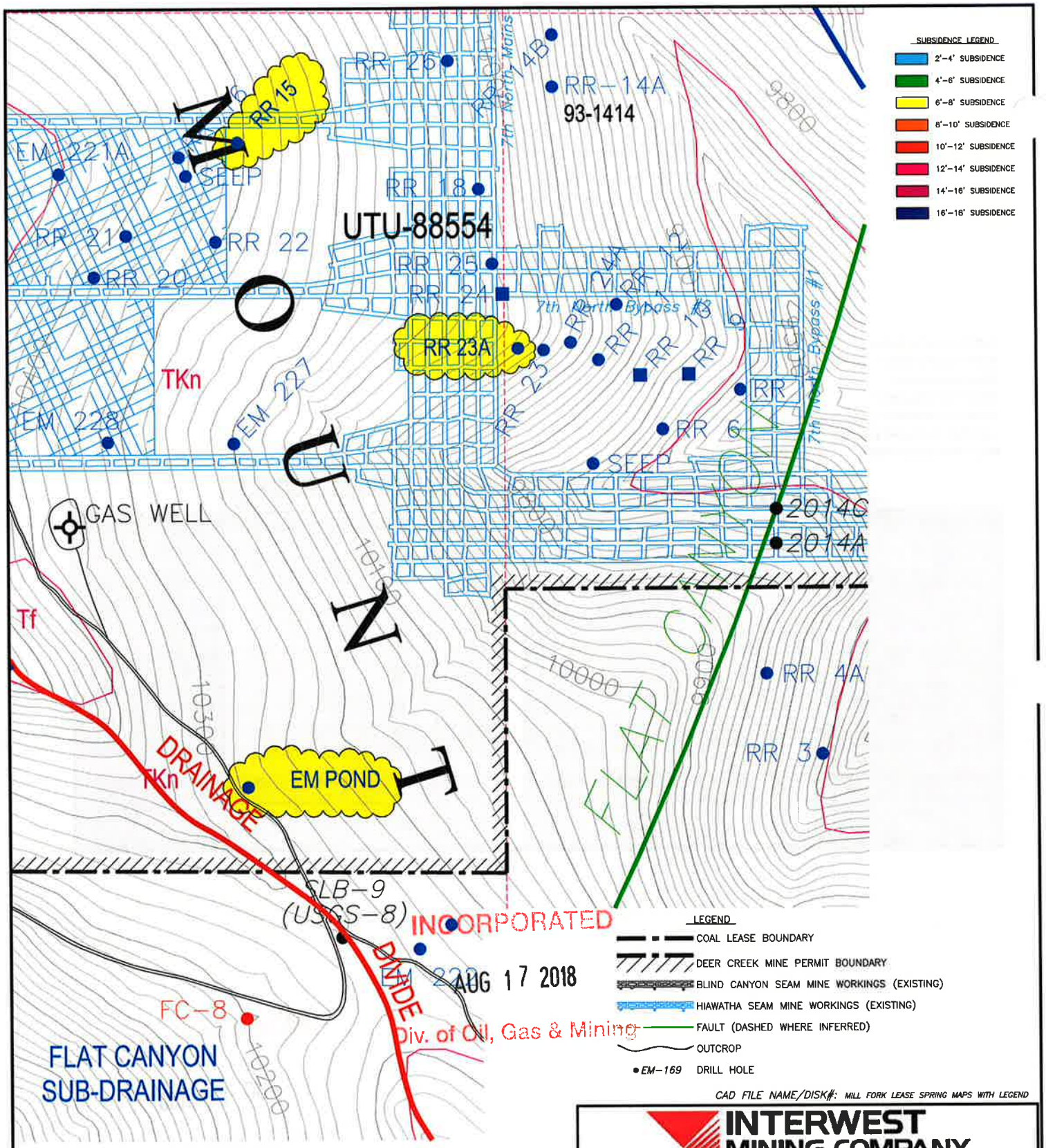
AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: GRANTS SPRING
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1560'
Date of Nearest Mining: Nov-05

	Pre-Mining Data: 20000101 THROUGH 20051101				Post-Mining Data: 20051201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	290	221	253.428	7	235	205	221.916	24	BICARBONATE
CALCIUM	56.7	54.1	55.7571	7	58.97	48.46	52.7758	24	CALCIUM
CARBONATE	0				8	0	0.4	20	CARBONATE
CHLORIDE	4	3	3.57142	7	7	2	3.20833	24	CHLORIDE
CONDUCTIVITY	491	457	479.285	7	508	422	454.791	24	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	2.31	0.9	1.11285	7	2.83	0.38	1.25541	24	FLOW
HARDNESS	256	241	248.857	7	255	211	235.708	24	HARDNESS
TOTAL IRON	0				0	0	0	20	TOTAL IRON
DISSOLVED IRON	0				0	0	0	20	DISSOLVED IRON
MAGNESIUM	27.7	25.4	26.6	7	28.1	15.59	25.2425	24	MAGNESIUM
DISSOLVED MANGANESE	0				0.002	0	0.0001	20	DISSOLVED MANGANESE
MANGANESE	0				0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.01	7.51	7.74428	7	7.94	7.47	7.77041	24	PH
POTASSIUM	1.34	1.11	1.24857	7	5.96	0.65	1.5	24	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3.62	3.41	3.48857	7	3.85	1.45	3.49416	24	SODIUM
SULFATE	15	11	13	7	12	6	10.2083	24	SULFATE
SUSPENDED SOLIDS	258	258	258	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.4	4.9	4.81428	7	8.3	4.7	6.3625	24	TEMPERATURE
TOTAL DISSOLVED SOLIDS	272	226	248.714	7	377	217	251.583	24	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 7	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 7 OF 10	REV.

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring RR-15 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of RR-15 in the Hiawatha seam, (14th West, June 2005). Extraction face of the 14th West longwall panel is 55' west of RR-15.

Subsidence: No subsidence has been detected near RR-15. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2008. RR-15 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring RR-15. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1994 through 1995 by Genwal Resources and 2000 through 2017 by PacifiCorp. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - RR-15 located on northeast facing slope surrounded with conifers. Flow from springs RR-16 and RR-15 diverted to weir with recorder (Emery Water Conservancy District). Per request from Emery Conservancy District, PacifiCorp removed the weir and recorder in August 2002. Flow from spring RR-15 generally ranges from 10 gpm to a maximum of 55 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring RR-15:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 170' below top.

Justification for removal from monitoring: RR-15 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site RR-15 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **RR-15**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
610' S.	1257'W.	NE	23	16S	6E	10350

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	Diverted To Weir (not functioning)	None	170' below top

Location Comments: Spring located on northeast facing slope surrounded with conifers. Flow from springs RR-16 and RR-15 diverted to weir with recorder (Emery Water Conservancy District).

Probable Recharge Area: Areas of higher elevation located to the west.

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate area.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

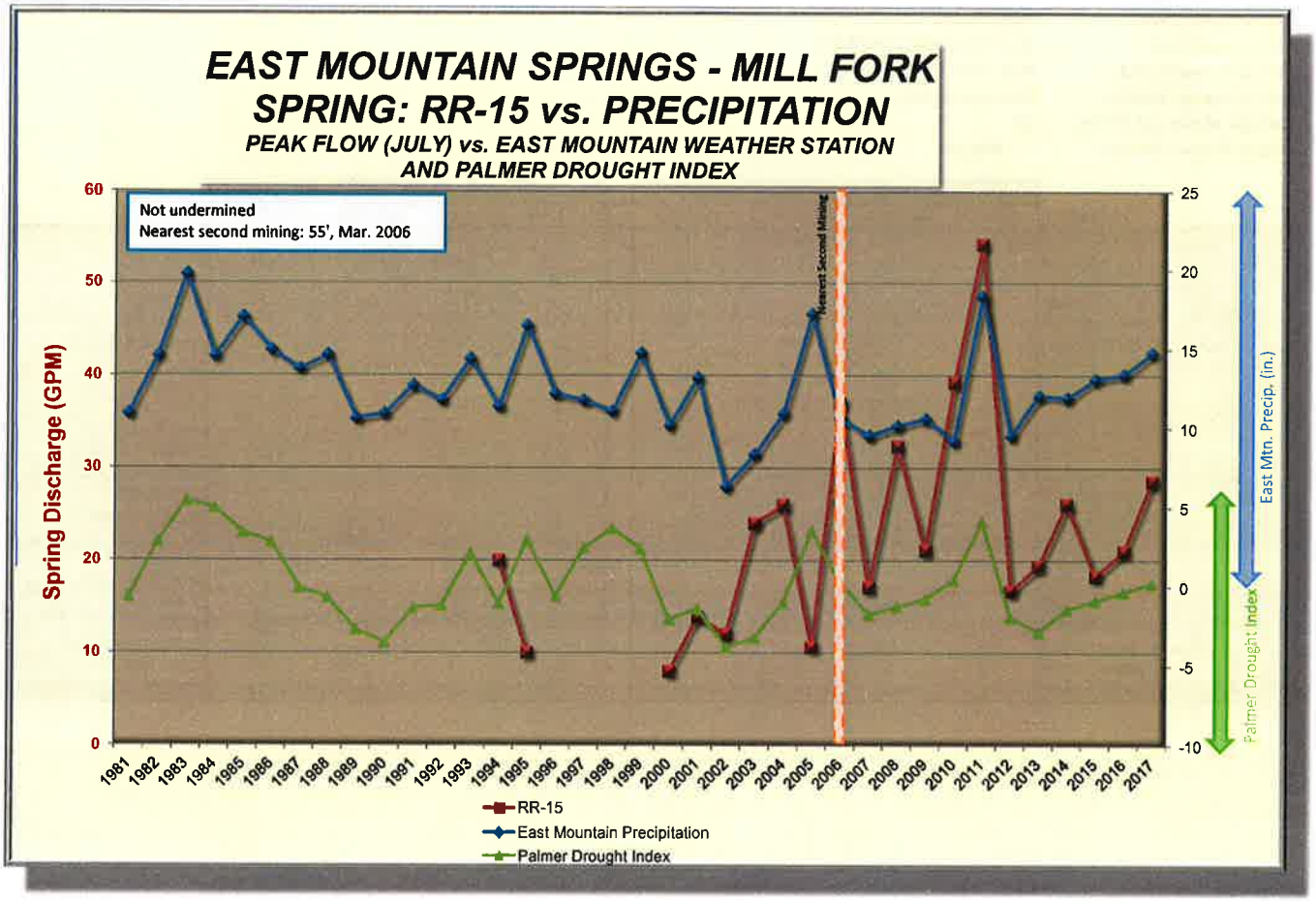
Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

RR-15 spring source

RR-15 Weir and recorder (removed August 22, 2002)

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: RR-15
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 55'
Date of Nearest Mining: May-06

	Pre-Mining Data: 20000101 THROUGH 20060430				Post-Mining Data: 20060501 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	285	207	253.727	11	238	204	216.608	23	BICARBONATE
CALCIUM	65.8	55	59.3181	11	60.9	54	57.4321	23	CALCIUM
CARBONATE	0				0	0	0	20	CARBONATE
CHLORIDE	2	1	1.12	10	2	0	0.91304	23	CHLORIDE
CONDUCTIVITY	498	419	440	11	479	356	430.956	23	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	26	6	12.2363	11	54.2	0.52	19.3426	23	FLOW
HARDNESS	241	218	229.636	11	243	210	226.739	23	HARDNESS
TOTAL IRON	0.832	0.121	0.3106	5	0	0	0	20	TOTAL IRON
DISSOLVED IRON	0.084	0.084	0.084	1	0	0	0	20	DISSOLVED IRON
MAGNESIUM	21.4	16.6	19.809	11	23.2	17.12	20.23	23	MAGNESIUM
DISSOLVED MANGANESE	0.159	0.003	0.058	3	0	0	0	20	DISSOLVED MANGANESE
MANGANESE	0.012	0.003	0.0075	2	0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.43	7.53	8.04181	11	8.09	7.37	7.80695	23	PH
POTASSIUM	0.73	0.34	0.5978	5	1.32	0.59	0.8	23	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	1.96	2.77181	11	6.5	2.23	3.21565	23	SODIUM
SULFATE	11	4	6.04545	11	10	5	6.95652	23	SULFATE
SUSPENDED SOLIDS	214	214	214	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.8	3	4.01818	11	8.5	3.4	4.36086	23	TEMPERATURE
TOTAL DISSOLVED SOLIDS	259	213	237.727	11	272	215	243.086	23	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 24, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring RR-23A is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of RR-23A in the Hiawatha seam, (7th North Mains, August 2004).

Subsidence: No subsidence has been detected near RR-23A. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2009. RR-23A is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring RR-23A. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - RR-23A is located in a clearing on an east facing slope surrounded by aspens. Abundant tufa deposits. Spring forms a small drainage. Flow from spring RR-23A generally ranges from 10 gpm to a maximum of 50 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring RR-23A:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 360' above base.

Justification for removal from monitoring: RR-23A has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site RR-23A be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **RR-23A**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1571' S.	64' E.	NW	24	16S	6E	10023

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	None	360' above base

Location Comments: Spring located in clearing on east facing slope surrounded by aspens. Abundant tufa deposits. Spring forms small drainage.

Probable Recharge Area: Areas of higher elevation located to the west.

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity.

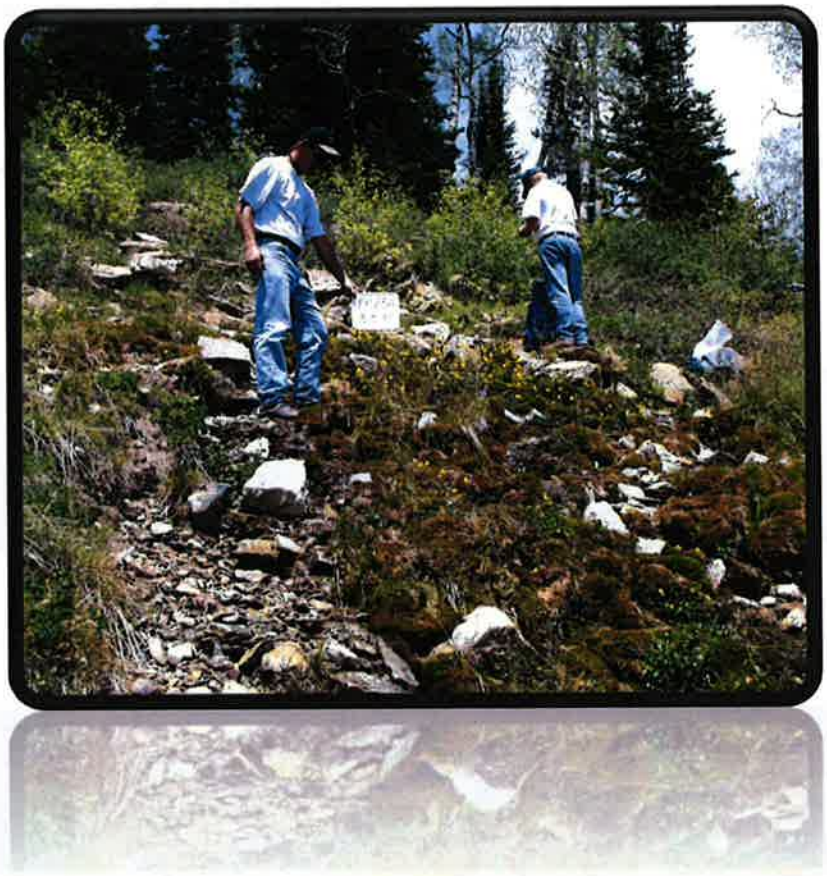
INCORPORATED

AUG 17 2018

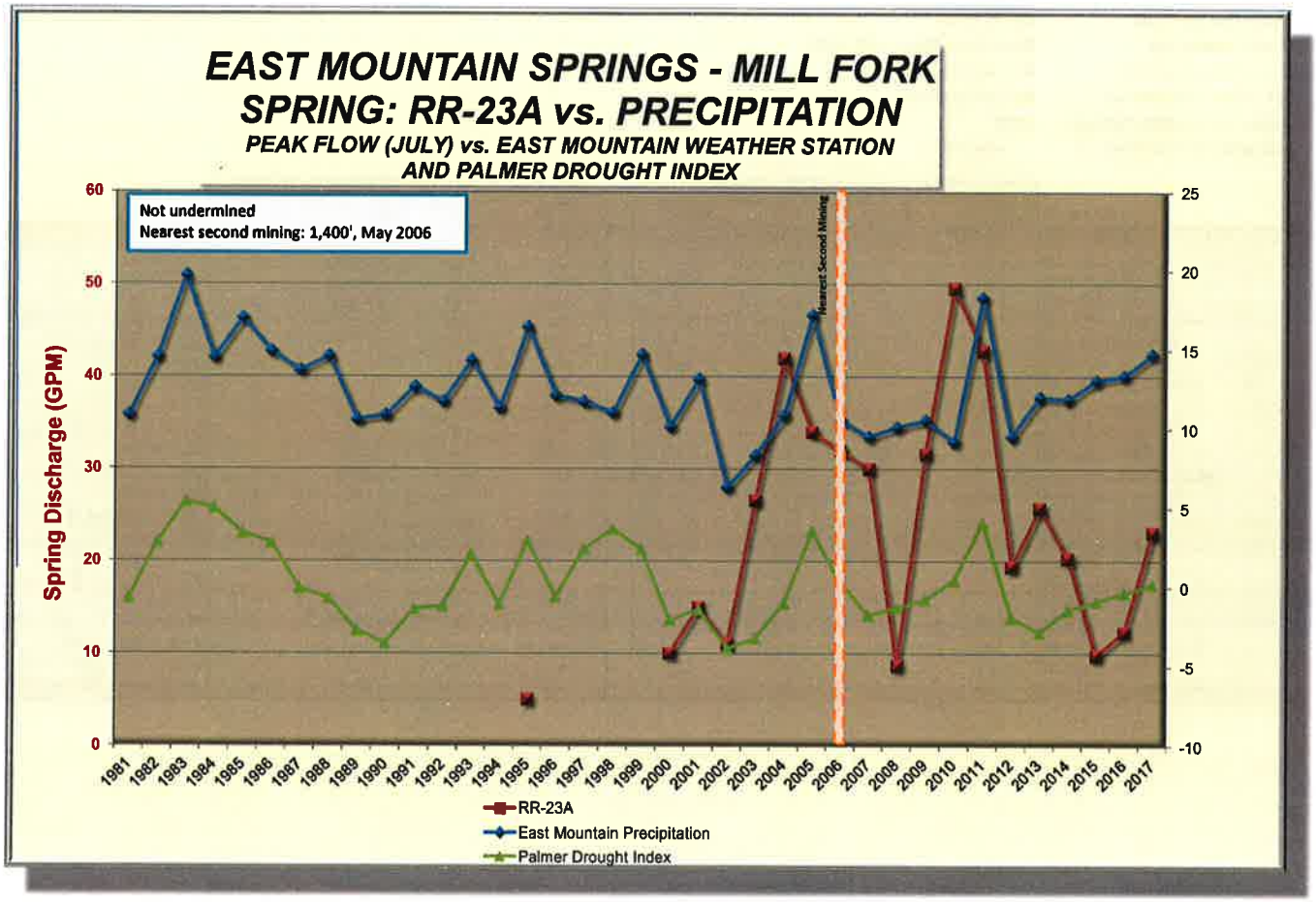
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: RR-23A
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1400'
Date of Nearest Mining: May-06

	Pre-Mining Data: 20000101 THROUGH 20060430				Post-Mining Data: 20060501 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	309	297	276.181	11	258	217	240.304	23	BICARBONATE
CALCIUM	73.1	65	68.8454	11	75.2	63.42	69.6313	23	CALCIUM
CARBONATE	0				0	0	0	19	CARBONATE
CHLORIDE	2	1	1.59	10	3	0	1.47826	23	CHLORIDE
CONDUCTIVITY	566	461	493.272	11	560	411	489.173	23	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	42	8.32	17.5381	11	49.6	5.7	18.6495	23	FLOW
HARDNESS	272	245	255.636	11	282	232	258.086	23	HARDNESS
TOTAL IRON	1.12	0.3	0.54725	4	1.19	0	0.12238	21	TOTAL IRON
DISSOLVED IRON	0.008	0.008	0.008	1	0	0	0	19	DISSOLVED IRON
MAGNESIUM	21.7	19.5	20.9181	11	22.8	17.95	20.4526	23	MAGNESIUM
DISSOLVED MANGANESE	0.265	0.012	0.1385	2	0.066	0	4.38095	21	DISSOLVED MANGANESE
MANGANESE	0.011	0.011	0.011	1	0	0	0	19	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.28	7.21	7.69818	11	8.3	7.15	7.53913	23	PH
POTASSIUM	0.714	0.51	0.60866	6	1.1	0.56	0.72043	23	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	2.22	2.89545	11	3.78	1.97	2.78608	23	SODIUM
SULFATE	14	10	11.9181	11	15	8	12.2173	23	SULFATE
SUSPENDED SOLIDS	280	280	280	1	0				SUSPENDED SOLIDS
TEMPERATURE	8.2	4	5.21818	11	8.6	8.9	5.1	23	TEMPERATURE
TOTAL DISSOLVED SOLIDS	304	226	271.545	11	312	249	277.043	23	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: EMPOND Spring is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat on August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred 1,620' north of EMPOND in the Hiawatha Seam in December 2005.

Subsidence: Maximum subsidence in area 1,560' north of Grants Spring has stabilized at approximately 6 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2008. EMPOND is outside of the subsided area.

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring Grants Spring Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected since 1993 through 1995 by Genwal Resources and 2000 and through 2017 by PacifiCorp. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. EMPOND is a located below ridge on east facing slope above small pond adjacent to road. Vegetation of the area surrounding the spring is dominated by conifers. Flow from spring EMPOND generally ranges from 1 gpm to a maximum of <10 gpm.

Geologic Mode of Occurrence for spring EMPOND:

- Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 160' below top.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Justification for removal from monitoring: EMPOND has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site EMPOND be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **EMPOND**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1744' N.	1223' W.	SE	23	16S	6E	10280

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	None	160' below top

Location Comments: Spring located below ridge on east facing slope above small pond adjacent to road. Vegetation of the area surrounding the spring dominated by conifers.

Probable Recharge Area: Highlands area to the northwest (recharge limited).

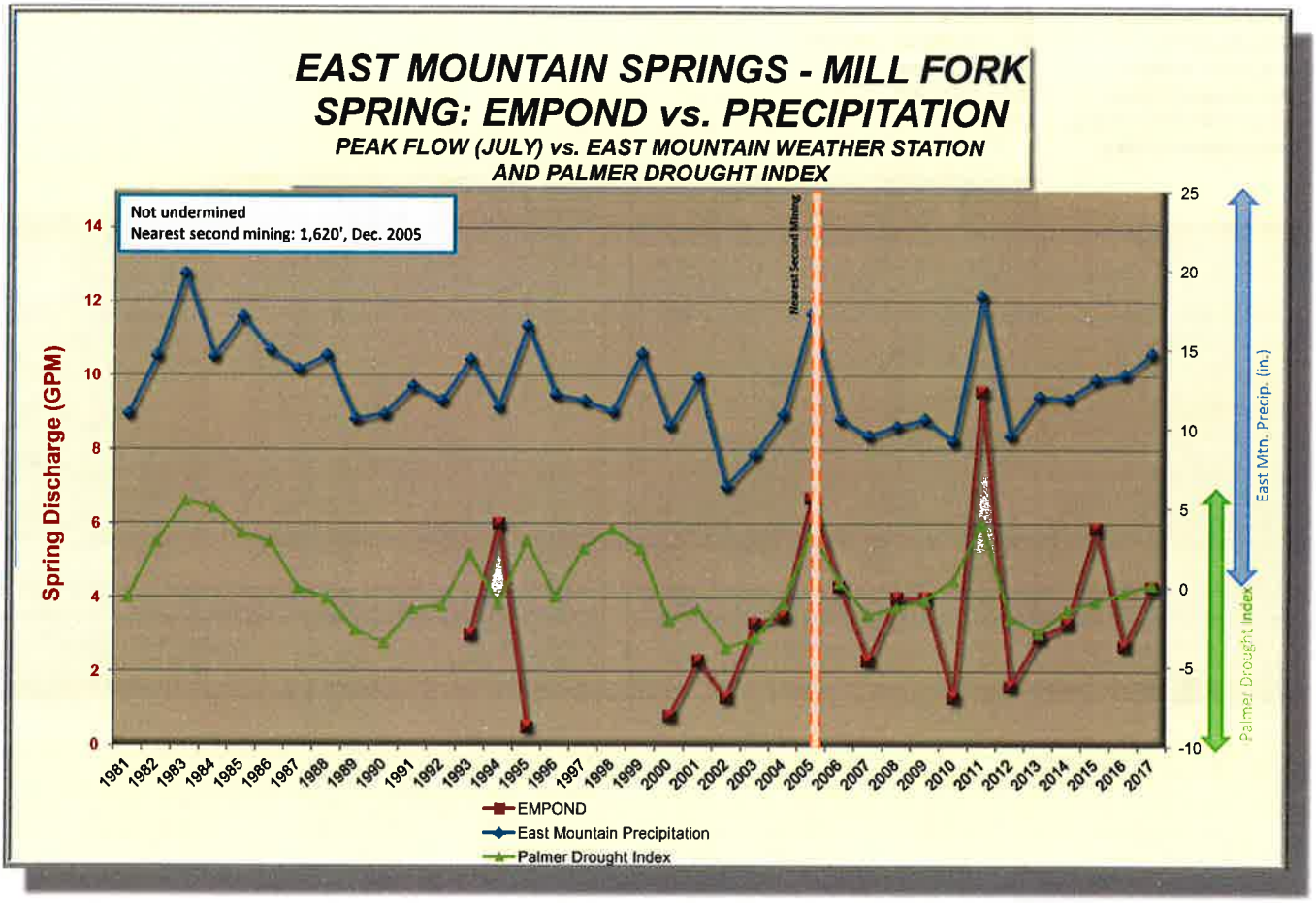
Relationship to Adjacent Springs: This spring occurs in the same manner as EM-222 and EM-223.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

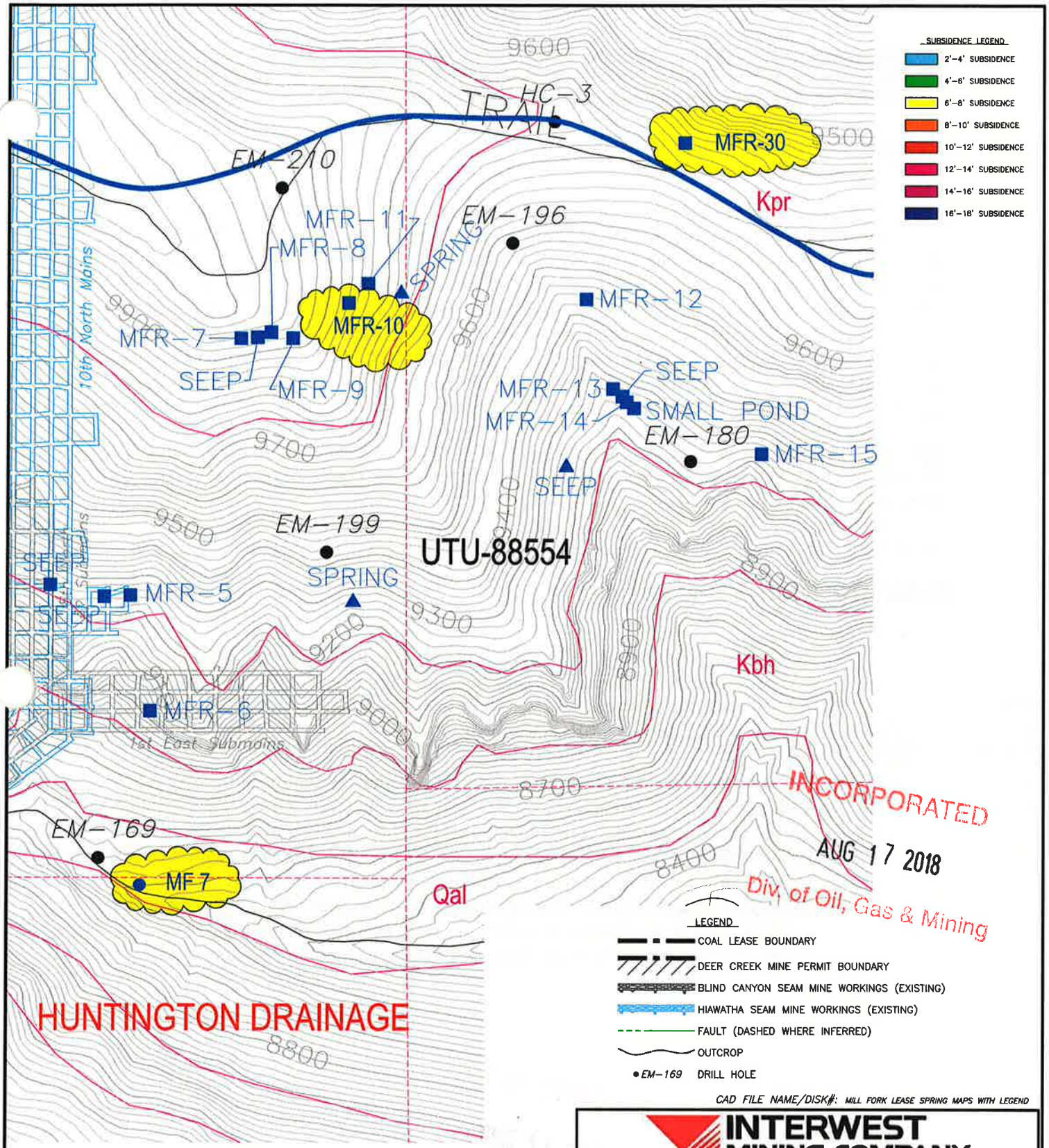


INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: EMPOND
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1620'
Date of Nearest Mining: Dec-05

	Pre-Mining Data: 20000101 THROUGH 20051130				Post-Mining Data: 20051201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	296	228	269.1	10	299	213	225.875	24	BICARBONATE
CALCIUM	62	57.4	60	10	62.74	54.49	58.16125	24	CALCIUM
CARBONATE	0				12	0	0.6	20	CARBONATE
CHLORIDE	2	1	1.13	10	3	0	1.33333	24	CHLORIDE
CONDUCTIVITY	525	446	468.7	10	491	371	445.125	24	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	6.7	0.5	2.175	10	9.57	0.37	2.78333	24	FLOW
HARDNESS	249	231	242.7	10	254	221	236.875	24	HARDNESS
TOTAL IRON	1.5	0.088	0.4452	5	1.4	0	0.20695	23	TOTAL IRON
DISSOLVED IRON	0.056	0.056	0.056	1	0	0	0	20	DISSOLVED IRON
MAGNESIUM	23.7	21.9	22.57	10	24.1	20.45	22.137	24	MAGNESIUM
DISSOLVED MANGANESE	0.07	0.002	0.02	5	0.063	0	8.29166	24	DISSOLVED MANGANESE
MANGANESE	0.008	0.007	0.0075	2	0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.21	7.84	7.983	10	8.15	7.67	7.91791	24	PH
POTASSIUM	0.697	0.589	0.60433	6	0.92	0.53	0.65375	24	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	2	2.385	10	2.56	1.85	2.06583	24	SODIUM
SULFATE	7	4.8	5.38	10	6	3	3.79166	24	SULFATE
SUSPENDED SOLIDS	239	239	239	1	0				SUSPENDED SOLIDS
TEMPERATURE	6	3.8	5.24	10	10.6	4.9	6.9	24	TEMPERATURE
TOTAL DISSOLVED SOLIDS	280	231	251.6	10	287	204	245.333	24	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU–88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 8	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 8 OF 10	REV. ___

Location: Section 7, Township 16 South, Range 7 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MFR-30 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MFR-30.

Subsidence: No subsidence has been detected near MFR-30. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. MFR-30 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MFR-30. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MFR-30 is located in small clearing on a north facing slope. Area surrounding the spring source is vegetated with mountain brush, aspens and conifers. Flow from spring MFR-30 generally ranges from 0/seep to a maximum of <3 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MFR-30:

- Water flowing down through fractures in the Upper Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Upper Price River (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 80' below top.

Justification for removal from monitoring: MFR-30 has been monitored by PacifiCorp since 2001. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MFR-30 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MFR-30**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2298' S.	1304' E.	NW	7	16S	7E	9680

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Upper Price River	None	None	80' below top

Location Comments: Spring located in small clearing on north facing slope. Area surrounding the spring source vegetated with mountain brush, aspens and conifers.

Probable Recharge Area: Areas of higher elevation located to the west.

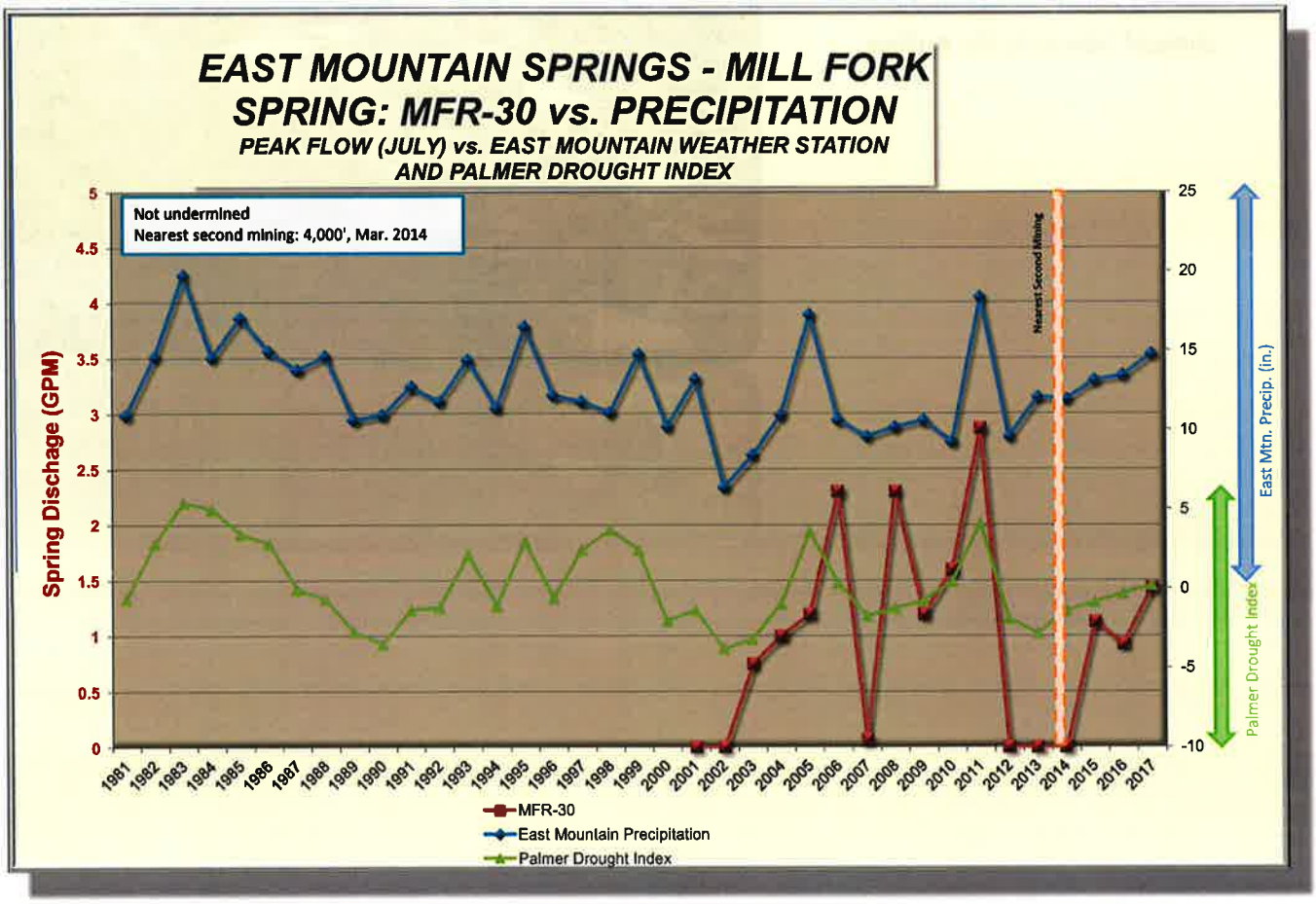
Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate area (MFR-28, MFR-29).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the Upper Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MFR-30
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 4000'
Date of Nearest Mining: Mar-14

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20140301 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	383	258	305.166	12	316	252	278.666	3	BICARBONATE
CALCIUM	89.22	77	84.275	12	88.94	68.67	71.8366	3	CALCIUM
CARBONATE	0	0	0	5	0	0	0	3	CARBONATE
CHLORIDE	3	1	2.25	12	3	2	2.33333	3	CHLORIDE
CONDUCTIVITY	698	593	624.833	12	633	552	587.333	3	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	26.6	0.22	3.41833	12	1.44	0.98	1.16666	3	FLOW
HARDNESS	327	287	311	12	318	266	283.666	3	HARDNESS
TOTAL IRON	1.23	0	0.4207	10	2.62	0	0.93	3	TOTAL IRON
DISSOLVED IRON	0	0	0	5	0	0	0	3	DISSOLVED IRON
MAGNESIUM	26.11	21	24.4258	12	26.24	23.72	25.33	3	MAGNESIUM
DISSOLVED MANGANESE	0.012	0	0.0036	5	0.061	0	2.13333	3	DISSOLVED MANGANESE
MANGANESE	0.026	0	0.00625	8	0	0	0	3	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.27	7.56	7.95416	12	8.55	7.89	8.19999	3	PH
POTASSIUM	1.04	0.79	0.81072	11	1.35	0.89	1.12	3	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	16.5	8	12.96	12	14.42	12.69	13.4433	3	SODIUM
SULFATE	39	22	32.25	12	36	31	33.6666	3	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	10.2	3	6.28333	12	61.3	6.2	25.6666	3	TEMPERATURE
TOTAL DISSOLVED SOLIDS	400	308	351.083	12	388	283	318	3	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 12, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MFR-10 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MFR-10.

Subsidence: No subsidence has been detected near MFR-10. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. MFR-10 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MFR-10. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2001 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MFR-10 is located at the end of a trail which leads to reclaimed road. Denoted as "Spring" on Rilda Quad. map. Area surrounding the spring source is vegetated with conifers and aspens. Flow from spring MFR-10 generally ranges from 10 gpm to a maximum of 45 gpm (recorded flow of 2001 was 0.0 gpm).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MFR-10:

- Water flowing down through fractures in the lower section of the North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel.
- Geologic Formation: North Horn Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 140' above base.

Justification for removal from monitoring: MFR-10 has been monitored by PacifiCorp since 2001. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MFR-10 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MFR-10**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2680' N.	270' W	SE	12	16S	6E	9900

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	Developed With Steel Pipe, Diverted To Trough (not functioning)	None	140' above base

Location Comments: Spring located at the end of a trail which leads to reclaimed road. Denoted as "Spring" on Rilda Quad. map. Area surrounding the spring source vegetated with conifers and aspens.

Probable Recharge Area: Areas of higher elevation located to the west.

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate area.

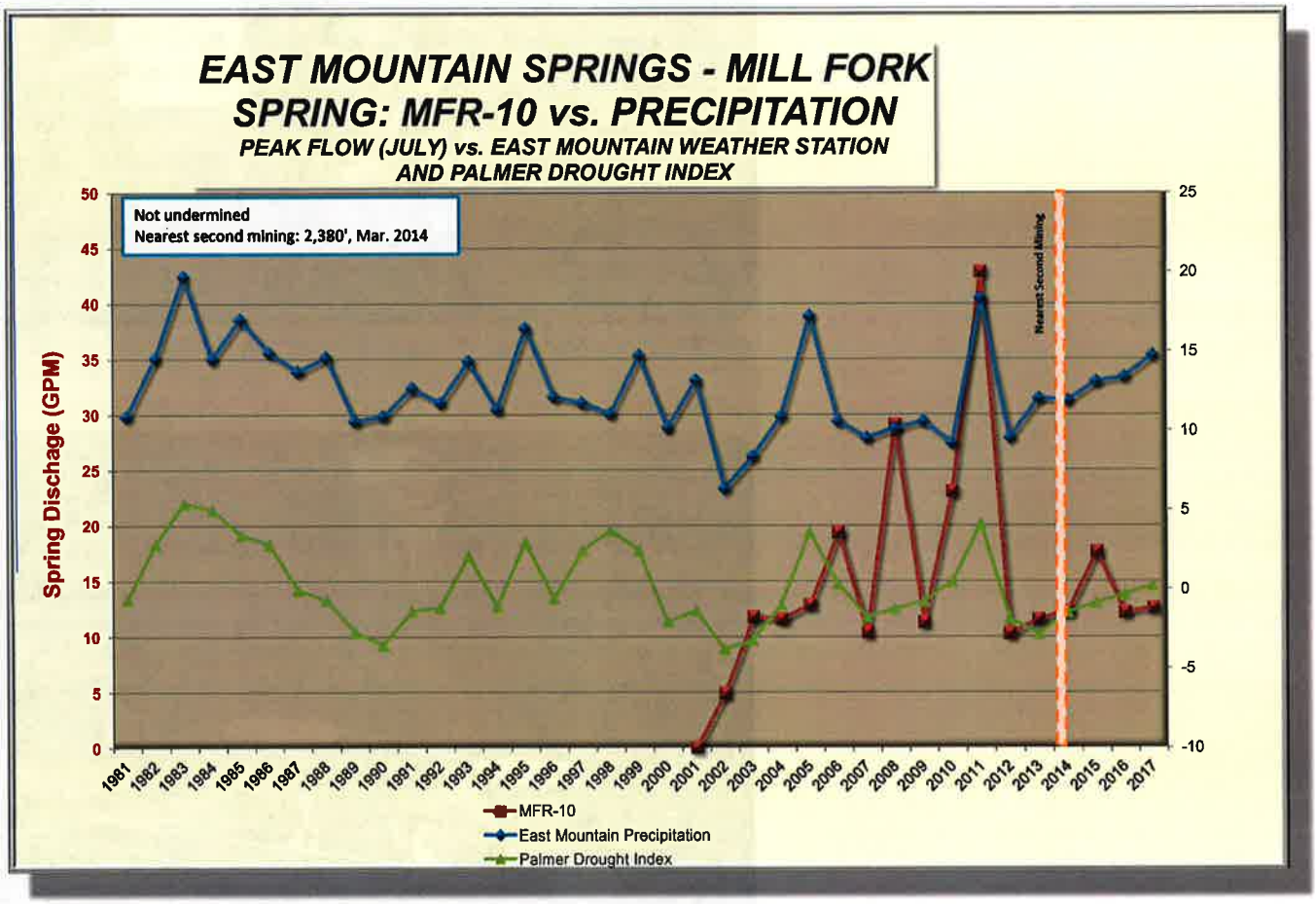
RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring: Water flowing down through fractures in the lower section of the North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel.

MFR-10 Spring Source

MFR-10 Trough

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MFR-10
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 2380'
Date of Nearest Mining: Mar-14

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20140301 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	326	228	269.73	26	260	229	244.75	8	BICARBONATE
CALCIUM	82.6	65	73.1584	26	74.25	58.28	65.83	8	CALCIUM
CARBONATE	6	0	0.46153	13	0	0	0	8	CARBONATE
CHLORIDE	4	2	2.38846	26	2	2	2	8	CHLORIDE
CONDUCTIVITY	618	380	525.5	26	545	497	517.25	8	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	151	2.4	15.4926	26	17.65	1.7	8.1975	8	FLOW
HARDNESS	305	253	279.653	26	288	236	261.75	8	HARDNESS
TOTAL IRON	1.84	0	0.19225	20	0	0	0	8	TOTAL IRON
DISSOLVED IRON	0	0	0	12	0	0	0	8	DISSOLVED IRON
MAGNESIUM	25.8	22	23.563	26	25.76	20.57	23.7175	8	MAGNESIUM
DISSOLVED MANGANESE	0.04	0	0.00431	16	0	0	0	8	DISSOLVED MANGANESE
MANGANESE	0	0	0	12	0	0	0	8	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.41	7.31	8.07038	26	8.54	8.16	8.2625	8	PH
POTASSIUM	1.15	0.48	0.82054	22	1.2	0.64	0.82875	8	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	6	2	4.04692	26	5.86	2.81	4.80125	8	SODIUM
SULFATE	29	11	23.073	26	31	19	25.375	8	SULFATE
SUSPENDED SOLIDS	267	267	267	1	0				SUSPENDED SOLIDS
TEMPERATURE	44.9	3.9	7.99615	26	30.1	2.4	11.675	8	TEMPERATURE
TOTAL DISSOLVED SOLIDS	341	262	295.346	26	314	269	291.75	8	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 13, Township 16 South, Range 7 East, SLB&M. This site is located within the Deer Creek mine permit boundary and Federal Coal lease UTU-88554.

Lease Association: Spring MF-7 is located in Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MF-7.

Subsidence: No subsidence has been detected near MF-7. **Nearest second mining is 1,707' west of MF-7. MF-7 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-7. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-7 is located on hillside near Mill Fork drainage on a north facing slope covered with spruce trees. Flow from spring MF-7 generally ranges from 10 gpm to a maximum of 65 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-7:

- Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.
- Geologic Formation: Blackhawk Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: At base.

Justification for removal from monitoring: MF-7 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-7 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-7**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
34' S.	1244' W.	NE	13	16S	6E	8580

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Blackhawk	None	None	320' below top

Location Comments: Spring located on hillside near Mill Fork drainage on north facing slope covered with spruce trees.

Probable Recharge Area: Areas of higher elevation located to the southwest.

Relationship to Adjacent Springs: This spring occurs in the same manner as MF-8A.

INCORPORATED

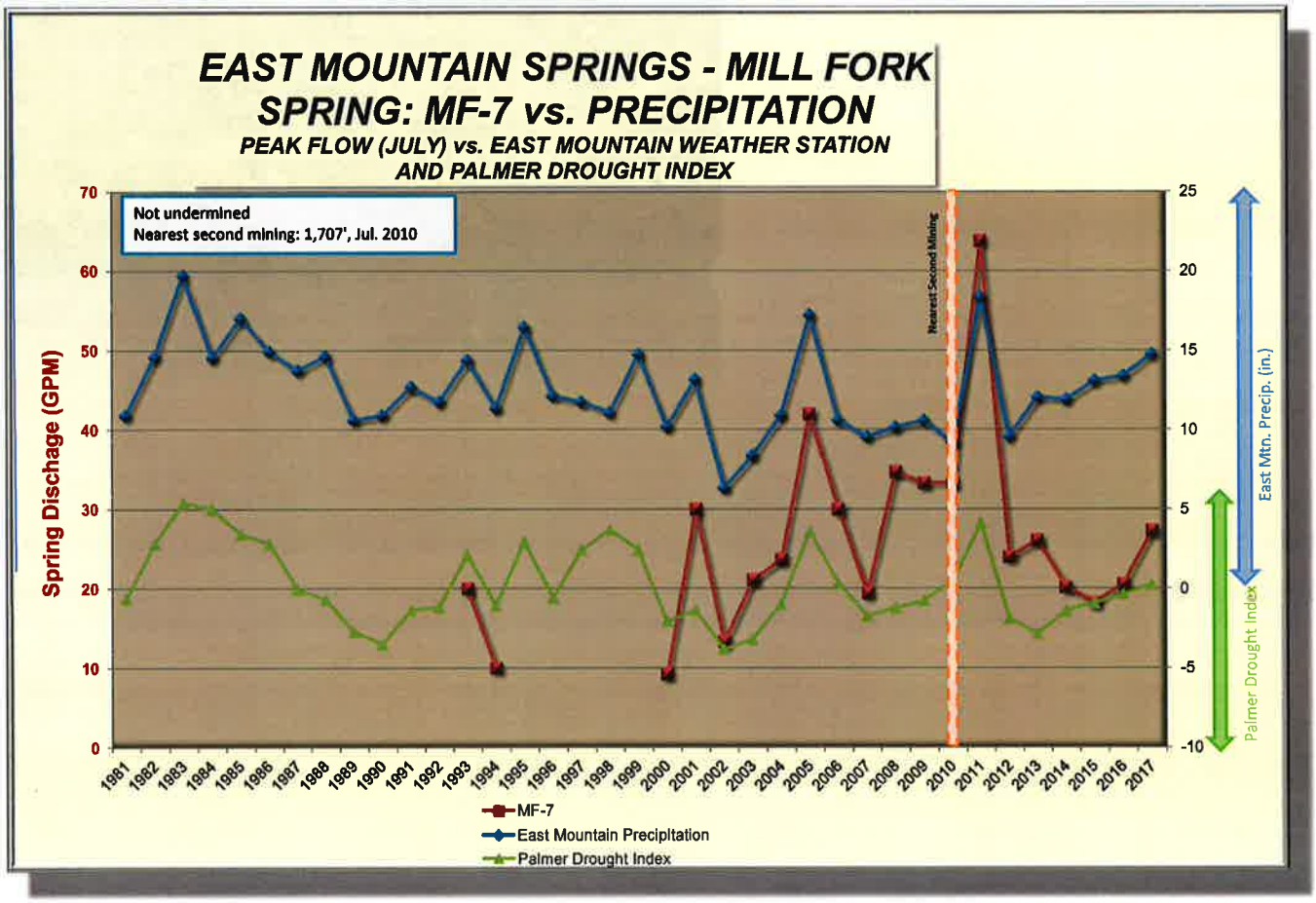
AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

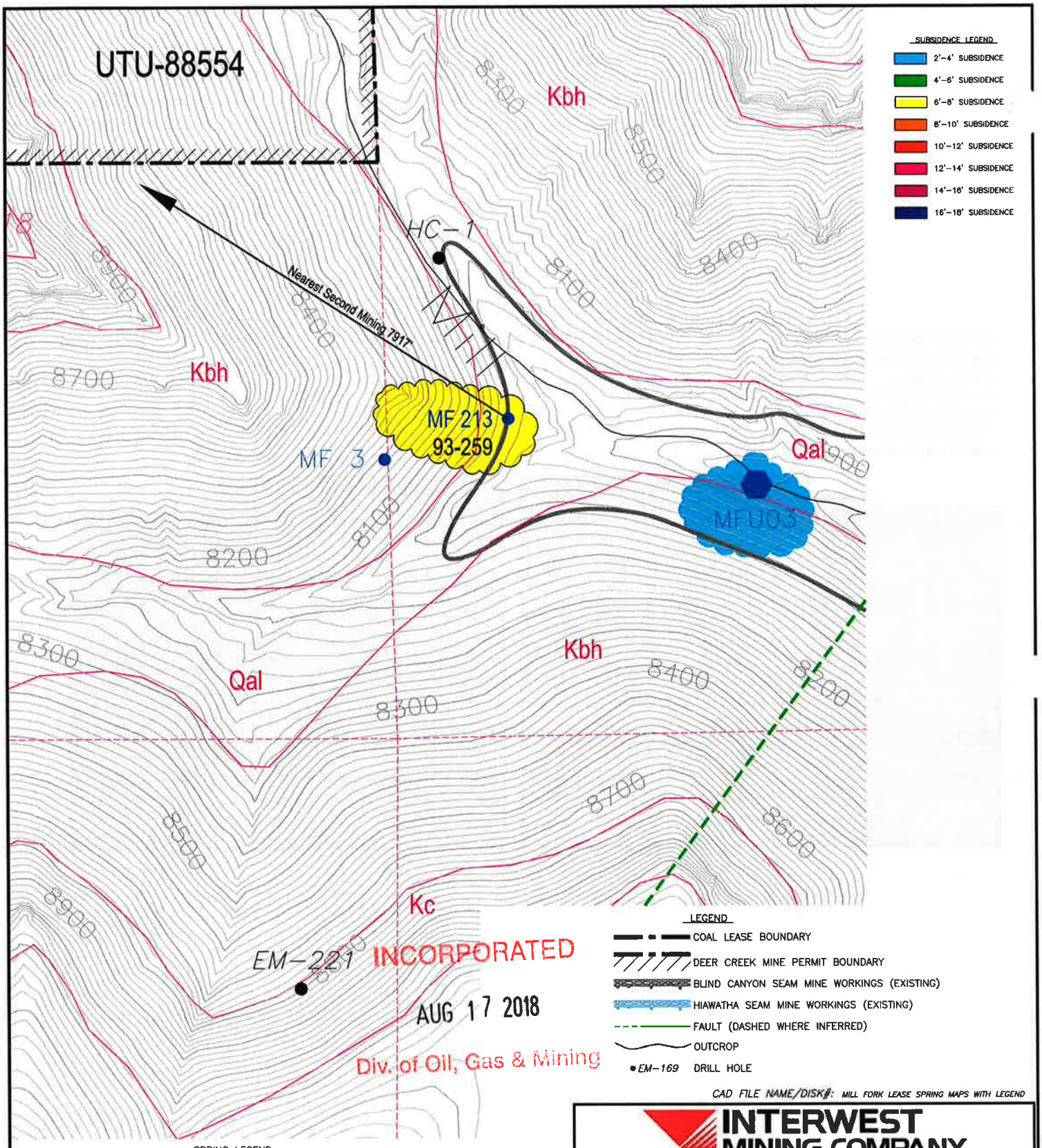
AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: MF-7
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1707'
Date of Nearest Mining: Jul-10

	Pre-Mining Data: 20000101 THROUGH 20100630				Post-Mining Data: 20100701 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	335	242	279.21	19	277	250	262.9375	16	BICARBONATE
CALCIUM	77.1	65	72.901	19	77.13	66.37	70.0975	16	CALCIUM
CARBONATE	0	0	0	4	12	0	0.75	16	CARBONATE
CHLORIDE	4	2	2.71052	19	3	2	2.5	16	CHLORIDE
CONDUCTIVITY	681	512	589.263	19	670	532	593.4375	16	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	42	9.3	21.5315	19	63.8	12.8	24.3931	16	FLOW
HARDNESS	325	269	303.105	19	325	160	293.0625	16	HARDNESS
TOTAL IRON	0.1	0	0.02	5	1.18	0	0.101875	16	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0	0	0	16	DISSOLVED IRON
MAGNESIUM	32.9	26	29.4015	19	32.92	16.75	28.665	16	MAGNESIUM
DISSOLVED MANGANESE	0	0	0	4	0.139	0	0.010125	16	DISSOLVED MANGANESE
MANGANESE	0	0	0	4	0	0	0	16	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8	7.45	7.80842	19	8.5	7.7	7.875625	16	PH
POTASSIUM	1.46	1	1.15895	18	1.84	1.04	1.34625	16	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	7	4	6.07789	19	68.11	6.87	18.59375	16	SODIUM
SULFATE	55	39	45.8315	19	74	29	51.8125	16	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	18.8	3.5	5.98333	18	40.5	4.4	7.25625	16	TEMPERATURE
TOTAL DISSOLVED SOLIDS	360	298	326.947	19	415	298	345.0625	16	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Ga



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 9	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 9 OF 10	REV.

Location: Section 17, Township 16 South, Range 7 East, SLB&M. This site is located within ½ mile offset of the Deer Creek mine permit boundary and Federal Coal lease UTU-88554.

Lease Association: Spring MF-213 is located within ½ mile offset of Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MF-213.

Subsidence: No subsidence has been detected near MF-213. **Nearest second mining is 7,915' west of MF-213. MF-213 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-213. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-213 is located near drainage bottom (Mill Fork - Right Fork) on an east/southeast facing slope covered with mountain brush, conifers and aspens. Large tufa deposits. Flow from spring MF-213 generally ranges from 15 gpm to a maximum of 70 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-213:

- Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.
- Geologic Formation: Blackhawk Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: At base.

Justification for removal from monitoring: MF-213 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-213 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-213**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1489' N.	584' E.	SW	17	16S	R7E	8030

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Blackhawk	None	93-259	At base

Location Comments: Spring located near drainage bottom (Mill Fork - Right Fork) on east/southeast facing slope covered with mountain brush, conifers and aspens. Large tufa deposits.

Probable Recharge Area: Areas of higher elevation located to the west.

Relationship to Adjacent Springs: This spring occurs in the same manner as MF-3.

INCORPORATED

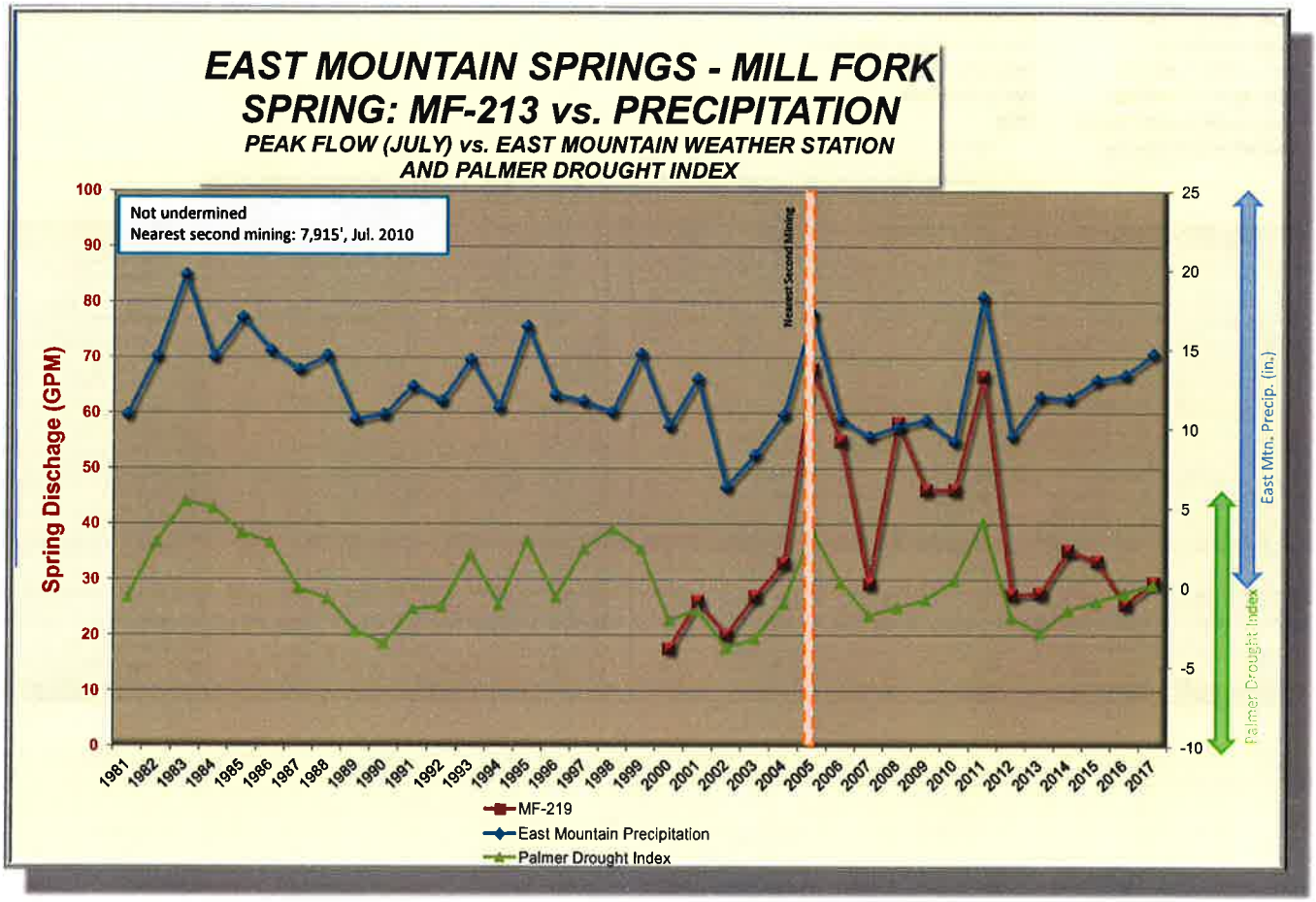
AUG 17 2018

Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring: MF-213
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 7915'
Date of Nearest Mining: Jul-10

	Pre-Mining Data: 20000101 THROUGH 20100630				Post-Mining Data: 20100630 THROUGH 20172131				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	332	241	279.842	19	261	226	252.25	16	BICARBONATE
CALCIUM	69.1	61	65.341	19	68.57	52.08	63.9456	16	CALCIUM
CARBONATE	9	0	1.8	5	5	0	0.3125	16	CARBONATE
CHLORIDE	4	2	2.66315	19	3	2	2.4375	16	CHLORIDE
CONDUCTIVITY	752	435	551.105	19	551	497	525.8125	16	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	68	10	28.2315	19	66.7	14.3	28.2075	16	FLOW
HARDNESS	294	272	283.157	19	290	227	273.75	16	HARDNESS
TOTAL IRON	0.319	0	0.88333	6	1.16	0	0.0725	16	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0	0	0	16	DISSOLVED IRON
MAGNESIUM	31	27.4	29.1584	19	29.96	23.53	28.0681	16	MAGNESIUM
DISSOLVED MANGANESE	0.004	0	0.0008	5	0.067	0	0.00418	16	DISSOLVED MANGANESE
MANGANESE	0.004	0	0.0008	5	0	0	0	16	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.22	7.21	7.95105	19	8.45	8.03	8.138125	16	PH
POTASSIUM	1.2	0.99	1.02982	17	1.89	0.95	1.085	16	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	7	4.61	5.55	19	8.86	5.08	6.72375	16	SODIUM
SULFATE	29	23	25.4526	19	52	23	28.375	16	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	10.6	5.6	7.85789	19	50.8	6.1	11.4125	16	TEMPERATURE
TOTAL DISSOLVED SOLIDS	324	264	294.473	19	352	280	299.5	16	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 9, Township 16 South, Range 7 East, SLB&M. This site is located 1 ½ mile east of the Deer Creek mine permit boundary and Federal Coal lease UTU-88554.

Lease Association: Little Bear Spring is located 1 ½ mile east of Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of Little Bear Spring.

Subsidence: No subsidence has been detected near Little Bear Spring. **Nearest second mining is 13,050' west of Little Bear Spring. Little Bear Spring is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

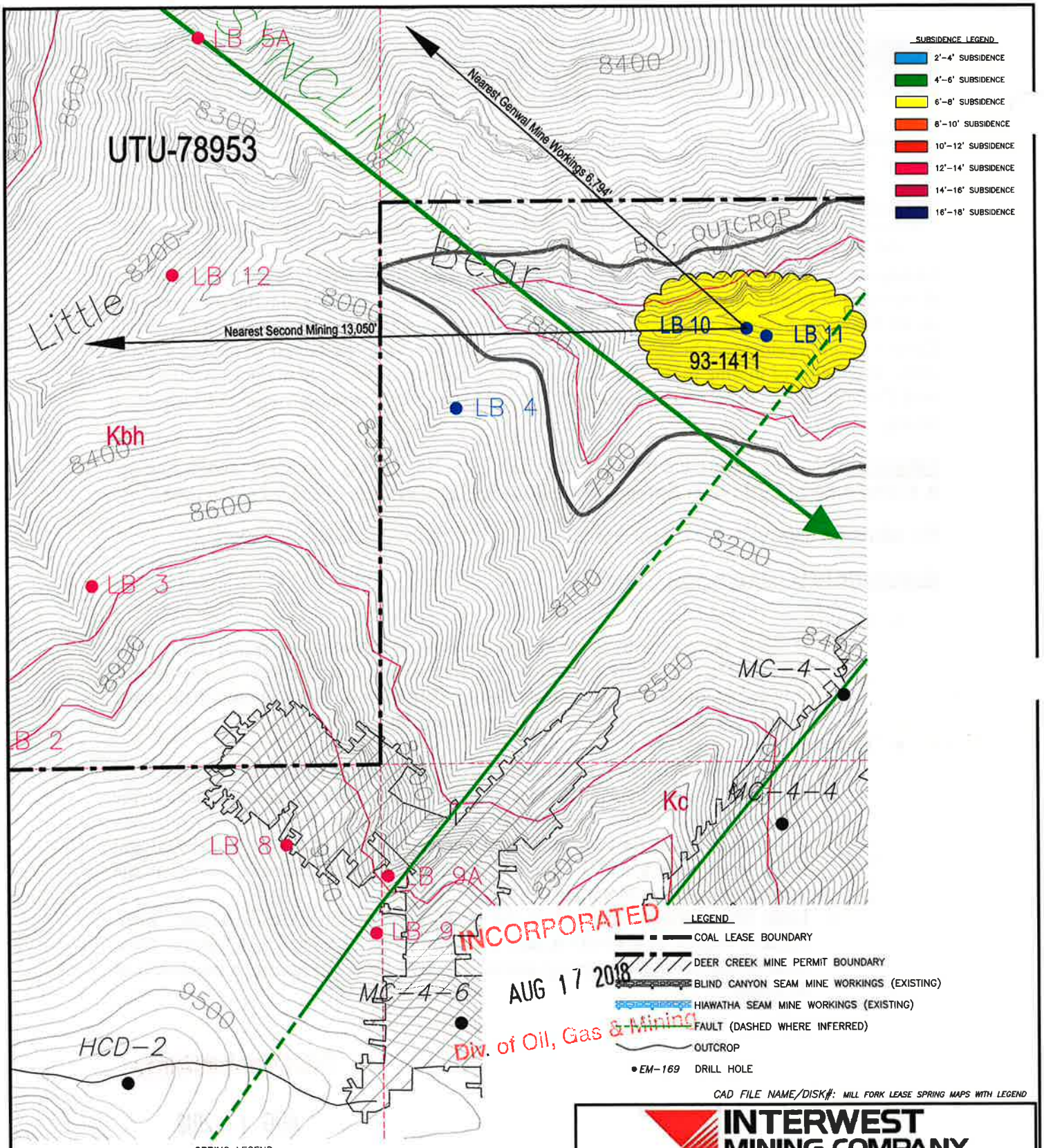
Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring Little Bear Spring. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1982 and has continued through 2017 by Castle Valley Special Service District. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - Little Bear Spring is located on the south slope of Little Bear Canyon. Main culinary supply to CVSSD (Cities of Huntington, Cleveland and Elmo). Flow from spring Little Bear Spring generally ranges from 225 gpm to a maximum of 475 gpm.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 10	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 10 OF 10	REV.

Geologic Mode of Occurrence for spring Little Bear Spring:

- Multiple potential recharge sources have been identified; south: fracturing related to the Mill Fork Graben, west: fractures - Little Bear Canyon, north: fractures - Huntington Creek Drainage.
- Geologic Formation: Blackhawk Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: At base.

Justification for removal from monitoring: Little Bear Spring has been monitored by Castle Valley Special Service District since 1982 and by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site Little Bear Spring be removed from the monitoring program.

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **Little Bear Spring**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2028' N.	1726' E	SW	9	16S	6E	7540

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Star Point Sandstone Panther Member	Developed With Collection Boxes & Pipeline	93-1411	near base

Location Comments: Spring located on the south slope of Little Bear Canyon. Main culinary supply to CVSSD (Cities of Huntington, Cleveland and Elmo).

Probable Recharge Area: Multiple potential recharge sources have been identified; south: fracturing related to the Mill Fork Graben, west: fractures - Little Bear Canyon, north: fractures - Huntington Creek Drainage

Relationship to Adjacent Springs: This spring is not related to other springs within the immediate area.

INCOMPLETED
AUG 17 2018
Div. of Oil, Gas & Mining

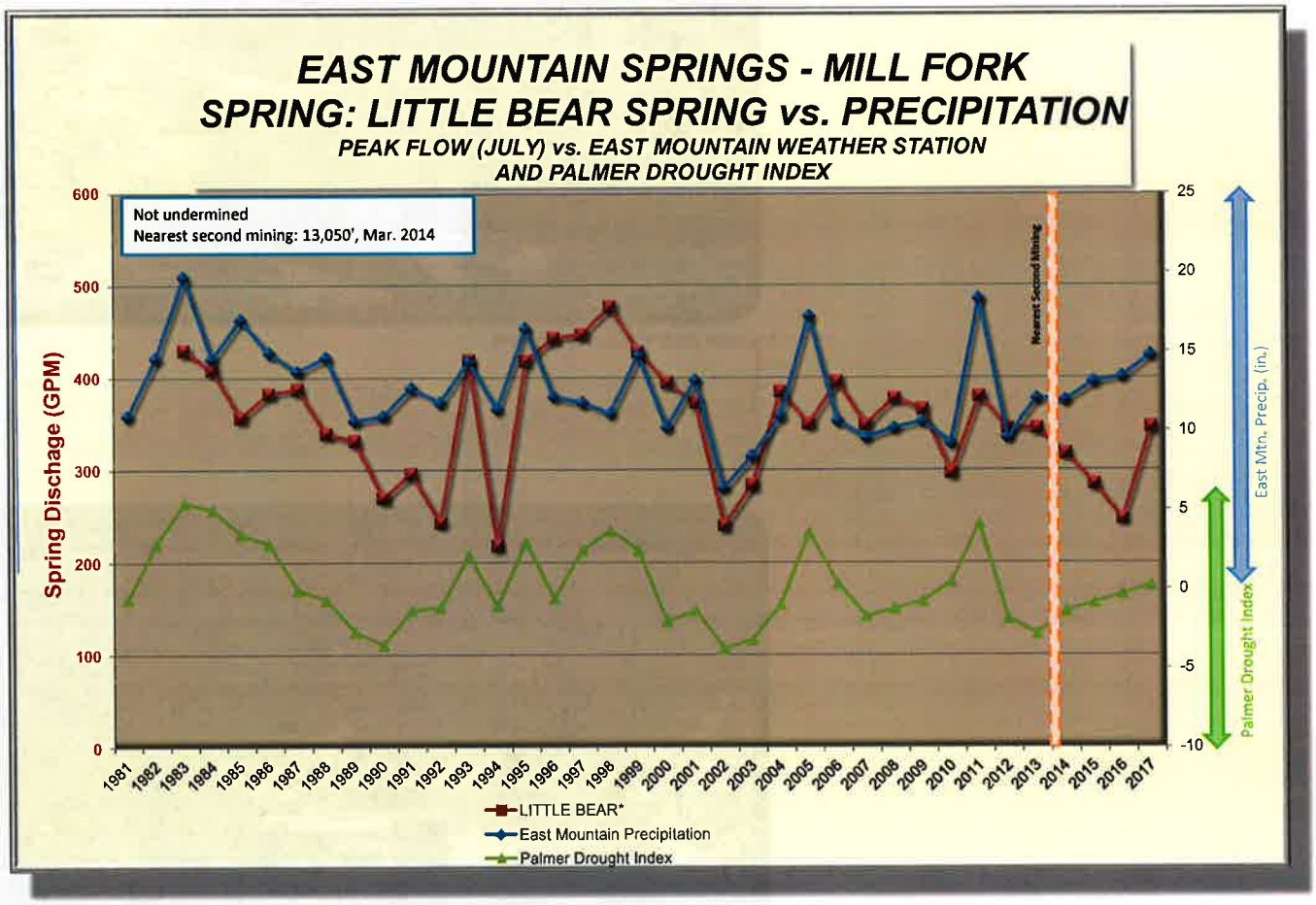
Geologic Occurrence of Spring:

Water flowing through fractures in the lower section of the Star Point Sandstone (Panther Member) intersects the surface.

Little Bear Collection System

Little Bear Collection System

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**Little Bear**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**13,050'**
Date of Nearest Mining:	**Mar. 2014**

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20140301 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	354	265	284.523	21	290	265	277.25	8	BICARBONATE
CALCIUM	68.85	63.45	66.4838	21	67.46	60.63	63.78	8	CALCIUM
CARBONATE	0	0	0	10	0	0	0	8	CARBONATE
CHLORIDE	6	3	3.95238	21	9	3	4.25	8	CHLORIDE
CONDUCTIVITY	650	559	592.142	21	596	526	576.625	8	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	387	270	338.1	14	347	247	294.625	8	FLOW
HARDNESS	330	294	315.571	21	321	293	306.5	8	HARDNESS
TOTAL IRON	0.21	0	2.66153	13	0.27	0	0.04625	8	TOTAL IRON
DISSOLVED IRON	0.006	0	5.45454	11	0	0	0	8	DISSOLVED IRON
MAGNESIUM	38.5	32.91	36.2995	21	38.17	33.28	35.75	8	MAGNESIUM
DISSOLVED MANGANESE	0.003	0	0.0003	10	0.008	0	0.00225	8	DISSOLVED MANGANESE
MANGANESE	0.007	0	6.36363	11	0	0	0	8	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	7.68	7.04	7.4138	21	7.67	7.39	7.50375	8	PH
POTASSIUM	3.4	1.96	1.65619	21	2.1	1.37	1.58125	8	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	11.2	6.41	7.29238	21	9.91	7.57	8.89875	8	SODIUM
SULFATE	41	31	36.9047	21	44	38	41.625	8	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	10.6	5.4	9.07	20	10.1	8.3	9.2125	8	TEMPERATURE
TOTAL DISSOLVED SOLIDS	356	298	324.523	21	383	311	335.625	8	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Deer Creek Mine
Federal Coal Lease UTU-88554 Full Lease Relinquishment
Appendix D

Evaluation of Impacts to Vegetation

Vegetation of Lease UTU-88554 is diverse, ranging from sagebrush, pinyon – juniper to brush, with groves of aspen trees and spruce - fir. A breakdown of vegetation type in the relinquishment area is shown below (mid-level vegetation provided by the Manti-LaSal National Forest Price Office):

Vegetation Types – UTU-88554:

Aspen	AS
Aspen/Conifer	AS/C
Bristlecone Pine/Limber Pine	BC/LM
Douglas Fir Mix	DFmix
Gambel Oak	GO
Mountain Big Sagebrush	MSB
Mountain Mahogany	MM
Mountain Shrubland	MS
Spruce/Fir	SF
Upland Herbaceous	UHE

Previous relinquishment documents submitted by PacifiCorp have included comparative sets of periodic infrared aerial photographs to detect changes in vegetation that might be related to mining. Until 2011, PacifiCorp had submitted aerial photographs on 1-year intervals and color infrared photographs on 5-year intervals. PacifiCorp attempted to detect changes in vegetation that might be caused by mining using both the color and color infrared images without success. The inability to detect changes in vegetation that might be caused by mining is due to several factors – spreading insect infestations in forests, forest fires, variations in precipitation from year to year, variations in the time of year when each set of photographs is taken, and the quality of the photographs themselves. These factors make it difficult or impossible to detect any changes that might be caused by mining activities. PacifiCorp amended the Deer Creek Mine permit to exclude this requirement in 2011; UDOGM approved the amendment on July 28, 2011 (see following correspondence and permit changes).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

P.O. Box 310
15 North Main Street
Huntington, Utah 84528

July 7, 2011

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

Subj: **Amendment to Remove the Commitment to Conduct Periodic Vegetation Surveys using Color and Color Infrared Aerial Photographs, Pacificorp, Deer Creek Mine, C/015/0018, Emery County, Utah**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West") as mine operator, hereby submits an amendment to remove the commitment to conduct periodic vegetation surveys using color and color infrared photographs from the Deer Creek Mine Permit. Submission of this amendment is in response to the 2010 Annual Report Review Completion, Task ID #3793, requesting submission of aerial photography for vegetation monitoring purposes.

Energy West has had aerial photographs taken of the active mining areas in black and white every year, and color and color infrared every 5 years. Energy West has attempted to detect changes in vegetation that might be caused by mining by interpreting these sets of photographs without success. The inability to detect changes in vegetation that might be caused by mining using color and color infrared images is due to several factors - spreading insect infestations in forest stands, variations in precipitation from year to year, variations in the time of year when the photographs are taken, and the quality of the photographs themselves. These factors make it difficult or impossible to detect any changes that might be caused by mining activities. Aerial photography, whether color or color infrared, will no longer be used for this purpose.

This amendment includes changes in Volume 1 as outlined below. Please refer to redline/strikeout text herein:

- Volume 1, Part 2 Environmental Resources, page 2-174

A redline/strike copy of the amended page has been included with this submittal. The required C1/C2 forms are also included. If you have any question or concern with this submittal please feel free to call myself at (435) 687-4712 or Dennis Oakley at (435) 687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Manager of Geology and Environmental Affairs

Enclosures: C1/C2 Forms
Volume 1, Part 2 Environmental Resources, page 2-174

cc file

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

VEGETATION MONITORING PLAN - DEER CREEK MINE R645-301-321

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive or regressive impacts ~~and final effects of the underground mining activities~~ on vegetation at the Deer Creek mine ~~on vegetation~~. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas ~~that will be impacted by underground mining~~. The monitoring shall be an extension of the baseline data as outlined in the Deer Creek PAP Volume 1.

Aerial photography taken annually up to present (2009) ~~will~~ be has been used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation. There has been no detected stress or any other impacts to vegetation using aerial photography.

Because stress to vegetation within the permit area is so much more subject to the natural forces in nature, (fire, insect infestation, drought, etc.) aerial photography will no longer be used.

~~Infrared photography was taken of impacted surface areas during September, 1987. This will be repeated in 1992 and continued on a five year schedule.~~ Reference area qualitative and quantitative monitoring at the Deer Creek Mine has been conducted at least on five year intervals in the past. Qualitative and quantitative monitoring was last conducted in 2007 and will continue on five year intervals through mine through reclamation and bond release.

~~Each vegetation type mapped and monitored will be based on a~~

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

~~dominant overstory and a dominant understory species to be consistent with Unita Southwestern Coal Region Data Adequacy Standards. The details of monitoring and analyses will be developed in cooperation with the US Forest Service.~~

The vegetation monitoring information for reference areas and reclamation sites ~~and an~~ will be evaluat~~ion~~ed ~~of the impacts of mining on vegetation will be~~ and submitted in an annual report following the year in which monitoring is conducted.

SOILS INFORMATION R645-301-200

Portal and support facility areas for the Deer Creek Mine are cut into steep, nearly perpendicular rock cliffs. The areas are dominated by rock outcrop, rubble land, and shallow soils.

Nowhere in the vicinity of the mine is there a source of material which would usually be referred to as 'topsoil'. Soil tests on the disturbed and undisturbed areas and coal waste show that the materials in the portal area should support selected vegetative materials. These test results, therefore, preclude the recommendation for procurement of topsoil for reclamation since the exposed materials are suitable growth media if properly managed. The one exception is that if during mining operations toxic substances are concentrated, it will be necessary to sample these areas periodically and take the necessary reclamation measures to dispose of or cover the areas in order to assure success of revegetation attempts. Results of soil analyses are summarized in Part 4, Reclamation Plan.

The applicant commits to fulfilling the requirements of

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

GARY R. HERBERT
Governor
GREGORY S. BELL
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

July 28, 2011

Kenneth S. Fleck, Geology and Environmental Affairs Manager
Energy West Mining Company
P.O. Box 310
Huntington, Utah 84528

Subject: Final Approval, Deer Creek Mine, C/015/0018, Remove Vegetation Survey Commitment, Task ID #3869

Dear Mr. Fleck:

The above-referenced amendment was conditionally approved on July 21, 2011 upon receipt of 8 clean copies. We received the requested clean copies on July 28, 2011. Enclosed is a stamped incorporated copy for insertion into your copy of the Mining and Reclamation Plan.

Thank you for your help during this process. If you have any questions, please feel free to call me at (801) 538-5325.

Sincerely,

Daron R. Haddock
Coal Program Manager

DRH/sgs
Enclosure
cc: Kenneth Walker, OSM
Jeff McKenzie, BLM
Pam Brown, USFS
Larry Crist, USFWS w/o
Marc Stilson, Water Rights w/o
Dave Ariotti, DEQ w/o
Chris Wood, DWR w/o
Kevin Carter, TLA w/o
Price Field Office
O:\015018.DER\WG3869\FinApp.doc

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • www.ogm.utah.gov

UTAH DNR OIL, GAS & MINING

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

P.O. Box 310
15 North Main Street
Huntington, Utah 84528

July 27, 2011

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

Subj: Clean Copy Submittal for Task ID #3949, PacifiCorp, Deer Creek Mine, C/015/0018, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company "Energy West" as mine operator, hereby submits the clean copies to the above approved amendment to update the Deer Creek Mine Mining and Reclamation Plan.

Actions to finalize this amendment include removing and/or replacing the noted pages. As noted above, all clean copy pages are included with this submittal. After stamping "Approved" on the clean copy pages, the Division needs to complete the following:

- **Volume 1:** Replace Page 2-174

Eight (8) complete clean copies of this amendment are submitted for Division certification. A C2 form is included for organization of removal or replacement of items into the Deer Creek MRP. If you have any questions concerning this amendment, please contact myself at 435-687-4712 or Dennis Oakley at 435-687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Geology and Environmental Affairs Manager

Cc: file

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

VEGETATION MONITORING PLAN - DEER CREEK MINE R645-301-321

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive or regressive impacts on vegetation at the Deer Creek mine. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas. The monitoring shall be an extension of the baseline data as outlined in the Deer Creek PAP Volume 1.

Aerial photography taken annually up to present (2009) has been used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation. There has been no detected stress or any other impacts to vegetation using aerial photography.

Because stress to vegetation within the permit area is so much more subject to the natural forces in nature, (fire, insect infestation, drought, etc.) aerial photography will no longer be used.

Reference area qualitative and quantitative monitoring at the Deer Creek Mine has been conducted at least on five year intervals in the past. Qualitative and quantitative monitoring was last conducted in 2007 and will continue on five year intervals through mine through reclamation and bond release.

The vegetation monitoring information for reference areas and reclamation sites will be evaluated and submitted in an annual report following the year in which monitoring is conducted.

SOILS INFORMATION R645-301-200

Portal and support facility areas for the Deer Creek Mine are cut into steep, nearly perpendicular rock cliffs. The areas are

INCORPORATED
JUL 28 2011
Div. of Oil, Gas & Mining
2-174
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Replaced

VEGETATION MONITORING PLAN - DEER CREEK MINE R645-301-321

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive and final effects of the underground mining activities at the Deer Creek mine on vegetation. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas that will be impacted by underground mining. The monitoring shall be an extension of the baseline data as outlined in the Deer Creek PAP Volume 1.

Aerial photography taken annually will be used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation.

Infrared photography was taken of impacted surface areas during September, 1987. This will be repeated in 1992 and continued on a five year schedule.

Each vegetation type mapped and monitored will be based on a dominant overstory and a dominant understory species to be consistent with Unita-Southwestern Coal Region Data Adequacy Standards. The details of monitoring and analyses will be developed in cooperation with the US Forest Service.

The vegetation monitoring information and an evaluation of the impacts of mining on vegetation will be submitted in an annual report following the year in which monitoring is conducted.

SOILS INFORMATION R645-301-200

Portal and support facility areas for the Deer Creek Mine are cut into steep, nearly perpendicular rock cliffs. The areas are

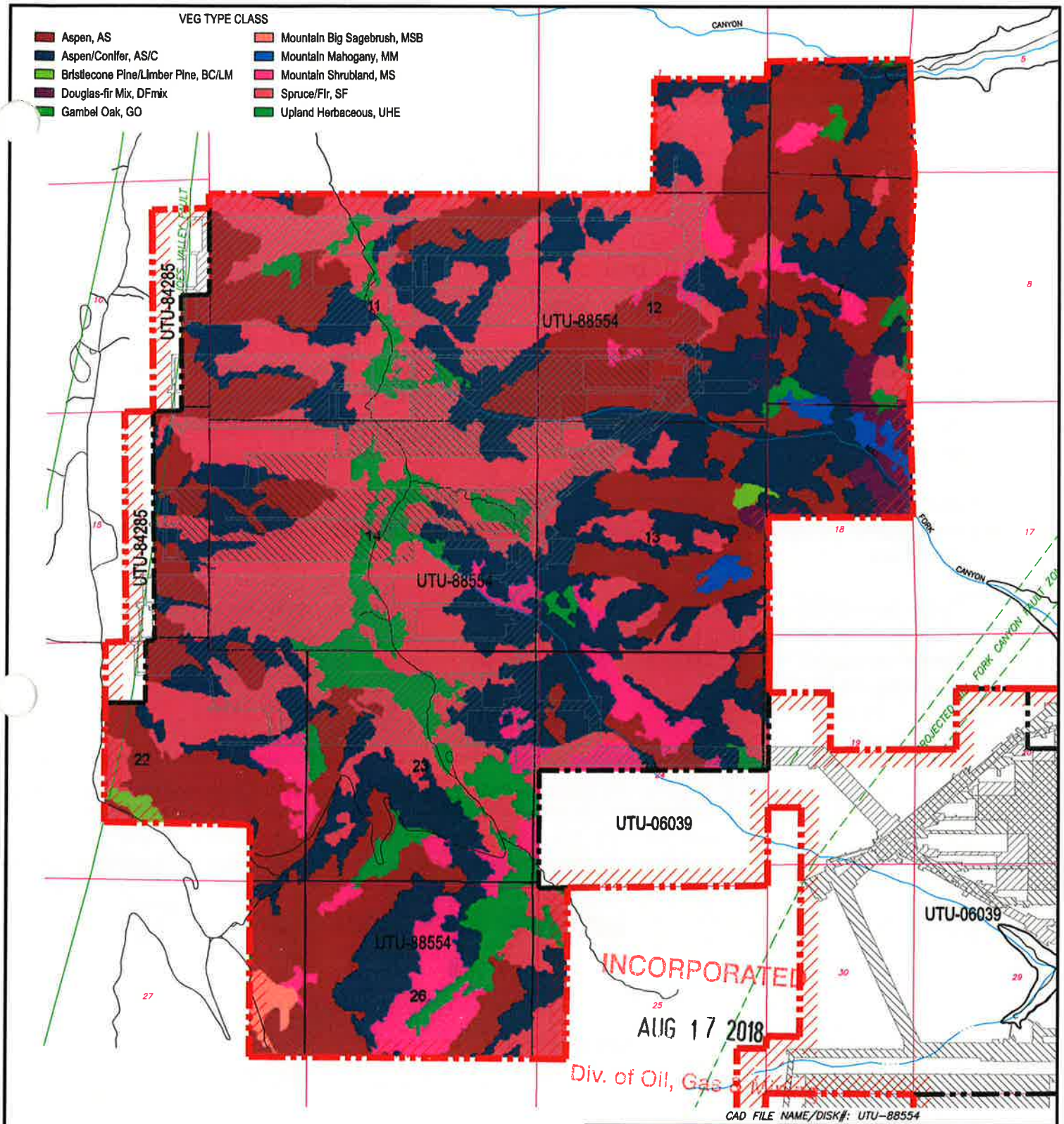
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Based on PacifiCorp's observations, no mining-related impacts to vegetation have been witnessed observed or reported in the UTU-88554 area. There were no surface facilities or installations on this lease.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



LEGEND

- LMU BOUNDARY UTU-73336
- COAL OUTCROP
- HIAWATHA SEAM MINE WORKINGS
- BLIND CANYON SEAM MINE WORKINGS
- FAULTS
- UTU-88554 FEDERAL LEASE NUMBER
- FEDERAL LEASE LINE
- ROADS
- DRAINAGE

CAD FILE NAME/DISK#: UTU-88554

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
VEGETATION BASE MAP

DRAWN BY:	K. LARSEN	APPENDIX D	
SCALE:	1" =3000'	DRAWING #:	
DATE:	APRIL 16, 2018	SHEET 1 OF 1	REV. ___

Deer Creek Mine
Federal Coal Lease UTU-88554 Full Lease Relinquishment
Appendix E

Evaluation of Impacts to Private Improvements

There are two private surface improvements in Lease UTU-88554. The first of these is the 345 KV power transmission line that crosses the southwest corners of the lease. It is owned by PacifiCorp / Rocky Mountain Power. Two separate studies of the potential subsidence beneath this line were conducted in 1997 and 2004. The power line crosses the southwest corners of the lease, where underground mining did not reach.

The gas well Federal 32-23, located near the center of Section 23, T.16 S., R. 6 E. was surveyed and observed during nearby longwall mining in 2005. Minor subsidence occurred with no effect on the well.

To the best of the knowledge of the lessee through due inquiry including reconnaissance flights, subsidence surveys and periodic surface topography inspections, there are no mining-related impacts associated with the Deer Creek Mine to any private surface improvements on the lease area being relinquished.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Appendix "F"

ENVIRONMENTAL AND CERCLA CERTIFICATION

CERCLA certification documents for sealing various districts of panels within the UTU-88554 lease have been submitted when those districts were sealed. Previous CERCLA inspections within UTU-88554 have taken place in March 2008, April 2009, September 2010, October 2014, February 2015, March 2015, and November, 2017. CERCLA documents for the remaining portions of the mine workings sealed and abandoned in 2017 are included with this relinquishment request.

On November 29, 2017, a hazardous/toxic waste inspection was conducted underground at Deer Creek Mine to clear the remaining open areas of the mine for permanent sealing. Full documentation of this inspection is included.

UPDES discharge water quality information derived from UPDES DMR submittal forms is presented here in graph form. The original monthly UPDES DMR reports were filed with Utah Division of Oil, Gas, and Mining, Utah Division of Water Quality, and the Environmental Protection Agency.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

ENVIRONMENTAL AND CERCLA CERTIFICATION

Submittal Date: 5-29-2018

Lease(s) # UTU-88554 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains, 24th through 27th West Sections and Remainder of Mine Workings

Coal Bed: Blind Canyon and Hiawatha Coal Seams

The Environmental Protection Agency promulgated final regulations to implement requirements established in Section 120(h) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by Superfund Amendments Reauthorization Act (SARA). Under section 120(h), whenever a Federal agency enters into any contract/agreement for the sale or transfer of public land/real property, and on which any hazardous substance was stored for one year or more, or known to have been released or disposed of, the contract (conveyance document) must include notice of the type and quantity of such hazardous substance, and the time at which such storage, release or disposal was originated. This final rule making became effective October 17, 1990.

Federal coal leases, if developed, result in the operator conducting mining operations on all or parts of the Federal lands. The lessee/operator, under appropriate circumstances, may utilize hazardous substances on the surface or underground on Federal lands. At the time of lease relinquishment, or at the time of any sealing or potentially sealing operation conducted by a Federal lessee, it is necessary for the lessee to inform the BLM and any other surface managing agency of any activities of a lessee that might be subject to CERCLA notification. This information will be utilized to satisfy the requirements under Section 120(h) of CERCLA as amended by SARA.

BLM requires the following information to the extent it is applicable to the Federal coal lease relinquishment area, area or any time that a mining operation seals or places structures possibly sealing an area. BLM will make the company proprietary information public only upon transfer or exchange of the affected lands.

Explanation:
Items 1-5 deal with hazardous substances and environmental issues. Item 6 is a CERCLA certification by an officer of the lessee. Suggested formats follow.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Required Information:

1. A list of any hazardous substances as defined in SARA Title III Consolidated List (40 CER 302.4) used on the lease (by date) or products that contain such substances. This shall include all hazardous substances and materials along with their Chemical Abstract Services Registry Numbers (CASRN), and petroleum based oil and other petroleum products that were used, stored or delivered to the lease. Quantities at this time are not necessary. This is for disclosure purposes only.

2. A copy of all reports of spills occurring on the lease or sealed area.

3. A copy of all reports submitted to the State of Utah listing any spill of petroleum based oil or other petroleum products on the lease exceeding 25 gallons or that cause a threat to human health or the environment.

4. A mine map covering the lease showing the location, type and model of any equipment or machinery that is known to be remaining underground. (this does not include materials and supplies, and hand tools). For every piece of equipment that will be left underground upon lease cessation of operations, please list the quantities of oil, batteries, or other fluids that are remaining, or could be remaining in the equipment.

5. A summary analysis of water quality reports showing whether or not the water quality has been affected by mining. The data that has been collected throughout the years should be the basis for this summary report. The UPDES/NPDES discharge permit requirements for the mine and copies of certifications or samples to show that these requirements have not been exceeded should be part of this analysis. The analysis should compare the water quality at the time of cessation of operations with the water quality that existed prior to mining in the base line analysis. This shall be for all waters that are affected by mining. The company should list any mitigation that was done to alleviate any water quality concerns.

6. An officer of the lessee shall sign and submit a certificate in the form attached for each lease or portion thereof where operations have ceased.

a. Based upon a complete search of all known records of the lessee(s), sublessee(s) and operator(s) (i) for the specified lease or portion thereof relinquished, operations ceased or sealed and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed; and upon our knowledge of past operations, there have been no reportable quantities of hazardous substances (per 40 CFR 302.4) and Part 373 or used oil (per Utah State Management Rule R-3 15-15), deposited or released within the lease, either on the surface or underground that will harm human health and the environment with respect to any such substances remaining on the property.

b. Based upon a complete search of all known records for the lessee(s), sublessee(s) and operator(s) for the specified lease or portion thereof relinquished, operations ceased or sealed and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed; and upon our knowledge of past operations, there has been a release or disposal of a reportable quantity of **hazardous substance** (per 40 CFR 302.4) and Part 373 or **used oil** (per Utah State Management Rule R-315-15) on the surface of the lease or underground, and all remedial action necessary has been taken to protect human health ~ and the environment with respect to any such substances remaining on the property. This shall be documented with sample analytical data from the remediation or removal process.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

(Officer of the Lessee) 5/29/18 (Date)

HAZARDOUS SUBSTANCE REPORT

Submittal Date: 5-29-2018

Lease(s) # _ UTU-88554 Full Relinquishment
Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains, 24th through 27th West Sections and Remainder of Mine Workings

Coal Bed _Blind Canyon and Hiawatha Coal Seams _

Hazardous Substance / Product	Date Utilized	CASRN (if applicable)	Location Used (Cross-cut if known)
None Spilled -			
See Attached CASRN List			

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Hazardous Substance Report CERCLA Page One of Two
Lease(s) UTU-88554
Deer Creek Mine - MSHA # 42-00121
Sealed Mine Sections: Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains 24th - 27th West Sections (Longwall Panels 25th, 26th, 27th West), and remainder of mine workings

Coal Bed Hiawatha Seam

Note: While these substances were likely transported into, used, or stored in the referenced leases during the time interval shown, (11/05 - 01/15) there are no reports or evidence that any of these substances were spilled or left within the sealed area. No complete list exists that shows all hazardous materials transported into, used, or stored within the referenced area.

Product Name	Date Utilized	Hazardous Ingredient Name	Component Percentage	CASRN	Location Used
D Cell Nickel Cadmium Battery, 4.8 VDC	12/03 - 12/17	Nickel and Nickel Hydroxide	20 - 32%	Unknown	All Sections
	12/03 - 12/17	Cadmium and Cadmium Hydroxide	13 - 22%	Unknown	All Sections
	12/03 - 12/17	Sodium Hydroxide	0 - 4%	Unknown	All Sections
	12/03 - 12/17	Potassium Hydroxide	0 - 4%	Unknown	All Sections
	12/03 - 12/17	Cobalt Hydroxide	0.5 - 2%	Unknown	All Sections
Chevron Superla White Oil	12/03 - 12/17	White Mineral Oil	100%	8042-47-5	All Sections
Blaster PB Penetrating Catalyst	12/03 - 12/17	Naptha	40 - 50%	64742-94-5	All Sections
	12/03 - 12/17	Petroleum Distillates, hydrotreated	30 - 40%	64742-47-8	All Sections
	12/03 - 12/17	Petroleum Distillates, solvent-dewaxed	20 - 30%	64742-65-0	All Sections
	12/03 - 12/17	Alcohols, C11-15 secondary ethoxylated	0 - 3%	68131408	All Sections
	12/03 - 12/17	Carbon Dioxide Propellant	0 - 3%	124389	All Sections
Krylon Spray Paints	12/03 - 12/17	Propane	14%	74-98-6	All Sections
	12/03 - 12/17	Butane	13%	106-97-8	All Sections
	12/03 - 12/17	Toluene	17%	108-88-3	All Sections
	12/03 - 12/17	Medium Aromatic Hydrocarbons	3%	64742-94-5	All Sections
	12/03 - 12/17	Napthalene	0.40%	91-20-3	All Sections
	12/03 - 12/17	Acetone	41%	67-64-1	All Sections
	12/03 - 12/17	Ethyl 3-Ethoxypropionate	4%	763-69-9	All Sections
Hand Cleaner, Brody Chemical	12/03 - 12/17	Aliphatic Petroleum Distillate	25 - 35%	64742-96-7	All Sections
RD-90 Spray Lubricant	12/03 - 12/17	Petroleum Lube Oil	10 - 20%	64742-65-0	All Sections
	12/03 - 12/17	Deodorized Kerosene	30 - 40%	64742-47-8	All Sections
	12/03 - 12/17	Mineral Oil	20 - 25%	8042-47-5	All Sections
	12/03 - 12/17	Mineral Spirits	5 - 10%	64741-65-7	All Sections
	12/03 - 12/17	Liquified Petroleum Gas	10 - 20%	68476-85-7	All Sections
Extreme Blue Windshield Washer Fluid	12/03 - 12/17	Methanol	<20%	67-56-1	All Sections
	12/03 - 12/17	Denatonium Benzoate	<2%	3734-33-6	All Sections
Carquest Starting Fluid	12/03 - 12/17	Heptane	69 - 79%	142-82-5	All Sections
	12/03 - 12/17	Ethyl Ether	11 - 21%	60-29-7	All Sections
	12/03 - 12/17	Carbon Dioxide	1 - 11%	124-38-9	All Sections
	12/03 - 12/17	Hexane	2.80%	110-54-3	All Sections
Blend #0019A Premium Starting Fluid	12/03 - 12/17	Heptane	60 - 70%	142-82-5	All Sections
	12/03 - 12/17	Ethyl Ether ACS Reagent Grade	23 - 33%	60-29-7	All Sections
	12/03 - 12/17	Carbon Dioxide	1 - 11%	124-38-9	All Sections
Diesel Engine Oil	12/03 - 12/17	Zinc Dithiophosphate	<2.5%	68649-42-3	All Sections
Cat Hydraulic Oil SAE 10W	12/03 - 12/17	None			All Sections
Cat Transmission and Drive Train Oil	12/03 - 12/17	None			All Sections
Solcenic 3B-BLK (Emulsion Oil)	12/03 - 12/17	Monoethanolamine	<10%	141-41-3	All Sections
	12/03 - 12/17	Triethanolamine	<5%	102-71-6	All Sections
Chevron Delo 400	12/03 - 12/17	Mineral Oil	70 - 95%	Mixture	All Sections
	12/03 - 12/17	Zinc alkyl dithiophosphate	1 - 5%	68649-42-3	All Sections
Conoco HD Fleet Engine Oil	12/03 - 12/17	Lubricant base oil	87 - 91%	Various	All Sections
	12/03 - 12/17	Zinc Compounds	1.0 - 1.5%	Proprietary	All Sections
	12/03 - 12/17	Additives	9 - 13%	Proprietary	All Sections
Conoco Transformer Oil	12/03 - 12/17	Hydrotreated dist., Lt. Napthenic	>99%	64742-53-6	All Sections
	12/03 - 12/17	Additives	<1%	Proprietary	All Sections
Contact Cleaner 2000	12/03 - 12/17	Decafluoropentane (HFC-43-10mee)	5 - 15%	138495-42-8	All Sections
	12/03 - 12/17	Cozol 401	80 - 95%	Proprietary Blend	All Sections
	12/03 - 12/17	Carbon Dioxide	3 - 8%	124-38-9	All Sections
Heavy Duty Degreaser	12/03 - 12/17	Trichloroethylene	95 - 99%	79-01-6	All Sections
	12/03 - 12/17	1,2 Butylene Oxide	0.50%	106-88-7	All Sections
	12/03 - 12/17	Carbon Dioxide	1 - 5%	124-38-9	All Sections
Shellzone All-Season Antifreeze/Coolant	12/03 - 12/17	Ethylene Glycol	90 - 98%	107-21-1	All Sections
	12/03 - 12/17	Deionized Water	1 - 3%	7732-18-5	All Sections
	12/03 - 12/17	Phosphoric Acid	1 - 3%	7664-38-2	All Sections

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Hazardous Substance Report CERCLA Page Two of Two
Lease(s) UTU-88554, UTU-84285
Deer Creek Mine - MSHA # 42-00121
Sealed Mine Sections: Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North mians, 10th North Mains 24th - 27th West Sections (Longwall Panels 25th, 26th, 27th West), and remainder of mine workings

Coal Bed Hiawatha Seam

Note: While these substances were likely transported into, used, or stored in the referenced leases during the time interval shown, (11/05 - 01/15) there are no reports or evidence that any of these substances were spilled or left within the sealed area.
No complete list exists that shows all hazardous materials transported into, used, or stored within the referenced area.

Product Name	Date Utilized	Hazardous Ingredient Name	Component Percentage	CASRN	Location Used
Holcim Portland Cement	12/03 - 12/17	Tri-calcium silicate	20 - 70%	12168-85-3	All Sections
	12/03 - 12/17	Di-calcium silicate	10 - 60%	10034-77-2	All Sections
	12/03 - 12/17	Tetra-calcium-alumino-ferrite	5 - 15%	12068-35-8	All Sections
	12/03 - 12/17	Calcium sulfate	2 - 10%		All Sections
	12/03 - 12/17	Tri-calcium aluminate	1 - 15%	12042-78-3	All Sections
	12/03 - 12/17	Magnesium oxide	0 - 4%	1309-48-4	All Sections
	12/03 - 12/17	Crystalline silica (quartz)	0 - 1%	14808-60-7	All Sections
	12/03 - 12/17	Hexivalent chromium		18540-29-9	All Sections
Shot-Set 250 Liquid Accelerator	12/03 - 12/17	Silicic Acid, Sodium Salt	1%	1344-09-S	All Sections
Johnson Controls Lead-Acid Battery	12/03 - 12/17	Lead	34%	7439-92-1	All Sections
	12/03 - 12/17	Lead Dioxide	31%	1309-60-0	All Sections
	12/03 - 12/17	Lead Sulfate	<1%	7446-14-2	All Sections
	12/03 - 12/17	Sulfuric Acid (35%)	34%	7664-93-9	All Sections
Johnsens Heavy Duty DOT 3 Brake Fluid	12/03 - 12/17	Diethylene Glycol Monobutyl Ether	5 - 20%	112-34-5	All Sections
	12/03 - 12/17	Triethylene Glycol	6 - 25%	112-35-6	All Sections
	12/03 - 12/17	Triethelyne Glycol Monoethyl Ether	6 - 25%	112-50-5	All Sections
	12/03 - 12/17	Triethylene Glycol Monobutyl Ether	20 - 39%	143-22-6	All Sections
	12/03 - 12/17	Tetraethylene Glycol Monobutyl Ether	5 - 20%	1559-34-8	All Sections
	12/03 - 12/17	Polyalkylene Glycol Monomethyl Ether	5 - 20%	23783-42-8	All Sections
	12/03 - 12/17	Polyethylene Glycol	5 - 20%	25322-68-3	All Sections
	12/03 - 12/17	Polyethylene glycol monobutyl ether	5 - 20%	9004-77-7	All Sections
	12/03 - 12/17	Polyalkylene Glycols	5 - 20%	9038-95-3	All Sections
	12/03 - 12/17	Diethylene Glycol	5 - 15%	111-46-6	All Sections
	12/03 - 12/17	Diethylene Glycol Monomethyl Ether	<5%	111-90-0	All Sections
Koehler Bright Star Lamp Battery Fluid	12/03 - 12/17	Sulfuric Acid (38%)	100%	7664-93-9	All Sections
Q-Bond Surface Bonding Cement	12/03 - 12/17	Portland Cement		65997-15-1	All Sections
	12/03 - 12/17	Crystalline Silicon Dioxide		13397-24-5	All Sections
	12/03 - 12/17	Calcium Hydroxide		001-305-620	All Sections
	12/03 - 12/17	Calcium Stearate		1592-23-0	All Sections
Roklok 70A	12/03 - 12/17	Polymethylene polyphenyl isocyanate	100%	009016-87-9	15 W
Roklok 70B	12/03 - 12/17	Polyglycols	60 - 100%	Mixture (2)	15 W
	12/03 - 12/17	Dimethylene Glycol	10 - 30%	111-46-6	15 W
Minova Lokset Resin Cartridge	12/03 - 12/17	Calcium Carbonate	60 - 100%	1317-65-3	All Sections
	12/03 - 12/17	Polyester Resin	5 - 15%	Not Reported	All Sections
	12/03 - 12/17	Styrene Monomer	3 - 7%	100-42-5	All Sections
	12/03 - 12/17	Diethylene Glycol	0.5 - 1.5%	57-55-6	All Sections
	12/03 - 12/17	Benzoyl Peroxide	0.5 - 1.5%	94-36-0	All Sections
Foamy Engine Bright Engine Cleaner	12/03 - 12/17	2-Butoxyethanol	2 - 10%	111-76-2	All Sections
	12/03 - 12/17	Aromatic Petroleum Naphtha	2 - 10%	64742-95-6	All Sections
	12/03 - 12/17	Isobutane	2 - 10%	75-28-5	All Sections
	12/03 - 12/17	Petroleum Base Oil	2 - 10%	8008-20-6	All Sections
	12/03 - 12/17	Propane	2 - 10%	74-98-6	All Sections
WD-40 Aerosol	12/03 - 12/17	Aliphatic Hydrocarbon	45 - 50%	64742-47-8	All Sections
	12/03 - 12/17			64742-48-9	All Sections
	12/03 - 12/17			64742-88-7	All Sections
	12/03 - 12/17	Petroleum Base Oil	15 - 25%	64742-65-0	All Sections
	12/03 - 12/17	LVP Aliphatic Hydrocarbon	12 - 18%	64742-47-8	All Sections
	12/03 - 12/17	Carbon Dioxide	2 - 3%	124-38-9	All Sections
Conoco Super Hydraulic Oil (all grades)	12/03 - 12/17	Lubricant base oil	>99	Various	All Sections
	12/03 - 12/17	Additives	<1	Proprietary	All Sections
Conoco Power Tran Fluid	12/03 - 12/17	Lubricant base oil	87 - 91%	Various	All Sections
	12/03 - 12/17	Zinc Compounds	1.0 - 1.5%	Proprietary	All Sections
	12/03 - 12/17	Additives	9 - 13%	Proprietary	All Sections
Powergear EP 5 - 35LB MPL	12/03 - 12/17	Mineral Oil	>95%	Proprietary	All Sections

UNCORPORATED
AUG 17 2018
DIV. OF Oil, Gas & Mining

CERCLA CERTIFICATION

Lease(s) # _ UTU-88554 Full Relinquishment
Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains, 24th through 27th West Sections and Remainder of Mine Workings

Coal Bed: Blind Canyon and Hiawatha Coal Seams

a. Based upon a complete search of all known records of the lessee(s), sublessee(s) and operator(s) (i) for the specified lease or portion thereof relinquished, sealed or potentially sealed, and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed or potentially sealed; and upon our knowledge of past operations, there have been **no** reportable quantities of **hazardous substances** (per 40 CFR 302.4) and Part 373 or **used oil** (per Utah State Management Rule R-315-15), deposited or released within the lease, either on the surface or underground that will harm human health and the environment with respect to any such substances remaining on the property.

b. Based upon a complete search of all known records for the lessee(s), sublessee(s) and operator(s) for the specified lease or portion thereof relinquished, operations ceased or sealed and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed; and upon our knowledge of past operations, there has been a release or disposal of a reportable quantity of **hazardous substance** (per 40 CFR 302.4) and Part 373 or **used oil** (per Utah State Management Rule R-315-15) on the surface of the lease or underground, and all remedial action necessary has been taken to protect human health ~ and the environment with respect to any such substances remaining on the property. This shall be documented with sample analytical data from the remediation or removal process.

(Officer of the Lessee) (Date) 5/29/18

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

PETROLEUM PRODUCT REPORT

Submittal Date 5-29-2018

Lease(s) # UTU-88554 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains, 24th through 27th West Sections and Remainder of Mine Workings

Coal Bed Blind Canyon and Hiawatha Coal Seams

Oil or Petroleum product spilled	Date spilled	Amount Spilled (If > 25 gallons)	Location Spilled (Cross-cut if known)
None			

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EQUIPMENT REMAINING UNDERGROUND REPORT

Submittal Date: 5-29-2018

Lease(s) # UTU-88554 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains, 24th through 27th West Sections and Remainder of Mine Workings

Coal Bed Blind Canyon and Hiawatha Coal Seams

Equipment name & model number	Date Inspected	Fluid types/batteries and amount	Final location (Cross-cut if known)
See Attached List			

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Deer Creek Mine

Federal Lease UTU-88554 Full Lease Relinquishment

Equipment Remaining In Lease UTU-88554 as of December 20, 2017

Pumps and D-Boxes, Grouped by Location

Description	HP	Location
27th West		
D/Box		27W X80
D/Box		27W X84
D/Box		27W X88
Pump	6.4	27W X84 #2
26th West		
D/Box		26W X41 #1
D/Box		26W X44 #1
D/Box		26W X45 #1
D/Box		26W X49 #1
D/Box		26W X49
D/Box		26W X57 (322)
D/Box		26W X57 (218)
D/Box		26W X57 (065)
D/Box		26W X61
Pump	6.4	26W X32 #2
Pump	5	26W X34 #1
Pump	5	26W X39 #1

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Pump	6.4	26W X41 #1
Pump	5	26W X43 #1
Pump	6.4	26W X45 #1
Pump	6.4	26W X48 #1
Pump	6.4	26W X50 #1
Pump	6.4	26W X56 #1
Pump	6.4	26W X56 #2
Pump	6.4	26W X57 O/C
Pump	6.4	26W X58 #1
Pump	6.4	26W CR 27-26
Pump	6.4	26W X61#1
Pump	6.4	26W X65

25th West

D/Box	25W X14 (2540)
D/Box	25W X14 (3399)
D/Box	25W X23
D/Box	25W X25 (114)
D/Box	25W X25 (1396)
D/Box	25W X30
D/Box	25W X35
D/Box	25W X42
D/Box	25W X45
D/Box	25W X51
D/Box	25W X56

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Pump	13	25W X15 #2
Pump	6.4	25W X18 #2
Pump	5	25W X23 #2
Pump	6.4	25W X26.5 #2
Pump	6.4	25W X30.5 #2
Pump	6.4	25W X34 #2
Pump	6.4	25W X42 #2
Pump	6.4	25W X45 #2
Pump	5	25W X51 #2
Pump	6.4	25W X56 #2
Pump	6.4	25W X57 #2

24th West Upper

D/Box		24W X58
D/Box		24W X63
D/Box		24W X68
D/Box		24W X74
D/Box		24W X79
D/Box		24W X87
D/Box		24W X91
D/Box		24W X92
D/Box		24W X94
Pump	28	24W X57 #1
Pump	13	24W X64 #1
Pump	5	24W X69 #1

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Pump	13	24W X75 tub
Pump	5	24W X80 #1
Pump	6.4	24W X87 #1
Pump	5	24W X90 #1
Pump	13	24W X92 s
Pump	6.4	24W X95 #1
Pump	13	24W X95 #1B

24th West Lower

D/Box		24W X16
D/Box		24W X27
D/Box		24W X31 (050)
D/Box		24W X31 (116)
D/Box		24W X35 (110)
D/Box		24W X35 (022)
D/Box		24W X42
D/Box		24W X50
D/Box		24W X57
Pump	6.4	24W X14 #1
Pump	28	24W X32 #1
Pump	6.4	24W X32 #1
Pump	5	24W X34 #1
Pump	5	24W X36 #1
Pump	5	24W X42 #1
Pump	5	24W X46 #1

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Pump	6.4	24W X57 #2
Pump	6.4	24W X57 #2

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

SUMMARY WATER ANALYSIS REPORT

Lease(s) # _UTU-88554 Full Relinquishment

Mine Name and MSHA Mine # _Deer Creek Mine #42-00121_

Mine Section (if applicable) Mill Fork Access #2, 7th North Bypass #1 & #2, 7th North Mains, 9th North Mains, 10th North Mains, 24th through 27th West Sections and Remainder of Mine Workings

Coal Bed _Blind Canyon and Hiawatha Coal Seams _

Dates: 11/05 – 01/15 (No Mine Discharge Since 1/15)

Submittal Date: 5-29-2018

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

SUMMARY WATER ANALYSIS REPORT

DEER CREEK MINE

Federal Lease UTU-88554 and UTU-84258
Lease Relinquishment

Mine ID
Utah Pollution Discharge Elimination System (UPDES) Permit Data
Quantity - Historical Data
Quality - Historical Data (UPDES Parameters)
Total Suspended Solids
Iron (Total & Dissolved)
Oil & Grease
Total Dissolved Solids
Ph

UPDES Permit Data:
Deer Creek Mine UPDES Permit: UT0023604
Mine Discharge - Site 002
Permit Renewed on February 1, 2015
Permit Expires on January 31, 2020

Permit Limitations (water discharged to Deer Creek Drainage):

Deer Creek Mine Water Discharge Site 002

	Effluent Limitations				Monitoring Requirements	
Effluent Characteristics	Average 30 - Day	Average 7 - Day	Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type
Flow, MGD	5.0 MGD	NA	NA	NA	Monthly	Measured
Total Suspend Solids, mg/l	15	25	NA	NA	Monthly	Grab
Total Iron, mg/l	NA	NA	NA	1.0	Monthly	Grab
Oil & Grease, mg/l	NA	NA	NA	10	Monthly	Grab
TDS, mg/l	NA	NA	NA	1200	Monthly	Grab
pH, Units	NA	NA	6.5	9.0	Monthly	Grab
Sanitary Waste	NA	NA	NA	None	Monthly	Visual
Oil and Grease, floating, visible foam	NA	NA	NA	None	Monthly	Visual

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

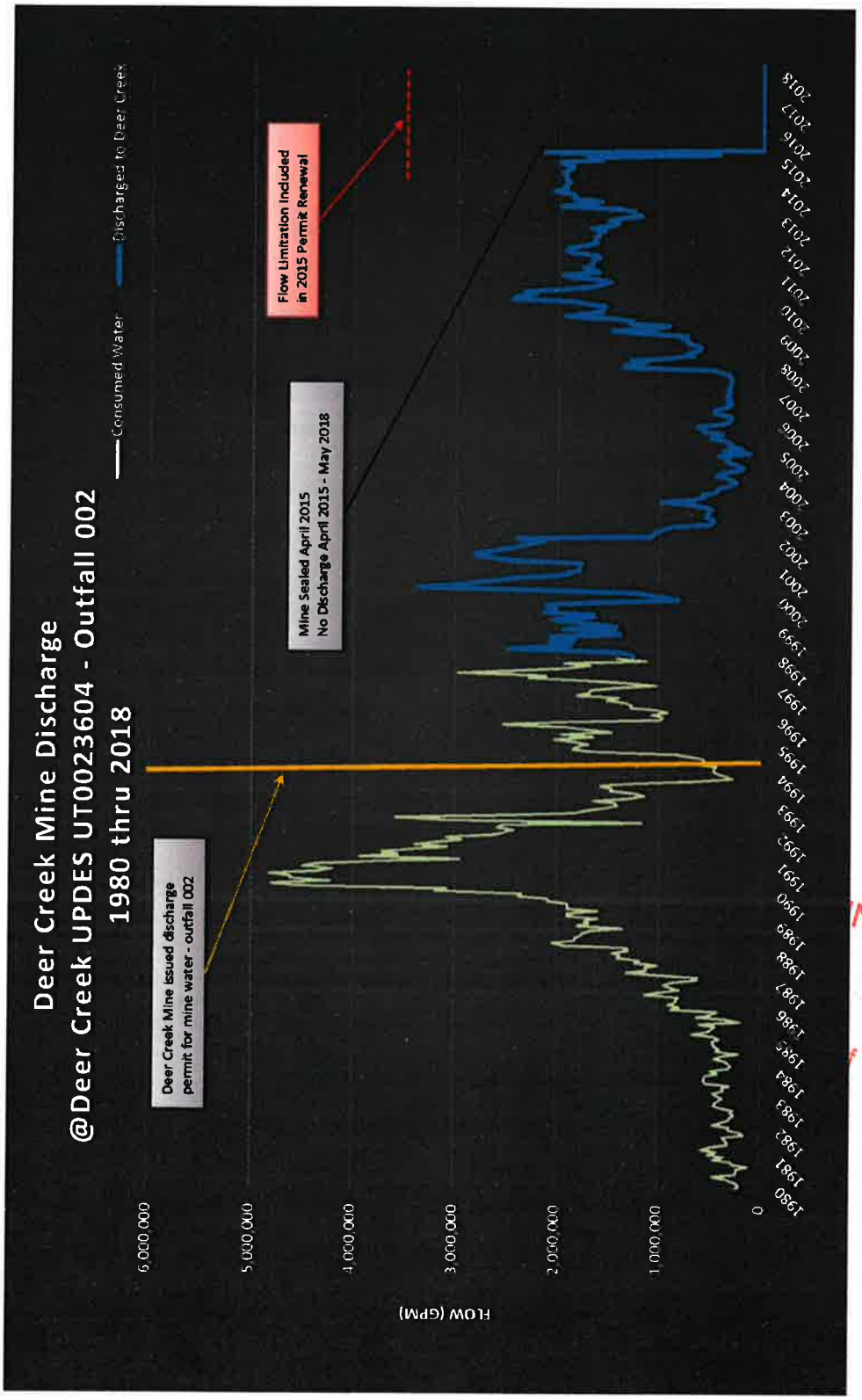
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Mine Water Discharge Site 002: 1980 – 2017

Mine Discharge Quantity



NCORPORATED
AUG 17 2018
f Oil, Gas & Mining

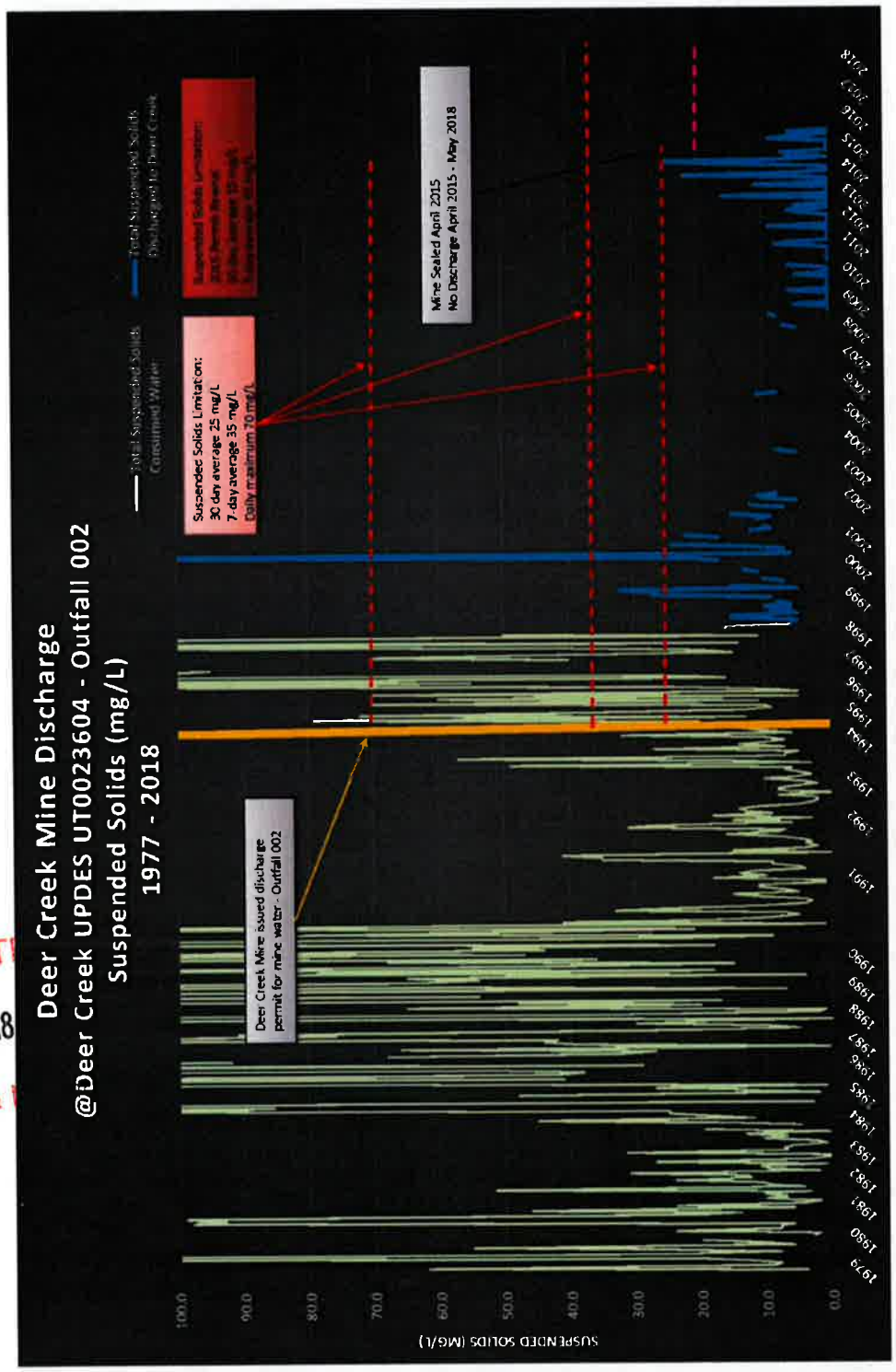
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Water Discharge Water Quality

Parameter: Total Suspended Solids



INCORPORATI
AUG 17 2018
Div. of Oil, Gas &

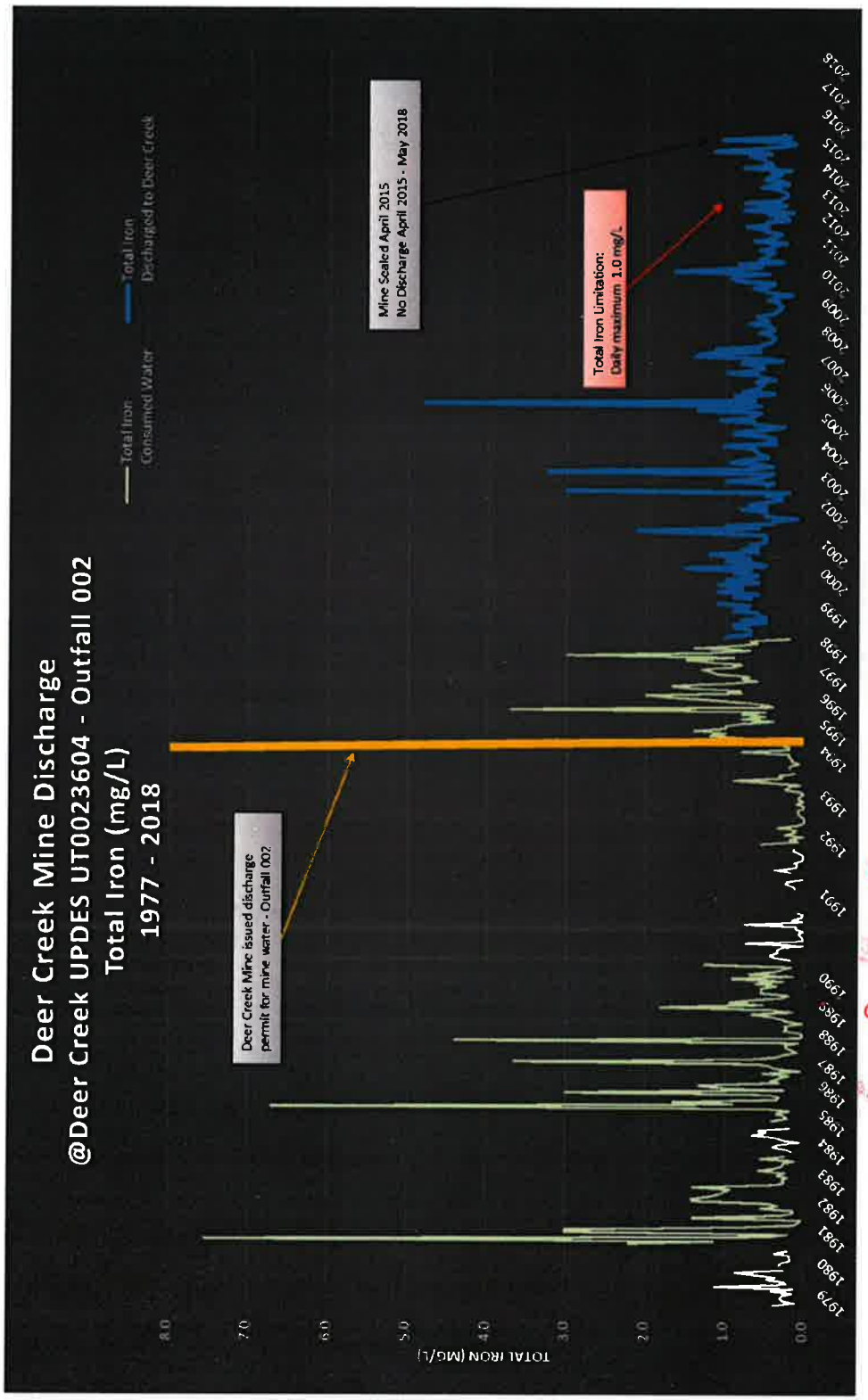
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Mine Water Discharge Water Quality

Parameter: Total Iron



INCORPORATED
AUG 17 2018
of Oil, Gas & Mining

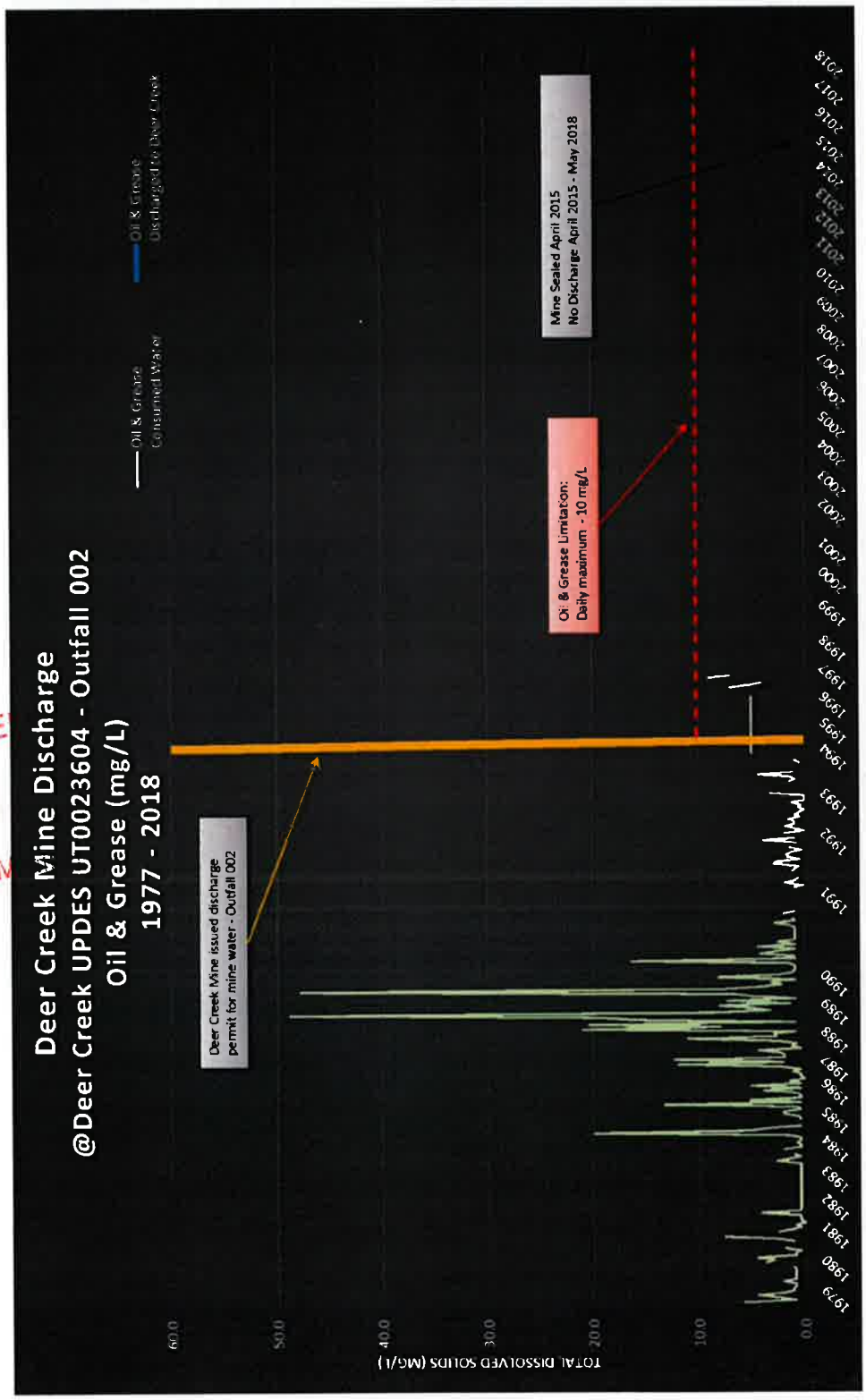
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Mine Water Discharge Water Quality

Parameter: Oil & Grease



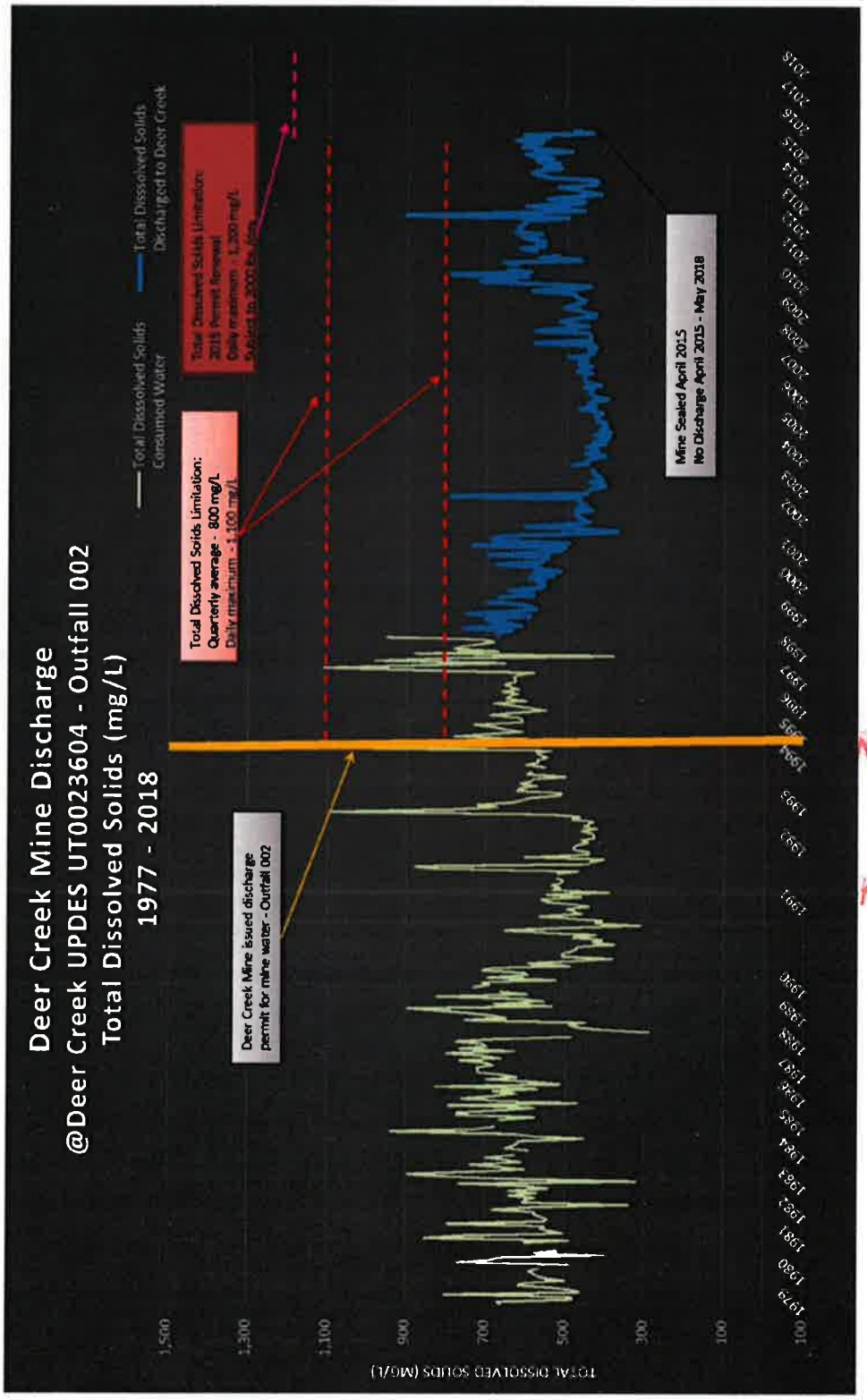
INCORPORATE
AUG 17 2018
Div. of Oil, Gas & M

MINE ID

DEER CREEK MINE

UPDES - 23604

Deer Creek Mine Water Discharge Water Quality
Parameter: Total Dissolved Solids



NCORPORATED
AUG 17 2018
f Oil, Gas & Mining

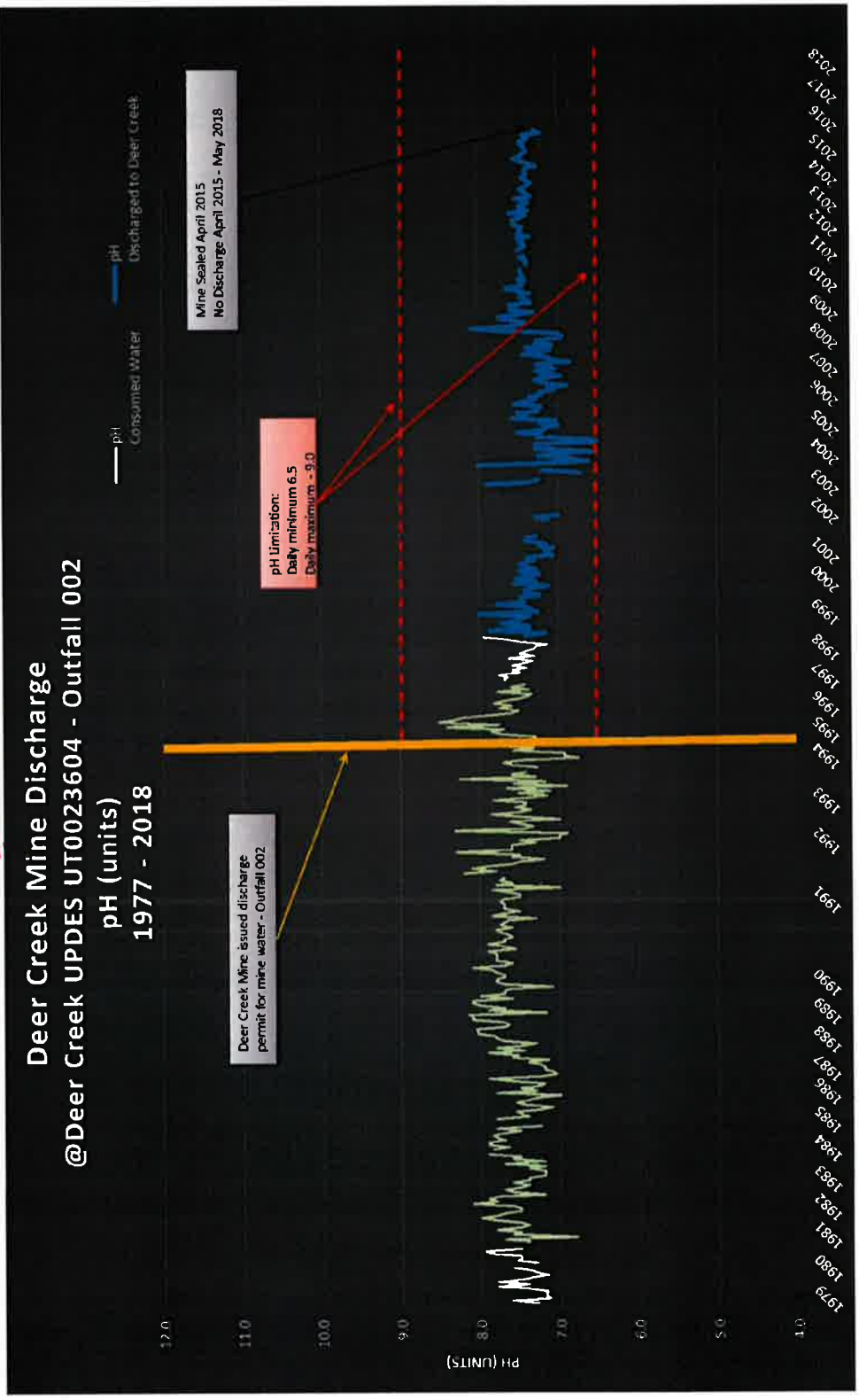
MINE ID

DEER CREEK MINE

UPDES - 23604

Deer Creek Mine Water Discharge Water Quality

Parameter: pH



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mini

Full Relinquishment
Federal Coal Lease
UTU-84285

May, 2018

PACIFICORP
A BERKSHIRE HATHAWAY ENERGY COMPANY

Prepared by:

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Managing Agent
1407 West North Temple, Suite 110
Salt Lake City, UT 84116

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

1407 W. North Temple, Suite 110
Salt Lake City, UT 84116

HAND DELIVERED

May 29, 2018

RECEIVED
MAY 30 2018
Bureau of
Land Management

Kent Hoffman
Deputy State Director
United States Department of the Interior
Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt lake City, Utah 84101-1345

RE: Overview of Federal Coal Lease Relinquishment Project (20 Federal Leases) East Mountain Logical Mining Unit UTU-73336, Deer Creek and Cottonwood Mines, Emery County, Utah

INCORPORATED

Dear Mr. Hoffman:

AUG 17 2018

By letter dated February 19, 2018, and on behalf of PacifiCorp, we provided our advance notice of intent to relinquish all or portions of the federal coal leases within the East Mountain Logical Mining Unit (LMU) UTU-73336, with the commitment to eventually provide individual formal federal coal lease relinquishment notices to your office to bring an end to the final chapter to this LMU.

Background and Purpose of Relinquishment

With PacifiCorp's decision and announcement on December 15, 2014, to close the Deer Creek Mine and end production from the LMU, this brought an end to 40+ years of coal production from this LMU. All coal production ceased on January 7, 2015. PacifiCorp has made steadfast efforts to complete all mine closure activities including the construction of permanent portal seals for the entire Deer Creek Mine complex and LMU.

All economically recoverable coal reserves within the entire LMU have been mined out or have been determined uneconomical to mine as acknowledged by BLM's letter dated March 23, 2016 (copy enclosed). Having fully complied with the federal coal lease terms

and their associated federal regulations, PacifiCorp has no intentions to re-open the mines within the LMU. Therefore, the purpose of this relinquishment exercise is to surrender the federal coal lease acreage back to the federal government that is no longer needed and retain selected lease acreage for reclamation purposes only. Refer to Map 1 (enclosed) which depicts the federal coal lease areas being relinquished (yellow) and the areas retained (green) for reclamation purposes.

LMU Lease Relinquishment Project Overview

We have prepared individual relinquishment notifications for 20 of the 21 federal coal leases that have comprised the LMU. Of the 20 federal coal lease relinquishment notifications, 12 leases are full relinquishments and 8 leases are partial relinquishments. Listed below are the 20 federal coal leases included in this relinquishment exercise:

(1) UTU-88554 (Full)
(2) UTU-84285 (Full)
(3) UTU-06039 (Partial)
(4) UTU-24317 (Full)
(5) UTSL-051221 (Partial)
(6) UTU-2810 (Partial)
(7) UTSL-050862 (Partial)
(8) UTU-014275 (Full)
(9) UTU-024319 (Full)
(10) UTU-47977 (Full)
(11) UTU-084924 (Full)
(12) UTU-084923 (Full)
(13) UTU-47979 (Partial)
(14) UTSL-070645/02292 (Full)
(15) UTSL-064607/064621 (Partial)
(16) UTU-083066 (Full)
(17) UTU-040151 (Partial)
(18) UTU-1358 (Full)
(19) UTSL-064900 (Partial)
(20) UTU-47978 (Full)

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

The eight (8) leases that are being partially relinquished, involve retaining selected portions of these leases for the following purposes:

1. To conduct surface reclamation on the disturbed lands in accordance with the state approved mine permits for the Deer Creek and Cottonwood Mines, and
2. Sustain the legal right-of-entry to these split estate federal lands while reclamation activities are conducted and finalized including the required 10-year minimum bond liability period to achieve Final Phase 3 Bond Release.

The individual lease relinquishment notifications will be submitted to your BLM office under separate cover letters as we get them completed in the order listed above.

Also, please note that federal coal lease UTU-044025 (within the LMU) is **not** included in this overall relinquishment exercise. PacifiCorp will need to retain all of federal coal lease UTU-044025 (total of 40 acres) for reclamation purposes and through the mine permit bond liability period to achieve Final Phase 3 Bond Release.

Conclusion

To the best of its information and belief, PacifiCorp is in compliance with the terms and conditions of this federal coal lease, inclusive of having made all payment obligations relative to rentals and royalties. Furthermore, PacifiCorp represents that the federal lease acres relinquished will not impair the public interest as all obligations under regulation 43 CFR § 3452.1 and all of the lease terms have been met per established BLM guidelines.

All relinquishment notifications have been prepared on behalf of PacifiCorp and have been acknowledged as set forth on each individual notification. We respectfully seek your attention to this matter and request that all twenty (20) lease relinquishments be accepted in a timely manner. Furthermore, with the submittal of these lease relinquishment notifications, this overall action will dissolve the East Mountain LMU UTU-73336 in its entirety.

Should you have any questions, need additional information or wish to discuss this matter with us, please feel free to contact me at 801-220-4612 or by email at Scott.Child@PacifiCorp.com.

Respectfully,

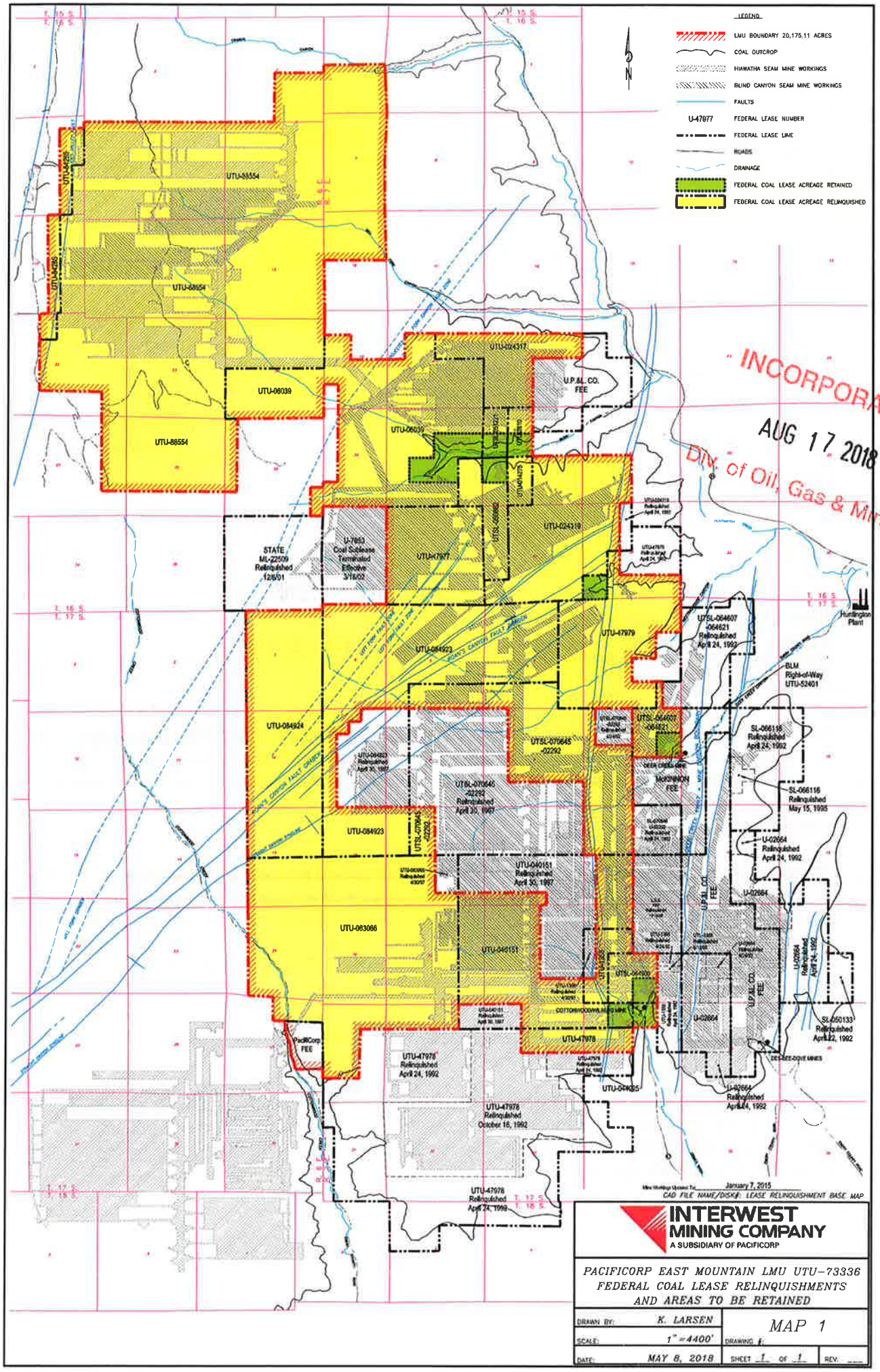
Scott M. Child
Manager, Lands & Regulatory Affairs

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Enclosures

cc: D. Ralston, B. Morgan, J. Potter, C. Semborski, K. Fleck, D. Oakley

SMC\Interwest\UTBLM2018-21(EastMtnLMU-FedLeaseRelinqProjOverview)


LEGEND
LMU BOUNDARY 20,175.11 ACRES
COAL OUTCROP
HIAWATHA SEAM MINE WORKINGS
BLIND CANYON SEAM MINE WORKINGS
FAULTS
U-47977 FEDERAL LEASE NUMBER
FEDERAL LEASE LINE
ROADS
DRAINAGE
FEDERAL COAL LEASE ACREAGE RETAINED
FEDERAL COAL LEASE ACREAGE RELINQUISHED
N
UTU-68554
UTU-06039
U.P.&L. CO. FEE
UTU-024317
UTU-024318
STATE ML-22509 Relinquished 12/6/01
U-7853 Coal Sublease Terminated Effective 3/16/02
UTU-47977
UTU-47979
UTU-084923
UTU-084924
UTSL-064607 -064621 Relinquished April 24, 1992
Huntington Plant
BLM Right-of-Way UTU-52401
UTSL-070645 -02292
UTSL-070645 -02292 Relinquished April 30, 1997
McKINNON FEE
SL-066116 Relinquished April 24, 1992
SL-066116 Relinquished May 15, 1995
U-02664 Relinquished April 24, 1992
U-02664
UTU-040151 Relinquished April 30, 1997
UTU-083066
UTU-040151
PacifiCorp FEE
UTU-47978
UTU-47978 Relinquished April 24, 1992
UTU-47978 Relinquished October 16, 1992
UTU-47978 Relinquished April 24, 1992
UTU-084925
SL-050133 Relinquished April 22, 1992
DESERET-OQUIRRH MINES
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining
January 7, 2015
CAD FILE NAME/DISK#: LEASE RELINQUISHMENT BASE MAP
INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP
PACIFICORP EAST MOUNTAIN LMU UTU-73336
FEDERAL COAL LEASE RELINQUISHMENTS
AND AREAS TO BE RETAINED
DRAWN BY: K. LARSEN
SCALE: 1"=4400'
DATE: MAY 8, 2018
MAP 1
DRAWING #:
SHEET 1 OF 1
REV:

United States Department of the Interior

BUREAU OF LAND MANAGEMENT
Green River District
Price Field Office
125 South 600 West
Price, UT 84501
http://www.blm.gov/ut/st/en/fo/price.html

MAR 2 3 2016

In Reply Refer To:
3482 (UTG023)
LMU UTU-73336 Mine Closure, UTU-88554, UTU-84285, UTU-06039
SL-070645/U-02292, U-084923, U-084924, U-083066, U-040151
U-044025, U-1358, SL-064607/064621, U-024317, U-024319
U-014275, SL-051221, U-47977, U-47978, U-47979, SL-050862
U-2810, LDS Fee Land, ML-48258/UTU-88554

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
7014-2120-0004-6185-8850

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Mr. Scott M. Child
Manager, Lands and Regulatory Affairs
Interwest Mining Company
1407 W. North Temple, Suite 310
Salt Lake City, Utah 84116

Re: Final Resource Recovery and Protection Plan (R2P2) Amendment and Final Disposition of the East Mountain Logical Mining Unit (LMU), Deer Creek Mine and Interwest Mining Company, as Managing Agent

Dear Mr. Child:

On September 25, 2015, the Bureau of Land Management (BLM) received a final R2P2 amendment from Interwest Mining Company for closing the subject mine and sealing the mine openings. This request follows the "Approved – Portal Sealing and Abandonment Plan – Final Closure of the Deer Creek Mine" letter from the BLM to Interwest dated April 10, 2015. In that letter the BLM approved the sealing of the mine. The received information from Interwest fulfills the requirements described in 43 CFR 3482.1(b) and (c).

Affected Leases and Logical Mining Unit (LMU): The idling of the mine affects the LMU UTU-73336, which includes all the leases and properties in the LMU.

Proposed Plan and Justification: Interwest has extracted all equipment out of the mine except those components required for dewatering the mine prior to final implementation of a ground water containment and distribution system. Upon final construction of the underground water management system, all openings to access the coal will be sealed with block walls containing

water drainage P-traps and will be back filled with noncombustible material for at least 30 feet outby. Unauthorized access into the mine and federal coal resources would be secured and the mine workings protected from long term degradation. Justification for the mine closure was PacifiCorp's decision to close the Deer Creek Mine based upon maximum economic recovery. PacifiCorp provided proprietary and confidential information demonstrating that production costs at the mine exceeded market costs and thus provided the decision to close the mine.

Inspection: As equipment has been withdrawn from the mine, the BLM has inspected all areas that have been abandoned before they became inaccessible. The BLM will continue to inspect accessible areas until final sealing has occurred.

Approval and Conditions: The BLM agrees with Interwest's proposal for sealing and securing the mine. The BLM accepts the final R2P2 and the update to the coal reserve as shown in the two-volume "Final Amendment (Per Mine Closure) September 2015 East Mountain LMU UTU-73336 Resource Recovery and Protection Plan for the Deer Creek and Cottonwood/Wilberg Coal Mines".

Maximum Economic Recovery (MER): MER has been determined to be achieved due to the mining costs encountered in this mine when compared with coal secured in the open market.

National Environmental Policy Act (NEPA): This approval of a minor modification to an approved R2P2 of an existing underground coal mine is categorically excluded from NEPA analysis, as explained in the Department Manual (5 DM Part 516 11.5 (F) (8)).

The BLM has determined that this R2P2 modification complies with the Mineral Leasing Act of 1920, as amended, the regulations at 43 CFR 3480, and the lease terms and conditions. Interwest is authorized to secure the Deer Creek Mine indefinitely. If you have any questions, please contact Steve Rigby at the Price Field Office (435-636-3604) or Jeff McKenzie at the BLM State Office (801-539-4038).

Sincerely,

Ahmed Mohsen
Field Manager

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

cc: Roger Bankert, BLM State Office (UT-920)

Office of Natural Resource Revenue
Attn: John Hovanec
DFC, 6th & Kipling, Bldg.85
P.O. Box 25165, MS 63010C
Denver, Colorado 80225-0165

Utah Division of Oil, Gas, and Mining
Daron Haddock
1594 West North Temple, Suite 1210
Salt Lake City, Utah 84114-5801

Mine Safety and Health Administration
Cord Cristando
45 East 1375 South
Price, Utah 84501

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

COPY

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

1407 W. North Temple, Suite 110
Salt Lake City, UT 84116

HAND DELIVERED

May 29, 2018

RECEIVED
MAY 30 2018
Bureau of
Land Management

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Kent Hoffman
Deputy State Director
United States Department of the Interior
Bureau of Land Management
Utah State Office
440 West 200 South, Suite 500
Salt lake City, Utah 84101-1345

RE: Notification of Full Relinquishment of Federal Coal Lease UTU-84285, East Mountain LMU, Deer Creek Mine, Emery County, Utah

Dear Mr. Hoffman:

In accordance with 43 CFR § 3452.1 (2017) and the terms of the referenced federal coal lease, submitted herewith in triplicate is documentation in support of PacifiCorp's full relinquishment of acreage under federal coal lease UTU-84285. The total acreage being surrendered is 213.57 acres. Refer to Map 1 for lease location within the East Mountain Logical Mining Unit UTU-73336.

The attachments to this letter contain lease specific information compiled using the Bureau of Land Management (BLM) relinquishment checklist developed by your staff. To assist the reviewer in the process, we've completed the checklist with the best available information known to us given the history of this lease. The supporting information is located in the accompanying appendices.

Background and Purpose of Relinquishment

With PacifiCorp's decision and announcement on December 15, 2014, to close the Deer Creek Mine and end production from the LMU, this brought an end to 40+ years of coal production for this LMU. All coal production ceased on January 7, 2015. PacifiCorp has made steadfast efforts to complete all mine closure activities including the construction of permanent portal seals for the entire Deer Creek Mine complex and LMU.

All economically recoverable coal reserves within the entire LMU inclusive of this federal coal lease has been mined out or has been determined uneconomical to mine as acknowledged by BLM's letter dated March 23, 2016 (copy enclosed). Having fully complied with the federal coal lease terms and their associated federal regulations, PacifiCorp has no intentions to re-open this mine. Therefore, the purpose of this relinquishment is to surrender this federal coal lease acreage back to the federal government and bring final closure to this matter.

Full Relinquishment

The legal description for full relinquishment of UTU-84285 is described below:

Federal Coal Lease UTU-84285		
Lease Issuance Date:		11/1/2006 to 11/1/2026
Lessee of Record:		PacifiCorp
Federal Coal Lease Acres:		**213.57**
Description of Lease Acreage Being Relinquished		**Acres**
T16S, R6E, SLB&M Emery County, UT		
Sec 10	S½NE¼NE¼, SE¼NE¼, W½E½SE¼	100.00
Sec 15:	E½W½E½	80.00
Sec 22:	Lot 3	33.57
	Total Lease Acres for Full Relinquishment:	**213.57**
	Total Lease Acres Remaining:	**0.00**

Conclusion

To the best of its information and belief, PacifiCorp is in compliance with the terms and conditions of this federal coal lease, inclusive of having made all payment obligations relative to rentals and royalties. Furthermore, PacifiCorp represents that the federal lease acres relinquished will not impair the public interest as all obligations under regulation 43 CFR § 3452.1 and all of the lease terms have been met including having demonstrated substantial completeness per BLM subsidence guidelines.

This relinquishment notification was prepared on behalf of PacifiCorp and is acknowledged as set forth below.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

We respectfully seek your attention to this matter and ask that this relinquishment be accepted in a timely manner. Should you have any questions, need additional information or wish to discuss this matter with us, please feel free to contact me at 801-220-4612 or by email Scott.Child@PacifiCorp.com.

Sincerely,

Scott M. Child
Manager, Lands & Regulatory Affairs

Acknowledged and agreed to this 29 of MAY, 2018 by PacifiCorp, the lessee of record:

Dana M. Ralston
Senior Vice President
Thermal Generation & Mining
Rock Mountain Power (a division of PacifiCorp)

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Enclosures

cc: B. Morgan, J. Potter, C. Semborski, K. Fleck, D. Oakley

SMC\InterwestUTBLM2018-02(UTU-84285FullReling)

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-84285

LEASE ACTIVITIES

1) Coal Lease Number: UTU-84285 *(Full Relinquishment)*

2) Lessee Name and Address:
PacifiCorp
c/o Interwest Mining Company
1407 West North Temple, Suite 110
Salt Lake City, Utah 84116

3) Utah Division of Oil, Gas, and Mining (DOGM) mine permit number: C/015/0018 (Deer Creek Mine).

4) Date of request: _____ Date filed: _____.

5) Acres requested to be relinquished: 213.57; Entire lease? YES ☒ NO ☐ (See attached map.) Comments: *Refer to Exhibit A for the legal descriptions of area relinquished. No areas retained. See also Figure 1 (a map depicting the area to be relinquished in its entirety).*

Original Lease Acreage: 213.57 Relinquished to date: 0.00 acres Remaining: 213.57 acres

6) Have all bonus bid payments been paid? YES ☐ NO ☐ N/A ☒ (If "NO", date anticipated to be paid in full: ___)

7) Are lease rental payments up to date? YES ☒ NO ☐ N/A ☐ (If "NO", date anticipated to be brought up to date: _____)

8) Has the lessee or the former lessee, if previously assigned, conducted mining activities on this lease? YES ☒ NO ☐ (If "NO", complete question 14, then proceed to question 23)

9) Type of mining conducted: Longwall ☒, Room & Pillar ☐, Surface ☐, Other ☐ (Explain) _____

10) If underground mined, excluding surface disturbances associated to subsidence, was there any surface disturbance conducted in association with the underground operation(s)? YES ☐ NO ☒ (If "YES", describe:

11) Date of initial mining: March 2006; last mining: March 2014.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-84285

12) Number of coal beds mined: 2 coal seams (Blind Canyon and Hiawatha)

13) Range of thickness of coal removed for each bed: 7' - 10'

14) Have all estimated recoverable coal reserves been recovered? YES ☒ NO ☐ N/A ☐ (If "NO", tons to remain in place: _____; Justification to leave these reserves must be provided.)
- *Refer to BLM approval letter dated March 23, 2016 (copy enclosed) regarding the final R2P2 for the Deer Creek Mine and final disposition of the East Mountain Logical Mining Unit with a determination that maximum economic recovery has been achieved.*

15) Was an R2P2 modification required to account for deficient recovery? YES ☒ NO ☐ (If "NO", explain: _____)
- *Refer to BLM approval letter dated March 23, 2016 (copy enclosed) regarding the final R2P2 for the Deer Creek Mine and final disposition of the East Mountain Logical Mining Unit with a determination that maximum economic recovery has been achieved.*

16) Have all production royalty payments been paid to ONRR? YES ☒ NO ☐ (If "NO", date anticipated to be paid in full: _____)

17) Did subsidence occur? YES ☒ NO ☐ (If "YES", continue; if "NO", proceed to 23)

18) Has it been demonstrated that the surface above subsided areas has been substantially stabilized per the criteria outlined in Appendix A? YES ☒ NO ☐ N/A ☐ (If "YES", please attach supporting documentation.)

19) Has the surface area been inspected to determine impacts to surface topography per the criteria outlined in Appendix B? YES ☒ NO ☐ N/A ☐ (If "YES", attach supporting documentation. If "NO", date when inspection is scheduled: ___)
- *Surface topography inspections were conducted through annual reconnaissance flights.*

20) Have there been any impacts to surface or groundwater per the criteria outlined in Appendix C? YES ☐ NO ☒ N/A ☐ (If "NO", attach supporting documentation.)
- *Refer to hydrographs*

21) Have there been any impacts to vegetation per the criteria outlined in Appendix D? YES ☐ NO ☒ N/A ☐ (If "NO", attach supporting documentation.)
- *Refer to DOGM write up*

INCORPORATED
AUG 17 2018
Div. of Oil, Gas

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-84285

22) Have there been any impacts to private improvements per the criteria outlined in Appendix E? YES ☐ NO ☒ N/A ☐ (If "NO", attach supporting documentation.)
- *There are no improvements*

23) Has CERCLA Certification been submitted per the criteria outlined in Appendix F? YES ☒ NO ☐ N/A ☐ (If "YES", attach supporting documentation.)
- *As of the date of this submittal. Refer to Appendix F.*

24) Was there any surface disturbance conducted independent of mining activities? YES ☐ NO ☒ (If "YES", describe: _____)

25) Have all concerned agencies commented on this relinquishment request? YES ☐ NO ☐ (If "NO", who has not? _____)

26) After review, BLM proposes the relinquishment of ___ acres (Attach acreage adjustments).

27) Is approval recommended at this time? YES ☐ NO ☐ (If "NO", items deficient or other areas of concern:

_____; Date completed / Satisfied: _____

_____; Date completed / Satisfied: _____

_____; Date completed / Satisfied: _____

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Checklist and Documentation of Findings
Federal Coal Lease Relinquishment
Under 43 CFR 3452
UTU-84285

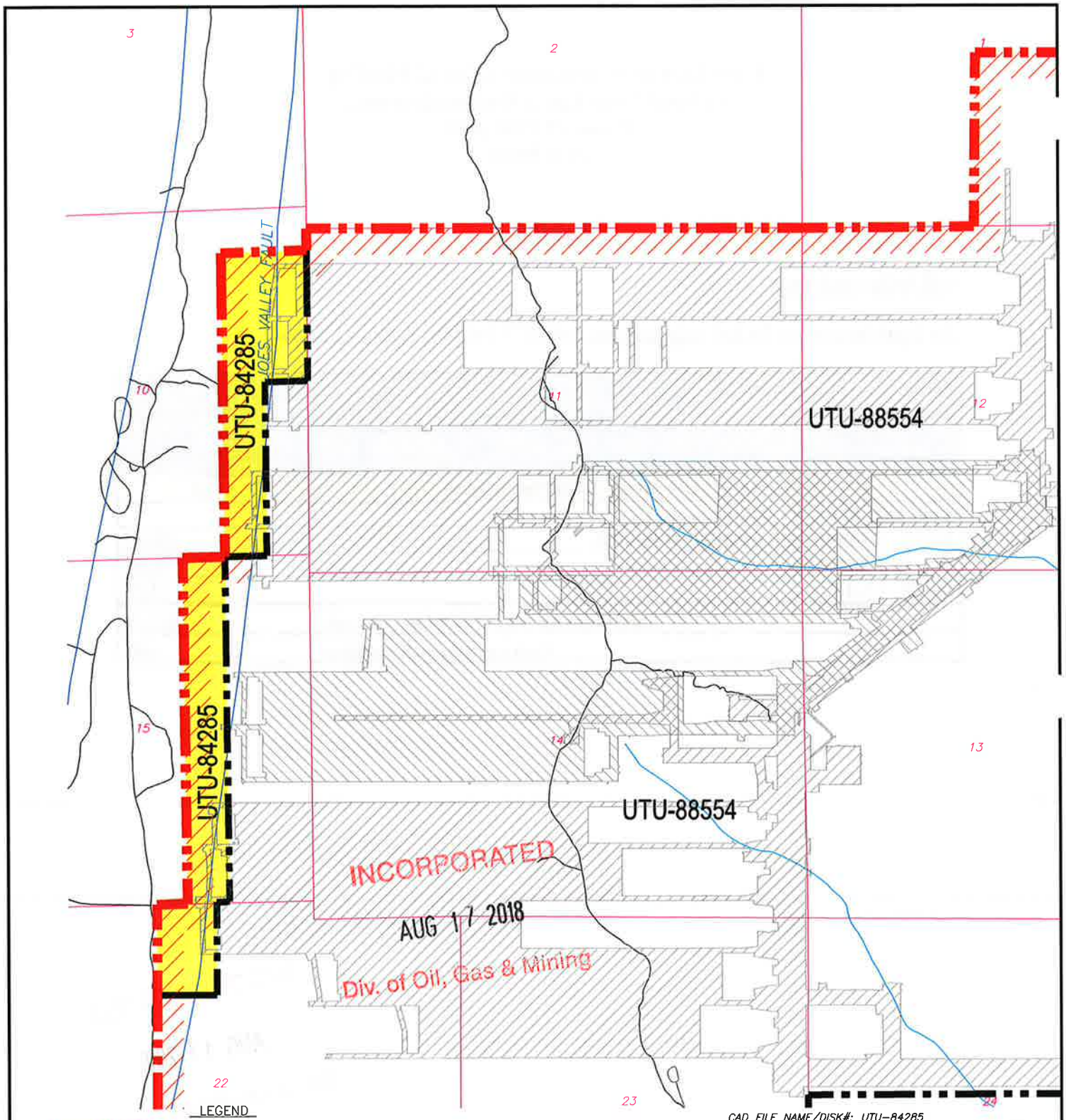
Exhibit A

Full Relinquishment

The legal description for full relinquishment of UTU-84285 is described below:

Federal Coal Lease UTU-84285		
Lease Issuance Date:		11/1/2006 to 11/1/2026
Lessee of Record:		PacifiCorp
Federal Coal Lease Acres:		**213.57**
Description of Lease Acreage Being Relinquished		**Acres**
T16S, R6E, SLB&M Emery County, UT		
Sec 10	S½NE¼NE¼, SE¼NE¼, W½E½SE¼	100.00
Sec 15:	E½W½E½	80.00
Sec 22:	Lot 3	33.57
	Total Lease Acres for Full Relinquishment:	**213.57**
	Total Lease Acres Remaining:	**0.00**

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



LEGEND

- LMU BOUNDARY UTU-73336
- COAL OUTCROP
- HIAWATHA SEAM MINE WORKINGS
- BLIND CANYON SEAM MINE WORKINGS
- FAULTS
- UTU-84285 FEDERAL LEASE NUMBER
- FEDERAL LEASE LINE
- ROADS
- DRAINAGE
- FEDERAL COAL LEASE RELINQUISHMENT AREA

N

CAD FILE NAME/DISK#: UTU-84285

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-84285

DRAWN BY:	K. LARSEN	FIGURE 1	
SCALE:	1" =2000'	DRAWING #:	
DATE:	APRIL 23, 2018	SHEET 1 OF 1	REV.

Deer Creek Mine
Federal Coal Lease UTU-84285 Full Lease Relinquishment
Appendix A

Subsidence and Surface Stabilization

Mining History

This lease is comprised of a single contiguous block of coal reserves in the Hiawatha and Blind Canyon seams on the east side of the Joes Valley Fault. This lease was issued on November 1, 2006 so that longwall mining in the adjacent lease UTU-88554 could reach the farthest mining extents possible to the west and have the bleeder and setup entries as close to the fault as was practicable. Mining of gateroads and bleeder entries was extended into UTU-84285, as long as no mining took place within 200 feet of the fault plane at mine level as determined by horizontal directional drilling, and no second mining took place within a 22 degree angle of draw from the surface expression of the fault. The final arrangement of gateroad and bleeder entries did allow for some longwall (second mining) recovery in UTU-84285. Coal reserves were recovered by continuous miner and longwall methods. The Blind Canyon mine workings did not directly overlie the Hiawatha mine workings. Mining in the Hiawatha seam took place between 3/2006 and 3/2014. Mining in the Blind Canyon seam took place for only a few days in 11/2007.

The following narrative provides details related to PacifiCorp's subsidence monitoring and control plan for East and Trail Mountains, including the Trail Mountain Mine.

Subsidence Monitoring Plan

The establishment of a subsidence monitoring plan is a requirement of the Division of Oil, Gas and Mining (DOGM) detailed in R645-301 -525.440.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

PacifiCorp initially adopted a twofold approach to subsidence monitoring:

1) aerial photogrammetry,
2) on-the-ground monumentation.

After seven years of comparing the two types of surveys PacifiCorp determined that both methods effectively document the amount of subsidence which has occurred; however, the aerial photogrammetry method has the advantage of showing more detail because more data points can be monitored with less effort. In 1987, with the concurrence of the State of Utah Division of Oil, Gas & Mining (DOGM), PacifiCorp discontinued on-the-ground monumentation and began collecting subsidence data solely by aerial photogrammetry.

The subsidence monitoring program, conducted since 1980, has produced data which not only document the amount of subsidence that has occurred but also allows the operator to predict the amount of subsidence that is likely to occur when mining in new areas. PacifiCorp submits a comprehensive report annually to the BLM, USFS, and the Utah Division of Oil, Gas, & Mining.

Aerial Photogrammetry

PacifiCorp's subsidence monitoring program is primarily based on aerial photogrammetry. PacifiCorp has been using aerial photogrammetry - based subsidence modeling since 1980. This method has proven to be the best way to collect subsidence data on East Mountain. A baseline photogrammetric survey was conducted in 1980 that included over 21,000 elevations measured on approximate 200-foot spacing grid. In flat areas with limited vegetation, the elevations can be read from the photographs with a precision of one-half foot. In steeper areas, where cliffs are present, the resolution is not as good, and inaccuracies of greater than ten feet can occur. In steeper areas, photogrammetric monitoring can, and has been, augmented by conventional survey data.

Annual Subsidence Survey Procedures

Aerial photographs of the entire East Mountain LMU area are used in conjunction with widely spaced survey control points on the ground to produce a digital elevation model of the ground surface in successive years from which a surface subsidence map is generated for each year. The ground control points are marked and surveyed using conventional survey methods, then flagged so that they can be seen in photographs taken from the air. Approximately 100 aerial photographs of East Mountain area are taken along 7 flight lines that traverse the LMU area from north to south. Overlapping portions of photographs taken from successive viewpoints along the flight lines produce stereoscopic views of the ground surface. These 93 views of overlapping photograph pairs are called "models" in the photogrammetric process. Elevations of the ground surface over the entire permit area are then calculated using a computer-aided stereo plotter, and verified using the known survey points. Ground elevations are calculated for a grid of approximately 200-foot centers, optimized for terrain. The baseline data, including surveying and flagging ground control points, acquiring the aerial photographs, and generating the surface grid and map, for the East Mountain Area were collected in 1980. These elevations are then compared to elevations measured from the photographs taken annually in the fall. Using this method, ninety percent of the points measured will be accurate to within plus or minus one-half foot.

PacifiCorp participated with the governmental agency task force which included representatives from the Bureau of Land Management, Forest Service and the Division of Oil, Gas and Mining, to develop *"Memorandum of Understanding for Processing of Requested to Relinquish Federal Coal Leases (10-MOU-97-001)"*. This document established "Standards for Relinquishment Consideration" including the amount of accepted variation in annual subsidence data. As stated in the MOU, the area will be considered stable, if the cumulative subsidence during the period (3 years) has been 1 foot or less under normal circumstances. Based on this agreement, subsidence measurements and areas and subsidence areas shown on PacifiCorp's annual subsidence maps show areas of total measurable subsidence greater than two feet. PacifiCorp's experience on East Mountain since 1980 has shown that the areas of minimum detectable subsidence, i.e., one foot or more, very rarely extend outside of the outline of the total mine workings, even in areas where more than one seam has been mined.

PacifiCorp's contractor maintained survey control aerial targets within the permit boundary

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

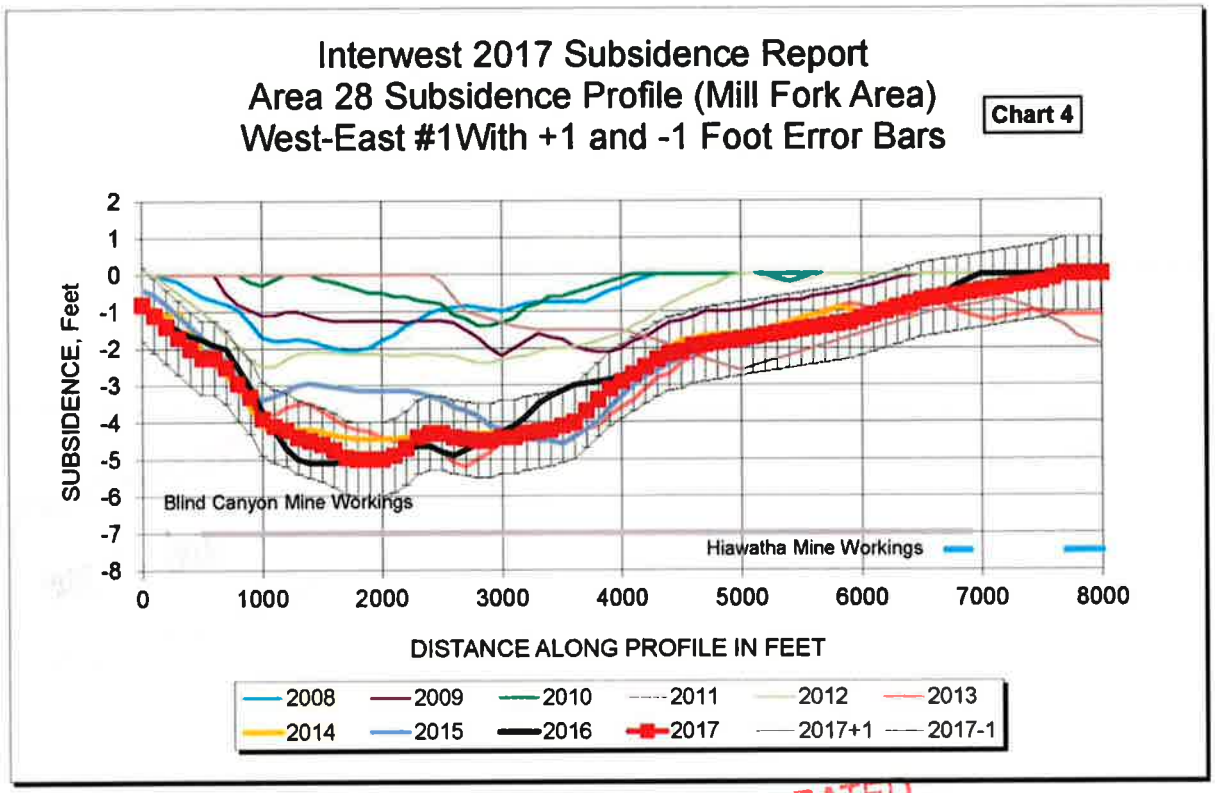
necessary to allow the interpretation of coordinate points on photos within ±0.5 foot. Following this procedure the operator conducted an aerial photo survey annually of all areas that were undermined. PacifiCorp has continued monitoring all areas undermined until the operator and DOGM agree that the subsidence in a given area has become stable and no further monitoring is necessary.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

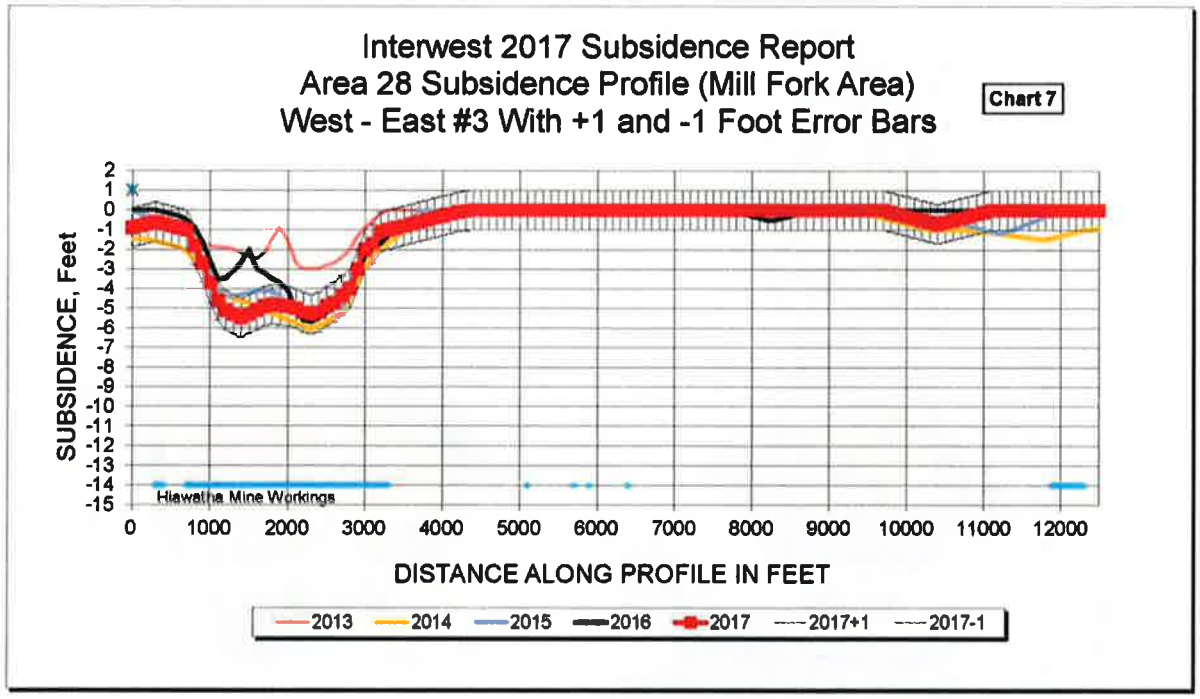
Federal Lease UTU-84285 Subsidence Data

Lease stipulations for UTU-84285 prohibited first mining within 200 feet of the Joes Valley fault and second mining within a 22-degree angle of draw of the surface expression of the Joes Valley Fault. Subsidence adjacent to the lease UTU-84285 area has been monitored since 2005. Subsidence measurements by photogrammetric methods have been used, and subsidence profiles (shown on the following figures and accompanying maps) show subsidence measurements made between 2005 and 2017. Photogrammetric methods allow more complete subsidence monitoring coverage in areas that are topographically rugged and difficult to measure using conventional surveying methods.

PacifiCorp delineated a series of eight profiles covering the main longwall panel districts of Lease UTU-88554 and UTU-84285, including the dual-seam mining overlay area. The west ends of two of these profiles extend into the UTU-84285 lease. Subsidence within this area has reached a maximum of just over 1 foot. No change in subsidence has occurred since 2014, and the area is stable (see following figures and map). Also, the subsidence contour maps for 2017, included herein, show no increase in subsidence.



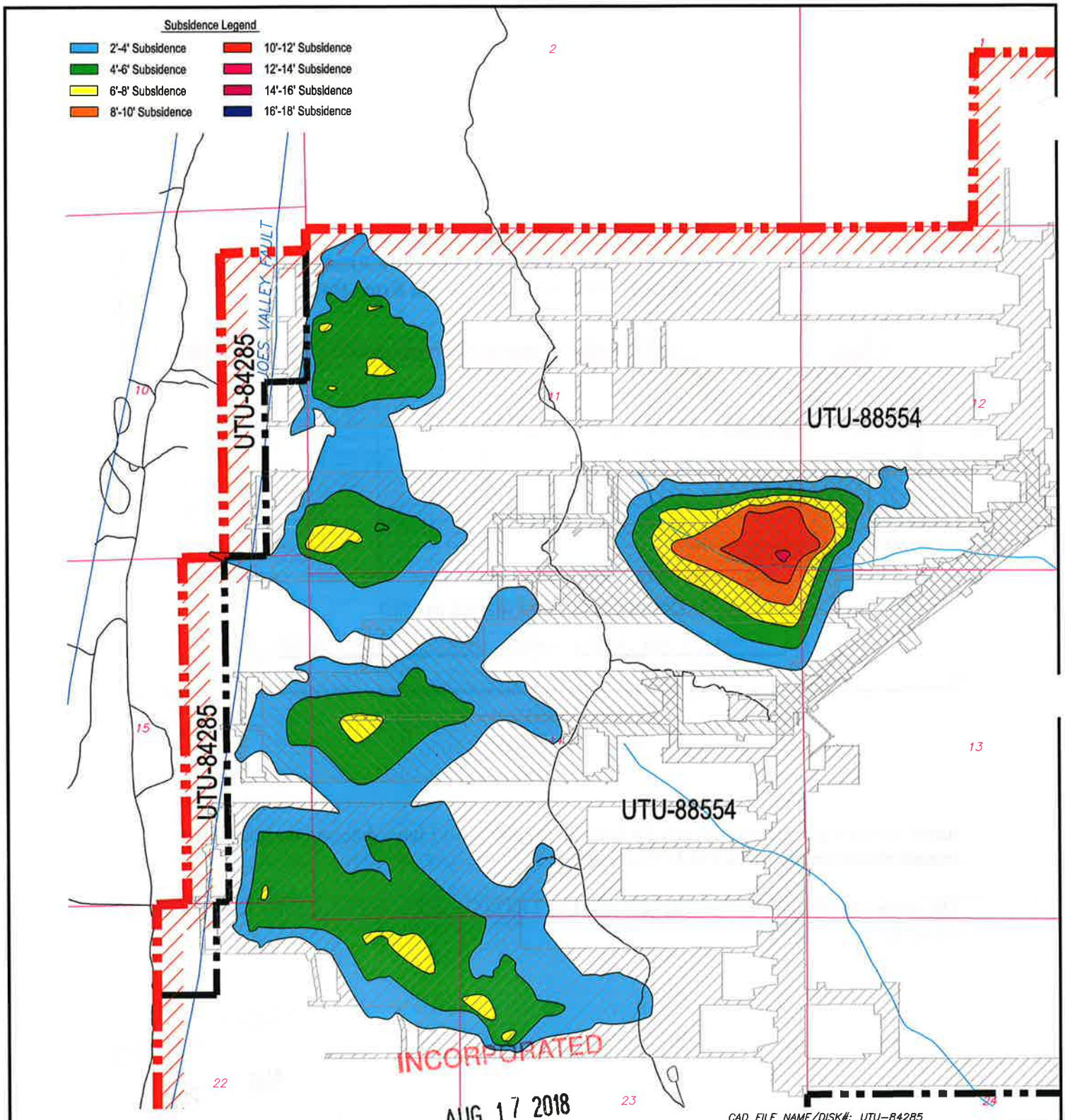
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



Aerial surveys conducted annually by helicopter 2006 - 2017 have detected no subsidence-related effects on the surface in UTU-84285.

The proposed relinquishment area of Lease UTU-84285 is stable and subsidence is substantially complete.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

LEGEND

- LMU BOUNDARY UTU-73336
- COAL OUTCROP
- HIAWATHA SEAM MINE WORKINGS
- BLIND CANYON SEAM MINE WORKINGS
- FAULTS
- UTU-84285 FEDERAL LEASE NUMBER
- FEDERAL LEASE LINE
- ROADS
- DRAINAGE

N

CAD FILE NAME/DISK#: UTU-84285

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COALLEASE RELINQUISHMENT UTU-8428
SUBSIDENCE BASE MAP

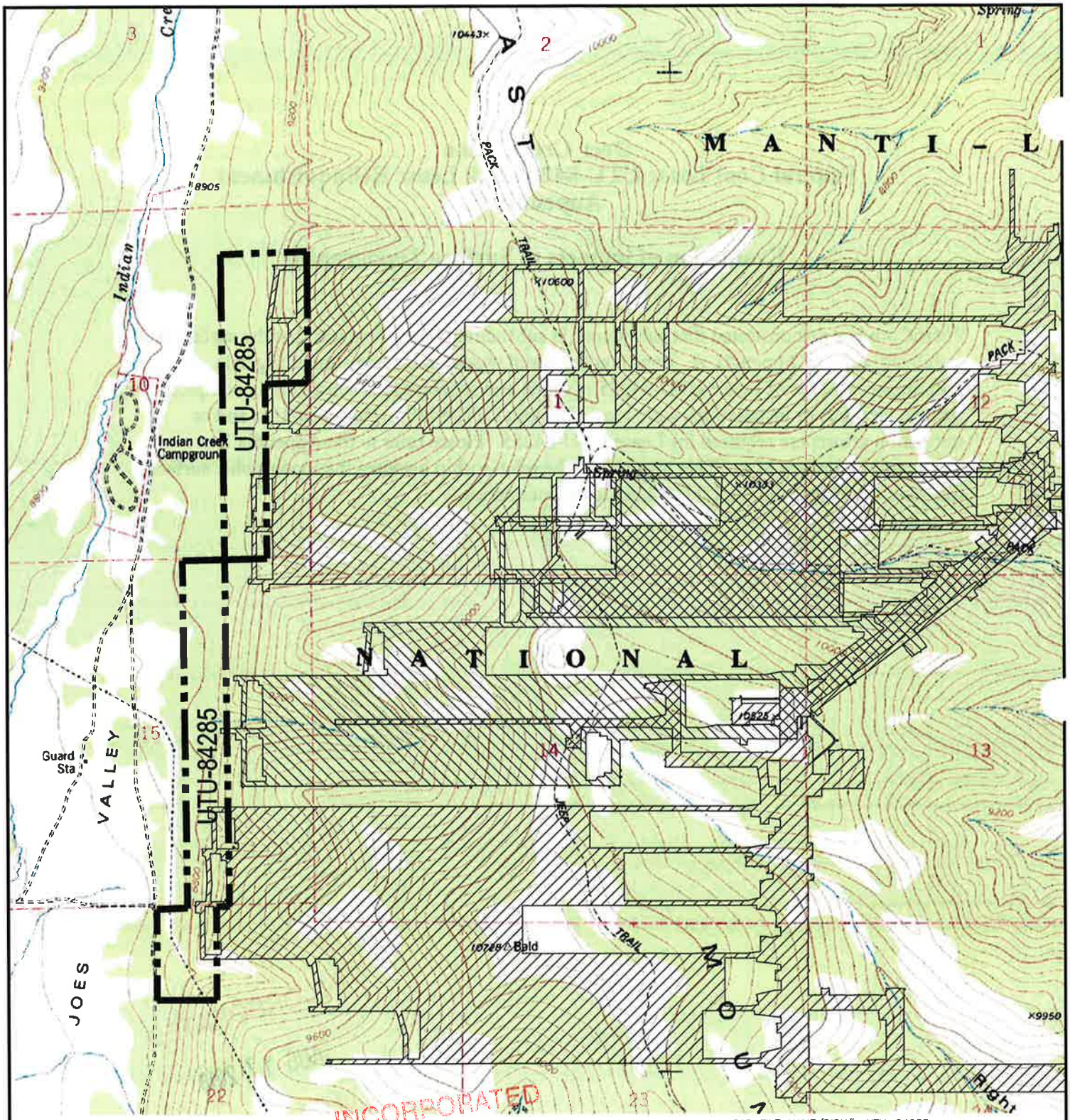
DRAWN BY:	K. LARSEN	APPENDIX A	
SCALE:	1" =2000'	DRAWING #:	
DATE:	APRIL 23, 2018	SHEET 1 OF 1	REV.

Deer Creek Mine
Federal Coal Lease UTU-84285 Full Lease Relinquishment
Appendix B

Evaluation of impacts to Surface Topography

PacifiCorp has demonstrated that subsidence is substantially complete and that the surface has stabilized; refer to Appendix A. Based on the aerial observations and supporting data, the relinquishment area of Lease UTU-84285 is stable and subsidence is substantially complete. No surface facilities or installations were located within UTU-84285. No restoration and/or mitigation efforts are required for Lease UTU-84285. Please refer to the Appendix B - Topographic Surface Map. This map shows the relationship between the topographic surface, the mine workings, and the UTU-84285 lease boundaries.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: UTU-84285

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

HIAWATHA SEAM MINE WORKINGS

BLIND CANYON SEAM MINE WORKINGS

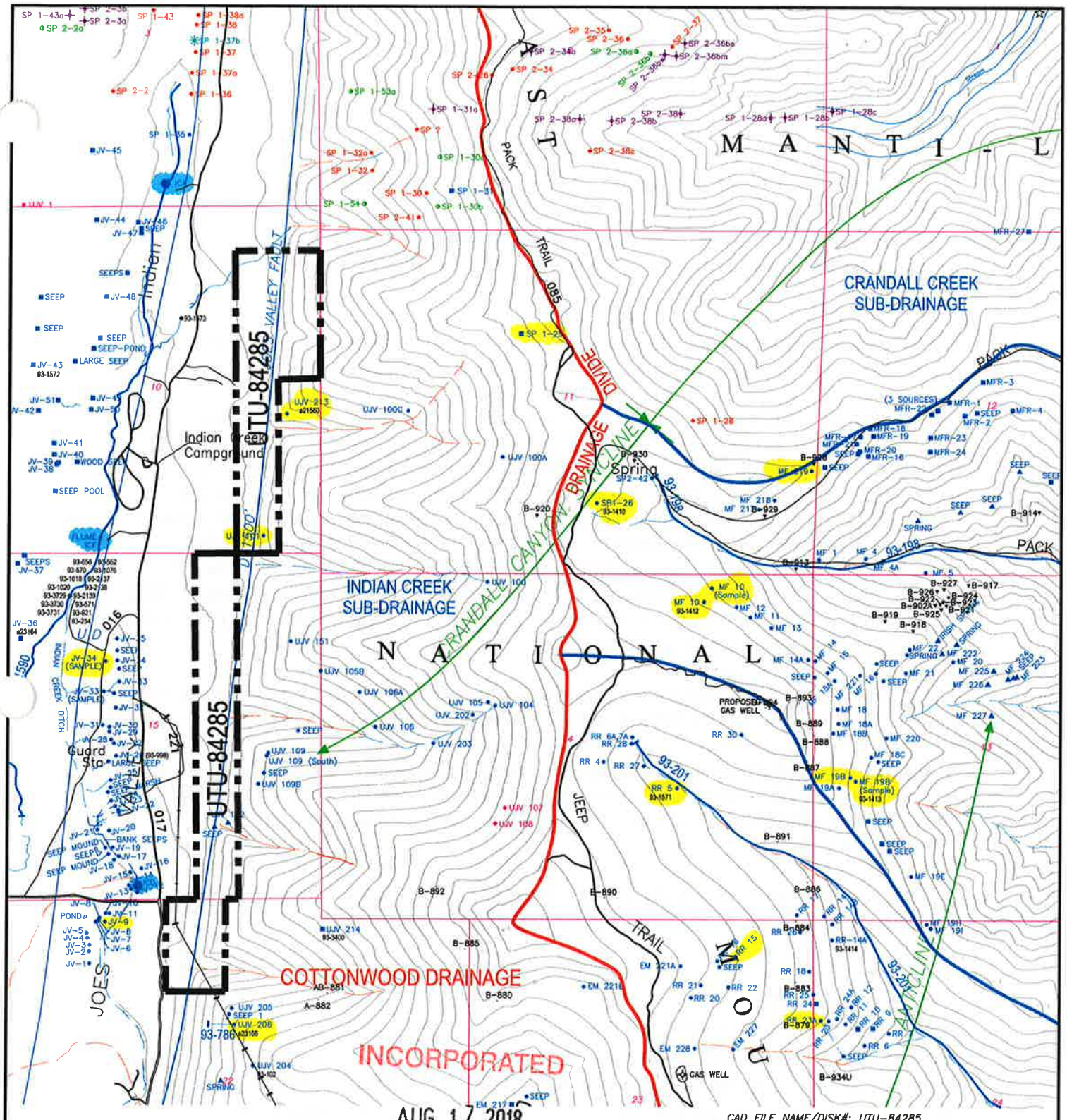
FEDERAL COAL LEASE RELINQUISHMENT AREA

N

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-84285
TOPOGRAPHIC BASE MAP

DRAWN BY:	K. LARSEN	APPENDIX B	
SCALE:	1" =2000'	DRAWING #:	
DATE:	APRIL 23, 2018	SHEET 1 OF 1	REV.



INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-84285
HYDROLOGIC DRAINAGE MAP

DRAWN BY:	K. LARSEN	*APPENDIX C*	
SCALE:	1" =2000'	DRAWING #:	
DATE:	APRIL 23, 2018	SHEET 1 OF 1	REV.

Deer Creek Mine
Federal Coal Lease UTU-84285 Full Lease Relinquishment
Appendix C

Evaluation of Impacts to Ground and Surface Water Hydrology

The following section provides a detailed description of the hydrology, including groundwater and surface water quality and quantity, of the land within UTU-84285 and surrounding area.

Since 1979 detailed data on the hydrology of the East Mountain area have been collected, compiled, and analyzed by PacifiCorp and several government agencies. Information collected by PacifiCorp is the result of exploratory drilling, field investigations, geologic mapping, aerial photography, spring surveys, groundwater tests, monitoring of numerous wells and stream stations, climatological monitoring, and investigations by independent consultants. The data collection program is part of a complete Hydrologic Monitoring Program which has been approved by the State of Utah, Division of Oil, Gas and Mining (DOGM) and the Office of Surface Mining (OSM). All data collected have been and will continue to be submitted to OSM, DOGM, United States Forest Service (USFS), and the Bureau of Land Management (BLM) each year in the annual Hydrologic Monitoring reports.

The hydrologic monitoring plan for the Deer Creek Mine Mill Fork Lease Area is specified in Volume 12 Hydrologic Section in the approved Mining and Reclamation Plan (MRP).

As outlined by the BLM, the interested parties have agreed that under normal circumstances, the minimum time period for continued monitoring will be three years. During this time period the operator/lessee will establish that the surface has substantially stabilized according to Appendix "A".

The following sections will describe and provide detail concerning the groundwater and surface water resources within and adjacent to Federal Lease UTU-84285.

Regional Groundwater Hydrology

The characteristics of a groundwater resource are dependent upon the geology of the water bearing strata and on the geology and hydrology of the recharge area. Groundwater movement and storage characteristics are dependent on the characteristics of the substratum. To facilitate an understanding of groundwater of the Mill Fork Area, a discussion of pertinent regional geologic features is presented below.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Regional Geology

The Mill Fork Area is located in the central portion of the Wasatch Plateau Coal Field in Emery County, Utah. Generally, this area is a flat-topped mesa surrounded by heavily vegetated slopes which extend to precipitous cliffs dropping steeply to the valley below. Relief of up to 5,000 feet is measured from Castle Valley lowland to the plateau above. The following discussion summarizes the structural geology and stratigraphy of the region and the mining areas located within the Mill Fork Area.

The regional geology of the Colorado Plateau in which the Wasatch Plateau coal field is situated is fairly simple. Sedimentary rocks have been accumulating in this region since Permian time. A broad, high, flat region that encompasses southeastern Utah, southwestern Colorado, northwestern New Mexico, and northern Arizona, the Colorado Plateau has been an area of relative stability while mountain-building episodes have occurred in surrounding regions. The thick accumulations of sedimentary rocks in this region are being deeply dissected by erosion, leaving the most recent coal reserves in the higher plateaus, where they are now being mined. The PacifiCorp mining area covers portions of East Mountain and Trail Mountain, which are separated by Cottonwood Canyon, a deep, partially glaciated valley.

The geologic formations exposed in the PacifiCorp mining area range from Upper Cretaceous (100 million years old) to Tertiary and Recent in age. These formations, in ascending order from oldest to youngest, are the Masuk Shale member of the Mancos Shale, the Star Point Sandstone, the Blackhawk Formation, the Castlegate Sandstone, the Upper Price River Formation (all Cretaceous), and the North Horn Formation, and the Flagstaff Limestone (Tertiary). The coal deposits are restricted to the lower portion of the Blackhawk Formation, about 2,500 feet below the top of the Plateau. Recent geologic deposits include numerous stream terrace gravels along streams and rivers, glacial till deposits in the upper reaches of Cottonwood Canyon, and alluvial and colluvial fills in all of the significant drainages.

The Masuk Shale is the upper member of the Mancos Shale and consists of light to medium gray marine mudstones. The marine Masuk Member of the Mancos Shale was deposited in an open marine environment (Mayo and Peterson, 2001). The Masuk Member is a highly erodeable calcareous, gypsiferous, and carbonaceous dark gray colored shale. It is continuously exposed along the eastern edge of the Wasatch Plateau, but is not exposed in the Mill Fork Area. The Masuk Member is approximately 1,300 feet thick. Westward thinning wedges of the Masuk inter-finger with tongues of the Star Point Sandstone. Usually this formation weathers readily, forming slopes which are often covered by debris. It is generally devoid of water.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas &

Overlying and inter-tonguing with the Masuk Shale is the Star Point Sandstone. In the East Mountain area the Star Point Sandstone consists of three or more massive sandstones totaling about 400 feet in thickness.

The Star Point Sandstone forms massive cliffs where exposed at the surface. The sandstone was deposited as seaward thinning (east), marine, shoreface blanket sands that are laterally continuous (Mayo and Peterson, 2001). Landward (west), these sandstones terminate abruptly into the mud- and organic-rich backshore facies (Van Wagoner and others, 1990). Because many of the organic-rich facies are now mineable quality coal, locally the Star Point Sandstone has immediate contact with coal seams. Elsewhere sandstone bodies of the Star Point Sandstone are overlain and underlain by lower shoreface and open marine shales of the Mancos Formation. What this means is that the marine shoreface sandstones are three dimensionally encased by low-permeability marine shales and fine-grained carbonaceous backshore coal-bearing facies (Mayo and Peterson, 2001).

The Star Point Sandstone thins eastward and merges with the underlying Masuk Member of the Mancos Shale. Three prominent tongues of the Star Point Sandstone inter-finger with the Mancos Shale. These three sandstone members, from top to bottom, are the Spring Canyon, Storrs, and Panther Sandstones. In the Mill Fork Area, the Spring Canyon tongue is approximately 100 feet thick, lies about 80 feet above the Storrs tongue, and consists of massive, fine- to medium-grained sandstone. The Storrs tongue lies about 120 feet above the Panther tongue and consists of 50 feet of soft, friable sandstone. The basal Panther tongue is approximately 100 feet thick and consists of massive, cross-bedded delta front sandstones Mayo and Peterson, 2001).

Even though the Star Point Sandstone exists throughout the entire East Mountain property, the low permeability and lack of recharge limit its usefulness as a water producing aquifer. Permeability and the limiting factors of recharge, i.e., very little outcrop exposure and limited vertical groundwater migration caused by the mudstone layers of the North Horn and Blackhawk formations, will be discussed in detail in the section entitled REGIONAL GROUNDWATER CHARACTERISTICS. Locally, the Star Point Sandstone exhibits aquifer characteristics. These are isolated occurrences where regional faults have created secondary permeability and have been intersected by major canyons with perennial streams. An example is Little Bear spring located in Huntington Canyon.

The Blackhawk Formation consists of alternating mudstones, siltstones, sandstones, and coal. Although coal is generally found throughout the Blackhawk Formation, the economic seams are

INCORPORATED

AUG 17 2018
Div. of Oil Gas & Mining

restricted to the lower 150 feet of the formation. The total thickness of the Blackhawk Formation in the East Mountain area is about 750 feet.

The upper portion of the Blackhawk Formation was deposited in an alluvial-plain/suspended-load fluvial channel environment (Mayo and Peterson, 2001). In these delta and flood-plain environments layers of mud are more abundant than channel sands. Sandstone channels are generally isolated from each other both laterally and vertically by mud-rich overbank and inter-fluvial rocks (Galloway, 1977). The upper portion of the Blackhawk Formation also contains some thin carbonaceous shale layers and thin coal seams that are not of economic interest.

The lower portion of the Blackhawk Formation contains the mineable coal deposits and consists of more thinly bedded sandstone and shale layers (Johnson, 1978). The coal-bearing units of the lower Blackhawk Formation overlie and are laterally juxtaposed to marine shoreface sandstones of the Blackhawk Formation and Star Point Sandstone (Mayo and Peterson, 2001). On a large scale, these sandstone bodies are laterally continuous but terminate abruptly into the mud- and organic-rich backshore faces in a landward direction (Van Wagoner and others, 1990). However, individual rock layers are lenticular and discontinuous, with abundant shaley interbeds. The fine to medium grained sandstones occur as thin- to massively-bedded paleochannel deposits. The paleochannels increase in frequency, thickness, and lateral extent upward in the formation. There is also a vertical repetition of erosional scours within the upper sandstones (Marley, 1979).

The Castlegate Sandstone, the lower member of the Price River Formation, generally caps the escarpment which surrounds the eastern limit of the property. The Castlegate Sandstone consists of approximately 250 to 350 feet of coarse-grained, light gray, fluvial sandstones; pebble conglomerates; and subordinate zones of mudstones.

The formation was deposited from bed-load fluvial channel systems. The Castlegate Sandstone is made up of coarse-grained, often conglomeratic, fluvial sandstone. Thin inter-beds of siltstone and claystone occur in lower portion the formation. Sandstone dominates over mudstone and individual sand channels may be thin, wide, or interpenetrating. Although the primary porosity is high, the existence of mudstone drapes and pervasive carbonate and silica cement greatly reduces the overall porosity (Mayo and Peterson, 2001, Appendix B).

The Upper Price River Formation, which overlies the Castlegate Sandstone, is about 350 feet thick and forms steep slopes which extend upward from the Castlegate Sandstone.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

The Price River Formation was deposited from mixed-load fluvial channel systems that have sandstone/mudstone ratios intermediate between bed-load and suspended-load channel systems (Mayo and Peterson, 2001). Sandstones and mudstones occur in about equal proportions. Point bars that develop in this type of system are larger than those in suspended-load channel systems. Mudstone drapes created during low flow stages of the active fluvial system separate the sandstones from each other both horizontally and vertically (Mayo and Peterson, 2001).

The North Horn Formation forms the cap rock for much of East and Trail mountains where the Flagstaff Limestone has been eroded away. Mudstones dominate the rock types present and are generally gray, light brown, to purple in color. Localized, lenticular sandstone channels are present throughout the formation. The sandstone beds are more common near the upper and lower contacts of the formation. The North Horn Formation is approximately 850 to 1,000 feet thick in the Mill Fork Area.

The North Horn Formation was deposited in an alluvial-plain/suspended-load fluvial channel environment (Mayo and Peterson, 2001, Appendix B). In such environments layers of mud are more abundant than sands, which occur in sandstone channels. The sandstone channels are generally isolated from each other, both laterally and vertically, by mud-rich overbank and inter-fluvial rocks (Galloway, 1977). In the study area the formation consists primarily of shale with discontinuous sandstone channels, minor lenses of limestone, and conglomerate. Highly bentonitic mudstones, which swell when wetted, are common in the lower two-thirds of the formation.

The Flagstaff Limestone caps the uppermost portions of East Mountain is the youngest formation exposed in the Mill Fork Area. It typically forms small exposures on top of the plateau. A thickness of 105 feet was measured on Trail Mountain immediately south of the study area (Davis and Doelling, 1977). Maximum thickness in the Mill Fork Area is approximately 80-100 feet.

The Flagstaff Limestone consists of carbonates, marls, and some thin sandstone stringers deposited in lacustrine, marginal lacustrine, and alluvial plain depositional environments (Garner and Morris, 1996). It primarily consists of light- to medium-gray colored limestone containing abundant secondary fractures produced during uplift and subaerial exposure (Mayo and Peterson, 2001, Appendix B).

Regional Groundwater Characteristics

Waters entering the groundwater system are mostly from snow melt. The amount of water which enters the groundwater system is highly variable from one site to another. The low surface relief

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

on the top of East Mountain encourages the infiltration of melting snow. Conversely, the many areas with steep slopes have a much more limited infiltration opportunity. All of the geologic formations which surface in the area have relatively low permeability which further reduces the amount of water entering the groundwater system. Probably less than five percent of the annual precipitation recharges the groundwater supply (Price and Arnow, 1974; U. S. Geological Survey, 1979).

Geology controls the movement of groundwater. Because of the low permeability of the consolidated sedimentary rocks in the East Mountain area, groundwater movement is primarily "through fractures, through openings between beds, and, in the case of the Flagstaff Limestone, through solution openings" (Danielson et al., 1981, p. 25).

The majority of the groundwater which infiltrates the Flagstaff Limestone flows down vertical fractures which intersect sandstone channel systems in the North Horn Formation. The majority of the groundwater reaching this point intersects the surface in springs located in the North Horn Formation. Very little recharge intersects the Price River Formation and Castlegate Sandstone; consequently, they are not water saturated where intersected in the numerous drill holes penetrating those units. The remaining water then flows downdip (to the southeast) from the northern reaches of East Mountain until it discharges in the form of springs.

Data have been collected from numerous coal exploration drill holes, from within the adjacent mine workings, from surface drainages, and from the springs in the area. The data have identified two separate isolated aquifer systems on the East Mountain property; the first is localized perched water tables in the North Horn and the Price River formations, and the second is a combination of localized perched water tables in the Blackhawk Formation and the Star Point Sandstone which exhibits some limited potential as a regional aquifer. Stratigraphy is the main controlling factor restricting groundwater movement and development of regional and perched aquifer systems within the East Mountain property. The following is a description of the various formations and how they influence the groundwater systems. The description is in descending order, which parallels the general groundwater flow.

Flagstaff Limestone

This formation displays a strong joint pattern which permits good groundwater movement both vertically and horizontally through the formation. Exposures of the Flagstaff Limestone are limited to a narrow north-south trending ridge located in the western half of the Mill Fork Area.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

North Horn Formation

This formation is comprised of a variety of rock types which range from highly calcareous sandstone to mudstone. Its permeability is variable.

Lenticular sandstone channels are oftentimes present in the upper and lower portions of the formation. Water which percolates down fractures from the overlying Flagstaff Limestone works its way into the sandstones, forming the perched water tables. The actual lateral extent, or correlation, between the perched water tables has not been identified; and it is not practical to do so because the tables are limited in extent and variable in stratigraphic location. Many springs have been identified where the sandstone channels intersect the land surface.

The lower two thirds (upper Cretaceous in age) of the formation is generally highly bentonitic mudstone which is impermeable. It is likely that this material is acting as an aquiclude, preventing adequate recharge from reaching the Upper Price River Formation or Castlegate Sandstone below. The mudstones present swell when they come in contact with water. Therefore, vertical migration of water along fractures through this material is limited because the fractures are sealed by the swelling clays.

The depth of the aquifers in the North Horn Formation is variable due to the rugged topography. The localized perched water tables may either intersect the surface of the ground or be covered by as much as 1,000 feet of overburden. They are located at least 1,400 feet above the coal seam to be mined. Communication of water between the perched aquifers in the North Horn Formation and the water flowing into the mine is limited in quantity and occurs very slowly. The monitoring of the numerous springs located on East Mountain gives PacifiCorp the ability to assess any effects that mining might have on the North Horn Formation perched aquifers.

With the data available it is not possible to compile a piezometric map of the waterbearing strata in the North Horn Formation because the channels are discontinuous and not interconnected.

Upper Price River Formation

The Upper Price River Formation is comprised predominantly of sandstone but commonly contains mudstone beds between the point bar deposits. It is generally devoid of water because it lacks adequate recharge.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Castlegate Sandstone

The formation is thought to be fairly permeable but, where it has been intersected by drill holes, has never been found to be water saturated. It is often dry or slightly damp in some zones. It is devoid of significant water because it lacks.

Blackhawk Formation

The Blackhawk Formation contains only perched or limited aquifers which exist within the strata overlying the coal seams and the upper portion of the Star Point Sandstone Formation. The perched aquifers exist as fluvial channels (ancient river systems) which overlie and scour into the underlying strata. Channel systems were part of a deltaic depositional setting active during and after the coal forming peat accumulation. The largest influx of water encountered during the mining process occurs beneath the fluvial channels. The sandstone channels are mainly composed of a fine to medium grained sand with similar characteristics to the Star Point Sandstone Formation. The semi-permeable and porous nature of the channels allows an effective route for water transport. Other constituents of the Blackhawk Formation (i.e., non-permeable mudstone, carbonaceous mudstone, coal seams, and inter-bedded mudstones/siltstones and sandstones) generally act as aquicludes which impede vertical groundwater flow to the lower stratigraphic units. In areas other than where faulting and fracturing have created secondary permeability, the migration of water from the perched aquifers-sandstone channel systems of the Blackhawk Formation to the Star Point Sandstone Formation is limited. Extensive mining in the Cottonwood/Wilberg complex, which produces coal from the Hiawatha seam, is stratigraphically located directly on top of the upper member of the Star Point Sandstone. Only minor quantities of groundwater have been produced from the Star Point Sandstone. The coal seams of the Blackhawk Formation are effective in impeding vertical groundwater movement. In many areas in the adjacent mines where roof coal was left in place because of abundant thickness or as an additional effort to support the immediate roof, production of groundwater occurred only when roof support was installed or when a roof failure occurred exposing the overlying sandstone channel systems. Listed below are hydrologic characteristics of individual rock types reported by the USGS, Open File 84067.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Lithology: Sh, shale; Slt, siltstone; Ss, sandstone; f, fine grained; m, medium grained.
Hydraulic Conductivity: I, impermeable to water even at pressures of 5,000 pounds per square inch (psi).

				Hydraulic Conductivity (feet per day)	
Geologic Unit	Lithology	Depth below land surface	Porosity %	Horizontal	Vertical
Blackhawk Formation	Ss, f	1,521	14	1.5x10-2	3.7x10-3
	Slt	1,545	3	9.3x10-8	1.2x10-7
	Sh	1,786	2	I	I
	Ss, f	1,792	14	1.1x10-2	3.9x10-3
	Sh	2,170	4	1.1x10-8	---
	Slt	2,265	2	2.0x10-7	2.2x10-6
Star Point Sandstone	Ss, m	2,466	17	3.1x10-2	1.1x10-2
	Ss,	2,493	11	1.5x10-2	6.6x10-3

In the adjacent Cottonwood and Deer Creek mines, the majority of the water flowing into the mines comes from within the limited fluvial channel aquifers; however, water is also transmitted into the mine workings by way of faults, joints or fractures, and in-mine drill holes. Many locations within the mines have been monitored in the past, but a limited number of accessible long term water monitoring locations now exists because most water-producing areas of the mines are dewatered and stop flowing shortly after initial mining in the area.

In several locations in the Deer Creek and Wilberg/Cottonwood mines, such as retreated longwall panels, water is being produced but cannot be measured because the workings are inaccessible. The water entering these areas flows into numerous low areas in the mine which act as temporary sumps. The water is then pumped to the main sump located near the mine portal. Because the pumping system in the mine is ever changing (i.e., portable pumps being moved to various locations within the mine as the need arises), it is not possible to collect meaningful data from specific areas of the mine that can be compared with data collected from years or even months past.

Based on data from the adjacent mines, several observations have been made concerning the Blackhawk water-bearing strata. The sandstone, which is semi-permeable and porous, affords an effective route of water transport; while relatively impervious shale in the Blackhawk Formation prevents significant downward movement of the percolating water. Of the water-producing areas, those closest to the active mining face exhibit the greatest flows. As mining advances the area adjacent to the active face continues to be

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

excessively wet, and previously mined wet areas experience a decrease in flow. It appears that the water source is being dewatered since mined out areas of the mine do not continue to produce water indefinitely. The water source must be either of limited extent, e.g., a perched aquifer, or have a limited recharge capacity. In an attempt to quantitatively evaluate saturated sandstone channels, a dripping channel in the 6th West area of the Deer Creek Mine was investigated. The channel, located near a minor fault with very limited displacement, has the dimensions of >2,000 feet in length, 150 feet in width and a maximum thickness of 25 feet. An array of uphole monitoring wells was installed across the width of the channel. The wells were 15 to 25 feet deep and were open along their entire depth. Each well was equipped with a shutoff valve and pressure gauge. The idea was to conduct a pump test by letting selected wells gravity drain and simultaneously measuring pressure change in nearby wells. Because a maximum of about 2 psi was recorded in the well (i.e. (5 feet of water) we were unable to conduct the test. What the well did demonstrate was that the sandstone channel was not fully saturated and it was a perched, unconfined groundwater system.

Although much of the water transfer within the Blackhawk Formation is through fractures or faults, data indicate that recharge to the Blackhawk is limited because of the above confining formations and many of the fractures become sealed by swelling bentonitic clays which stop or limit the water transfer, confirmation of which exists along the numerous faults and fractures over the area. A measurable flow of water along a fault existed at only one location in the Wilberg/Cottonwood Mine - along the Pleasant Valley Fault in Main West, Wilberg. This location produced an estimated average flow of 5 gpm from the time it was encountered to 1980 when the flow stopped. The fractures sealed readily because of the ability of the shaley layers to swell and decompose to form an impervious clay, preventing significant downward percolation, collection, or conveyance of water along faults in the Blackhawk Formation.

Significant quantities of groundwater were also encountered in the Deer Creek Mine, 4th South area, where development entries intersected fractures/faults associated with the Roans Canyon Fault system. As with other areas where groundwater has been intercepted, the flow from the 4th South/2nd Right area has decreased rapidly, from approximately 2000 gpm in March 1990 to approximately 120 gpm in December 1990. Exploratory drilling was utilized in the development entries to locate and map the extent of the water producing fracture. The water producing zone was isolated utilizing an inflatable packer and a pressure gauge was installed to monitor the head differential. Pressure readings recorded were similar to those of Roans Canyon Fault crossing at 3rd North, with readings varying from 80-90 pounds per inch. This calculates out to approximately 200 feet of head. The amount of overburden in the area where the water

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

producing fracture was encountered is approximately 1800-2000 feet. In reviewing the dewatering curve and the initial head differential, groundwater produced from the interception of the water producing fracture was a function of storage and recharge to the fault is limited. To monitor the potential impact of mine dewatering, PacifiCorp installed a series of wells in both the Deer Creek and Cottonwood/Wilberg mines (refer to Volume 9 Hydrologic Section Maps HM-2 and HM-3). These wells were incorporated in the hydrologic monitoring program in 1989. Well development information was detailed in the 1989 Annual Hydrologic Monitoring Report and in Volume 9 - Hydrologic Support Information). Only the wells in the Deer Creek Mine along the axis of the Straight Canyon Syncline revealed a change which could possibly be related to mine dewatering. In addition to the in-mine monitoring PacifiCorp installed a series of surface wells to monitor the potential impacts in Cottonwood Canyon located to the south of Mill Fork and in Rilda Canyon located to the east of Mill Fork. To evaluate the effects on the surface springs and surface drainage systems PacifiCorp maintains an extensive monitoring program. Data collected will be reported annually in the Hydrologic Monitoring reports.

Long-term water producing areas do exist within the current mine workings. Four types of occurrences have been recognized and will be monitored by the applicant and include 1) structural rolls with overlying fluvial channels, 2) Pleasant Valley and Roans Canyon Fault systems, 3) fractures and joints (lineaments), and 4) surface and in-mine drill holes.

Star Point Sandstone

The Star Point Sandstone overlies and inter-tongues with the Masuk Shale. The formation is approximately 350 to 400 feet in thickness and consists of at least three upward coarsening sandstone units. Mudstone units of the Masuk Shale are present above the lower two sandstone members of the Star Point Sandstone due to the inter-fingering nature of the contact between the two units.

The Star Point Sandstone, which immediately underlies the Hiawatha Coal Seam, exhibits some characteristics of an aquifer but experiences little recharge. Studies conducted by the USGS indicate that the Star Point Sandstone is of low permeability, thus limiting its usefulness as a water-producing aquifer. Most of the water discharge from the Star Point Sandstone is where it has been intersected by the major canyons in the plateau or where faulting has caused secondary permeability. This, plus the fact that the Star Point Sandstone is only slightly to moderately permeable, allows only limited flow of groundwater through the formation. Drill holes completed in the Deer Creek, Wilberg/Cottonwood and Genwal mines have defined the piezometric gradient in the lower Blackhawk/Star Point Sandstone system in isolated areas and confirmed the

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

groundwater flow conforms with the topographic relief and structural features, i.e., regional dip, Straight Canyon Syncline, and regional faulting.

The overall pattern of groundwater flow and surface water-groundwater interactions in the Mill Fork Area and adjacent areas can be described by a fairly simple conceptual model involving both active and inactive groundwater flow regimes (Mayo and Morris, 2000). Inactive zone groundwater systems contain old groundwater (i.e. 2,000 to 19,000 radiocarbon years), have very limited hydraulic communication with the surface and with other active groundwater flow systems, and are not influenced by either annual recharge events or short term climatic variability as evidenced by the decline in roof drip rates and lack of fluctuations of in-mine monitoring wells.

Solute chemistry in the Spring Canyon Member is not uniform beneath existing mines suggesting that there is a partitioning of groundwater systems in the member. This condition is likely the result of inter-bedded lower-permeability layers in the Star Point Sandstone which partition individual sandstone bodies. These findings are substantiated by monitoring well data from 6 wells in the Trail and East Mountain areas and are significant in that they strongly suggest that the Spring Canyon Member does not act as a single regionally continuous aquifer, but rather it supports a series of smaller, discrete groundwater systems.

Water in most of the Blackhawk/Star Point aquifer is confined under pressure between shale and siltstone beds within the aquifer (USGS, Lines, Open File Report 84067). Water is released from storage from confined aquifers mainly by compression of the sandstones and less permeable, confining beds as pressure in the aquifer declines. The quantity of water that can be released from storage is dependent on the storage coefficient, which is about 1x10-6 per foot of thickness for most confined aquifers (USGS Lines, Open File Report 84067). Data collected by PacifiCorp on the Roans Canyon Fault System in 1988, 3rd North fault crossing, confirmed the USGS storage coefficient estimations, with values ranging from 1.6x10-4 to 7.0x10-6. Transmissivity values computed for pump tests conducted by the USGS on Trail Mountain on semi-penetrating wells in the Blackhawk/Star Point aquifer ranged from 0.7 to 100 ft^2/day with a majority of the two results ranging from 1 to 10 ft^2/day. The computed transmissivity of 100 ft^2/day was greater than the laboratory data (listed early in this section) and was believed to be due to secondary permeability in the form of fractures. Transmissivity results ranging from 0.7 to 10 ft^2/day are indicative of the low permeability rock in most of the Cretaceous and Tertiary strata within the Wasatch Plateau.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Structural Hydrologic Features

Several important structural features, the Straight Canyon Syncline, Flat Canyon Anticline and Huntington Anticline, the Roans Canyon Fault Graben, Mill Fork Fault Graben, Left Fork Fault Graben, Pleasant Valley Fault, and the Deer Creek Fault, have been identified adjacent to and within the Mill Fork Area.

Folding:

Strata in the Mill Fork area are gently folded in two broad structural features. The Flat Canyon Anticline crosses the southeastern portion of the lease area. This anticline trends southwest to northeast, and plunges to the southwest. Dips in the anticline range from two to six degrees with the south limb dipping the steepest.

To the north, the north limb of the Flat Canyon Anticline becomes the south limb of the Crandall Canyon Syncline, a flat-bottomed syncline. This syncline also trends southwest to northeast. Dips on the northwest side are much steeper than on the southeast side.

Faulting:

The only known fault within the Mill Fork Area is the Joes Valley Fault, which forms the western limit of the coal reserves in this area. The Joes Valley Fault is the largest and most prominent of several north south trending fault zones within the Wasatch Plateau coal field. Displacement of the fault is approximately 1,500 feet, downthrown on the western side. The fault creates a continuous north-south escarpment on the east side of Joes Valley. Several side canyons are cut into this escarpment on the western side of the lease area, all of which drain into Joes Valley. The fault zone itself is not visible along this escarpment, but the fault has been intercepted underground in the Genwal Mine to the north. Where the fault has been intercepted in the Genwal mine workings, a drag fold is present, indicated by a gentle downward folding of the strata along the fault zone, extending for a few hundred feet to the east of the fault.

The nearest known faulting outside of the lease area is the Mill Fork fault graben. The Mill Fork fault graben passes to the southeast of the lease area. This fault graben was crossed in ARCO's Huntington Canyon #4 Mine in Mill Fork Canyon and has a displacement of about twenty five (25) feet on the each side. The trend of this fault zone is approximately N 40° E. Based on projections from maps of #4 Mine, this graben should pass by the southeast corner of the lease area, between the Mill Fork lease and the existing Deer Creek Mine. Where it crosses the northern end of East Mountain, the fault has been mapped to have a displacement of thirty (30) feet down on the northwest side. Deer Creek mine workings have not intercepted this fault zone and exploration drilling in

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

the right fork of Rilda canyon does not show any displacement, indicating that the displacement of the fault zone is too small to measure with exploration drilling, or that it has disappeared in this area. This fault zone does not appear in any surface outcrops.

Springs and Seeps

Prior to coal leasing, lands administrated by the United States Forest Service require sufficient environmental baseline data to be analyzed during the National Environmental Protection Act (NEPA) analysis process. In preparation for coal leasing through the lease-by-application process, Genwal Resources conducted baseline spring and seep surveys from 1994-1996 (northern portions of the lease were surveyed in 1989-90). Data collected by Genwal Resources was determined by the Forest Service to meet the requirements of the Data Adequacy Standards. Information submitted to the Forest Service included: location, flow and quality (data indicates general trends, date of collection generalized and quality limited to field data). With PacifiCorp's acquisition of the Mill Fork State Coal Lease (reverted to the BLM on August 1, 2011 and designated as federal lease UTU-88554), a complete re-evaluation of groundwater resources was initiated in 2000 and continued through 2002. Evaluation of the data revealed similar geologic occurrences to the southern portion of East Mountain, (majority of the groundwater resources discharge from the North Horn Formation in a down-dip configuration), which has been monitored by PacifiCorp for more than thirty years. The water reconnaissance program of the Mill Fork Area was initiated with an aerial survey via helicopter. During the reconnaissance survey, previous baseline survey data was evaluated for field location accuracy. Based upon initial observations, PacifiCorp commenced a field program in 2000 to completely map, field mark and photograph each groundwater source. Previous baseline studies were utilized as a guide of potential groundwater resources. The entire area of the Mill Fork Area (including leases UTU-88554 and UTU-84285) and adjacent area was traversed. During the field reconnaissance process, when water resources were encountered, they were tracked to the source. At the sources, the sites were located utilizing GPS surveying techniques (GPS - equipment: Trimble Asset Surveyor, differentially corrected, horizontal accuracy sub-meter), digitally photographed, field marked with a brass tag and measurements were taken of flow and temperature. PacifiCorp retained identification system established during the previous surveys, except for the Joes Valley area and Mill Fork Ridge. In these two areas, several springs were labeled with multiple tags of different numbers and separate springs were labeled the same identification. In addition to the field measurements, PacifiCorp collected baseline water quality samples. Not all sites were sampled, collection of water quality samples were restricted to sites where representative samples could be obtained. At selected sites, springs were also sampled for isotopic data. These sites were selected based on geographic location, geologic formation, and occurrence.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

During the 2000-2002 baseline evaluation, a total of 198 springs were identified within and adjacent to the Mill Fork Area. Each spring site on East Mountain has been studied to determine the geologic circumstances that cause the springs to occur. The mode of occurrence for each spring has been tabulated on the "Springs Geologic Conditions Inventory" sheets included in the Deer Creek Mine MRP. The springs on East Mountain originate in several different ways; however, many springs share the same mode of occurrence and, in some cases, are related.

The most frequent occurrences of springs are those located about 150 to 350 feet below the top of the North Horn Formation. Field observations along with drill hole data show a predominance of fluvial siltstone and sandstone at that stratigraphic interval. These sedimentary rocks represent many isolated fluvial systems which are water-bearing. The springs are formed where the fluvial channels intersect the land surface. Because the fluvial channels within this zone are generally not interconnected, the springs are not interrelated but share the same mode of occurrence.

Numerous springs located in the lower portion of the North Horn Formation occur when water flowing through fluvial sandstones which are underlain by a thin zone of impervious mudstone at the base of the North Horn Formation intersects the land surface. Field observations along with drill hole data indicate that impervious mudstone units occur at the upper and lower portion of the North Horn Formation. Even though these individual mudstone layers are discontinuous, the occurrence of this type of strata exists throughout the East Mountain Property. The springs related to this mode of occurrence are not generally interrelated because they are fed by waters flowing through isolated fluvial channel sandstones and siltstones.

Numerous springs are located along and within the Joes Valley Graben. Generally, the springs are located within the North Horn Formation (Bald Mountain Ridge located west of the Mill Fork Area) along the fault zone and the alluvial valley deposits. Many of the largest springs surveyed for the Mill Fork Area are located along this fault system west of the Mill Fork Area. The springs located along this fault zone are generally interrelated.

A few springs are located within both the Flagstaff and Price River formations; however, their occurrence is insignificant in comparison to springs located in the North Horn Formation.

Generally springs with discharges exceeding 50 gpm are associated with faulting where permeability has been increased by fracturing (example: Bald Ridge area). The discharge of the springs varies directly with the amount of precipitation and also varies seasonally. Discharge is greatest during the snow melt period, normally from late April through the month of June. Following periods of groundwater recharge the discharge recedes fairly rapidly at first, then

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

gradually, indicating a double porosity effect. At the end of the water year, the remaining discharge is only twenty to thirty percent (20-30%) of the peak discharge. Seasonal flow variation collected for the Mill Fork Area compares directly to the data collected for the southern portion of East Mountain and data collected by Genwal resources to the north.

The following table provides a breakdown of spring locations by geologic formation and surface drainage:

MILL FORK PERMIT AREA (Energy West 2000-2002 Surveys) SPRINGS by GEOLOGIC FORMATION and SURFACE DRAINAGE						
Drainage System	Geologic Formation					
	Alluvium	Flagstaff	North Horn	Upper Price River	Castle Gate	Blackhawk
Huntington Drainage						
Crandall Canyon	0	0	0	7	1	0
Mill Fork Canyon	0	0	44	10	1	5
Right Fork of Rilda Canyon	0	1	39	1	0	0
Cottonwood Drainage						
Un-Named Drainages of Joes Valley	35		29	19	6	0
Total Number of Springs = 198						

Groundwater Quality

Groundwater chemical quality is very good in strata above the Mancos Shale. The USGS reported a range in dissolved solids from 50 to 750 mg/l for samples from 140 springs in the region issuing from the Star Point Sandstone Formation and overlying formations (Danielson et al., 1981). During the Energy West 2000 - 2002 seep and spring surveys, a total of one hundred twenty-nine (129) samples were collected with a range of dissolved solids from 207 to 390 mg/l. Danielson et al. (1981) identified the regional trends of decreasing water quality from north to south and west to east across the Wasatch Plateau. Waters percolating through the underlying

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Mancos Shale quickly deteriorate, with total dissolved solids concentrations frequently exceeding 3000 mg/l.

Additional studies by PacifiCorp have confirmed the primary findings of the USGS concerning regional trends in quality. Originally, decreasing quality from north to south was believed to depict the groundwater flow direction, and the quality decreased as a function of the time it traveled through the strata. Although the time travel component is probably an important factor, in 1985 a surface exploration program identified the existence of an area of residual heat from an ancient burn on the outcrop throughout the southern extreme of East Mountain. The high temperature was also explored within the mine and a portion of reserves were lost because of the situation. It is now theorized that the high temperature water dissolved the mineral constituents of the formations, thereby altering the water chemistry. The quality also decreases vertically downward because of the influence of marine sediments along with the trend of decreasing quality from north to south.

An examination of the data indicates that a relationship exists between elevation and the total dissolved solids concentration of the springs. The data indicate that concentrations of dissolved materials increase with diminishing elevation for both surface streams and springs. The change in quality is a function of the differences in the chemical character of geologic formations which outcrop at different elevations.

To more closely identify springs which are related, water samples are analyzed to determine the percentage of cations and anions in solution. The purpose of the diagrams is to identify groups of related springs by water chemistry. The diagrams clearly show the similarity of water quality of springs originating in the same geologic formation. Historical data from PacifiCorp's on-going East Mountain Hydrologic Program has demonstrated is that, even though the quality varies slightly from individual sites as well as from different formations, seasonal variations do not exist. Data collected in 2000-2001 confirms the trends historical in data collected for southern East Mountain, i.e., despite the seasonal variability in discharge rates, the solute concentrations of active region ground waters do not exhibit significant seasonal variability.

PacifiCorp began in-mine quality monitoring in 1977 (Cottonwood/Wilberg and Deer Creek mines). With the collection of numerous samples throughout the extent of the mine workings, the quality has remained relatively constant. As with the springs the quality varies from individual sites, but quality from the individual sites remains constant versus time.

The predominant dissolved chemical constituents of the groundwater from both surface springs and samples collected in the mine are calcium, bicarbonate, magnesium, and sulfate.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Concentrations of magnesium are normally about one-half the concentration of calcium. Sulfate concentrations are typically higher in water from springs issuing from the Star Point Sandstone-Blackhawk aquifer zone or confined aquifers intersected by mine workings. As mentioned earlier, water quality degrades from the north to the south and also vertically.

PacifiCorp contracted Mayo & Associates in 1996 to conduct comprehensive study to characterize the hydrology and hydrogeology of the East and Trail Mountains. The hydrogeology of the PacifiCorp leases were evaluated by analyzing: 1) solute and isotopic composition of surface and ground waters, 2) surface and groundwater discharge data, 3) piezometric data, and 4) geologic information. The following lists the key points and conclusions from the 1996 study:

Conclusions from the 1996 Mayo & Associates Hydrologic Investigation

1. The $\delta 2H$ and $\delta 18O$ compositions demonstrate that all ground waters are of meteoric origin (i.e. snow and rain).
2. Active and inactive groundwater regimes occur in the mine lease area.
3. The active regime includes alluvial groundwater, groundwater in the Flagstaff Formation, and all near surface exposures of the other bedrock formations except, perhaps, the Mancos Shale. The near surface extends about 500 to 1,000 feet into cliff faces. Ground waters in the active regime contain abundant 3H and anthropogenic 14C.
4. Comparison of long-term discharge hydrographs with precipitation records demonstrates that active regime ground waters: 1) are in direct hydraulic communication with the surface, 2) are recharged by modern precipitation, and 3) have large fluctuations in spring discharge rates which can be attributed to seasonal and climatic variability. High-flow/low-flow discharge rates vary as greatly as 600 gpm to nearly dry; however, most high flow rates are less than 50 gpm.
5. Despite the seasonal variability in discharge rates, the solute concentrations of active region ground waters do not exhibit significant seasonal variability.
6. The inactive regime includes groundwater in sandstone channels in the North Horn, Price River, and Blackhawk Formations which are not in direct hydraulic communication with the surface (i.e. greater than about 500 to 1,000 feet from cliff faces). Mine workings are largely part of the inactive regime. The sandstone channels are vertically and horizontally isolated from each other and when encountered in mine workings are usually drained quickly. Coal seams are hydraulic barriers to groundwater flow. The blanket sands of the Star Point Sandstone are also largely in the inactive zone. Except where exposed near cliff faces, faults encountered in mine workings are part of the inactive regime. Except

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

near cliff faces, faults are not conduits for vertical hydraulic communication between otherwise hydraulically isolated pockets of groundwater.

7. Inactive region groundwater systems contain old groundwater (i.e. 2,000 to 12,000 years), and are not influenced by annual recharge events or short term climatic variability.
8. In-mine inactive regime ground waters occur in nearly stagnant, isolated zones which have extremely limited hydraulic communication with other inactive regime ground waters in the vicinity of mine workings and with near-surface active regime ground waters as evidenced by the following:

    a) Ground waters discharging into mine openings have 14C ages ranging from 2,000 to 12,000 years
    b) Roof drip rates rapidly decline when water is encountered in the mine indicating that the saturated zone above the coal seam is not hydraulically continuous and has a limited vertical and horizontal extent.
    c) Unsaturated conditions have been identified in boreholes drilled vertically into sandstone channels located above coal seams.

9. The fact that inactive region ground waters encountered in mine openings do not have an infinite age means that, at some time, there has been some hydraulic communication with the surface. This communication is extremely limited as illustrated by calculated steady state recharge-discharge rates of faults and sandstone channels in the inactive zone which range from 0.001 to 1.23 gpm.
10. Groundwater in the Star Point Sandstone is part of the inactive regime as evidenced by the 6,000 year 14C age of the sample from well TM-3. In the down dip direction along the axis of the Straight Canyon Syncline, potentiometric pressures in the Spring Canyon member results in upwelling of groundwater into Hiawatha seam mine openings. Such upwelling may locally reduce the pressure in the Spring Canyon member.
11. Aerially extensive groundwater regimes in the lower Blackhawk Formation and Star Point Sandstone do not exist within the lease area. Therefore, it is not meaningful to create piezometric surface maps of these systems.
12. Stream flow is dependent on snow melt, precipitation and thunderstorm activity. There is no apparent hydraulic communication between stream flow and groundwater encountered in mine openings.
13. The groundwater discharging into the Rilda Canyon alluvial collection system is of modern origin and is closely tied to seasonal recharge. This is evidenced by its modern radiocarbon and 3H contents and by the discharge hydrographs. The alluvial groundwater is not related to the groundwater encountered in the mines.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

14. The groundwater discharging in Cottonwood Canyon near Cottonwood Spring and Roans Spring discharges from glacial deposits and is of modern origin. The radiocarbon and 3H contents of this water indicate a modern origin. The water in the shallow glacial deposits is not related to the groundwater encountered in the mines.

In addition to the study conducted in 1996, Mayo & Associates were retained in 2000 to investigate hydrologic resources of the Mill Fork Area and adjacent areas. The purpose of this investigation is to 1) characterize the groundwater and surface water systems in the Mill Fork Area, and 2) determine the probable hydrologic consequences of underground coal mining to surface waters and ground waters within the Mill Fork Area. The hydrology and hydrogeology of the Mill Fork Area area have been evaluated by analyzing: 1) solute and isotopic compositions of surface waters and ground waters, 2) surface water and groundwater discharge data, 3) piezometric data, and 4) geologic information (refer to Appendix B for complete details).

Chemical Evolution of Groundwater (excerpt from Mayo & Associates Study)

a. Chemical Reactions

Solute compositions of groundwaters are the result of interactions between groundwater and bedrock lithology and between groundwater and atmospheric and soil gases. The general reactions responsible for the chemical evolution of groundwaters in the vicinity of the study area and inside the coal mines are described below:

Groundwater acquires most of its CO2(g) in the soil zone where the partial pressure of CO2 greatly exceeds atmospheric levels. This CO2 combines with water to form carbonic acid according to

$$CO2(g) + H2O = H2CO3 \quad (1)$$

Carbonic acid dissociates into H+ and HCO3- as

$$H2CO3 = HCO3^- + H+ \quad (2)$$

The H+ ions temporarily decrease the pH of the water but are quickly consumed by the dissolution of carbonate minerals that are abundant in the soil zone and in most aquifers. Carbonate mineral dissolution is represented as

$$2H+ + CaMg(CO3)2 = Ca2+ + Mg2+ + 2HCO3^-, \text{ and} \quad (3)$$
(dolomite)

$$H+ + CaCO3 = Ca2+ + HCO3^- \quad (4)$$

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

(calcite)

The net effect of reactions 2 through 4 is to increase the pH and the Ca^{2+}, Mg^{2+}, and HCO_3^- contents of waters. Dissolution of gypsum, which is present in minor amounts in many formations in the region, can elevate the Ca^{2+} and SO_4^{2-} contents in the absence of additional $CO_{2(g)}$ and H^+ according to

$$CaSO_4 \cdot 2H_2O = Ca^{2+} + SO_4^{2-} + 2H_2O \quad (5)$$

(gypsum)

Elevated Na^+ concentrations may result from either the dissolution of halite or from ion exchange on clay particles or on sodium zeolites (Mayo and others, 2000). Halite dissolution will increase the overall solute concentration (i.e. TDS) and will yield equal Na^+ and Cl^- contents when the solute compositions are reported in the meq/l units. Halite is not abundant in the study area. Ion exchange will not directly elevate the overall solute content, but will result in increased Na+ concentrations with corresponding decreases in $Ca2^+$ and/or Mg^{2+} concentrations. Halite dissolution may be represented as

$$NaCl = Na+ + Cl^- \quad (6)$$

And the ion exchange may be represented by reactions involving the sodium zeolite analcime,

$$2NaAlSi_2O_6 \cdot H_2O + Ca2+ = Ca(AlSi_2O_6)2 \cdot H_2O + 2Na^+, \quad (7)$$

$$2NaAlSi_2O_6 \cdot H_2O + Mg^{2+} = Mg(AlSi_2O_6)2 \cdot H_2O + 2Na^+, \quad (8)$$

or clay mineral exchange which may be represented as

$$Ca^{2+} + Na\text{-clay} = 2Na^+ + Ca\text{-clay} \quad (9)$$

$$Mg^{2+} + Na\text{-clay} = 2Na^+ + Mg\text{-clay} \quad (10)$$

Solute Compositions

a. Streams

(1) Crandall Canyon Drainage

Water quality samples taken below the confluence of the north and south forks of Mill Fork Creek have a mean TDS of about 300 mg/l and are of the Ca^2+-Mg^2+-HCO^{3-} type with lesser amounts of SO_4^{2-}. This water includes drainage from the Mill Fork Area as well as the area to the north.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

(2) Mill Fork Canyon Drainage

Water quality samples taken below the confluence of the north and south forks of Crandall Creek have a mean TDS of about 480 mg/l and are of the Ca^{2+}-Mg^{2+}-HCO_3^- type with lesser amounts of SO_4^{2-}. Most of this water originates in the Mill Fork Area.

(3) Rilda Canyon Drainage

Water quality samples taken below the confluence of the north and south forks of Rilda Creek have a mean TDS of about 400 mg/l and are of the Ca^{2+}-Mg^{2+}-HCO_3^- type. This water is mostly drainage from the Mill Fork Area.

b. Springs

The solute compositions of ground waters from nearly all of the springs in the Mill Fork Area are of similar chemical type. This is seen in the similarity of the shapes of the Stiff diagrams and the clustering of the data points on the Piper plot. All of the springs in the Mill Fork Area for which chemical analyses are available are of the Ca^{2+}-Mg^{2+}-HCO_3^- type with variable amounts of SO_4^{2-}. This chemical type is consistent with the dissolution of carbonate minerals in the presence of soil zone CO_2(gas) according to equations 1-4 above.

Mineral saturation calculations indicate that most of the springs and streams in the study area are at or above saturation with respect to the carbonate minerals calcite and dolomite. What this means is that the chemistry of the spring water is near equilibrium with respect to these minerals, and thus there is not a thermodynamic tendency to dissolve additional carbonate minerals if these are encountered in the groundwater system. Waters with saturation indices less than log = -0.1 have a thermodynamic tendency to dissolve the mineral species should they be encountered in the groundwater system and waters with a saturation indices greater than log = 0.1 have a thermodynamic tendency to precipitate the mineral species.

For additional dissolution of carbonate minerals to occur, an influx of $CO_{2(g)}$ into the groundwater system must occur. Common sources of $CO_{2(g)}$ in this environment include CO_2 produced by root respiration and organic decay in the soil zone and bacteriological processes resulting in the oxidation of CH_4 (methane). No surface or groundwater in the study area is near saturation with respect to gypsum. What this indicates is that, if gypsum is encountered along a waters flow path, dissolution of the gypsum will occur, resulting in elevated Ca^{2+} and SO_4^{2-} concentrations. Groundwater from the Blackhawk Formation and Star Point Sandstone encountered in nearby mine environments is

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

supersaturated with respect to both calcite and dolomite indicating that the water has the thermodynamic tendency to precipitate these minerals.

TDS concentrations of springs in the study area fall in the narrow range of 207 to 390 mg/l. A probability plot of the ordered ranking of the TDS of ground waters collected during the 2000-2001 spring and seep survey indicate a single population with a normal distribution. The fact that all of the Mill Fork Area springs discharging from alluvial systems, the North Horn Formation, Price River Formation, Castlegate Sandstone, and Blackhawk Formation have the same chemical character is of particular significance. In other areas in the Wasatch Plateau, bedrock springs commonly have a broader range of TDS and chemical type, which is related to the bedrock formation from which the springs discharge (Danielson and others, 1981; Mayo and Associates, 1997d; Mayo and Morris, 2000).

The mean TDS for each geologic formation ranges from 253 mg/l in the North Horn Formation to 322 mg/l in the Price River Formation. That there is not a greater variability in TDS, or a greater number of groundwater types represented in the springs in the study area implies that there is not a great deal of variation in the soil zone processes or mineralogy of the matrix of the groundwater systems from which these springs emanate. We believe that the lack of variability in groundwater solute chemistry occurs because the groundwater systems that support springs in the area flush large quantities of groundwater through the thick soil zone and shallow fractured bedrock. Over thousands of years, some of the soluble minerals which were once present in the shallow bedrock and in the soil have been leached away. Because these groundwater systems do not come into contact with rocks deeper in the geologic formations (which vary substantially in their soluble mineral contents) there is little variation in the chemical type of groundwater.

Although there is little variability in the chemical type and TDS of groundwater discharging from springs in the Mill Fork Area, there is considerable variability in the TDS and solute compositions of spring discharge waters and the solute composition of spring discharging from the Blackhawk Formation in the nearby Trail and Cottonwood Mine areas. We interpret the overall greater TDS and degree of chemical variability in the Blackhawk Formation in the Trail and Cottonwood Mine waters as a result of great precipitation variability in the Trail and Cottonwood Mine areas. Except for Joes Valley Alluvium, Mill Fork Area ground waters recharge and discharge from very wet upland areas. Trail and Cottonwood Mine groundwater recharge and discharge from a variety of elevations and recharge domains.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

In-Mine Groundwater

Because the Federal Lease UTU-84285 was a new lease area that did not have existing underground workings, the solute compositions of in-mine groundwater can only be inferred from compositions of in-mine waters in nearby mines. Extensive in-mine samples of Blackhawk Formation roof drip water are available from Energy West's mines which include Cottonwood, Wilberg, Trail Mountain, and Deer Creek. A limited number of in-mine samples from the Star Point Sandstone are also available from the Deer Creek and Cottonwood Mines (Mayo and Associates, 1997d) and from public documents for the Crandall Canyon Mine (Mayo and Associates, 1997a).

(1) Blackhawk Formation

In-mine roof drips from the Blackhawk Formation are of the Ca^{2+}- Mg^{2+} -HCO_3- -SO_4^{2-} type with appreciable amounts of Na^+. These ground waters have elevated TDS contents relative to Blackhawk spring waters in the Mill Fork Area and are generally chemically dissimilar to springs in the Mill Fork Area. The two spring samples from the Deer Creek and Cottonwood Mine areas have similar solute contents as the in-mine samples. Mayo and others (2000) found the elevated TDS in coal mine roof drip water to be the result of a cascading series of chemical reactions involving the oxidation of pyrite which increases the SO_4^{2-} concentration and releases H^+ ions. The H^+ ions are consumed by dissolution of additional carbonate minerals (i.e., calcite and dolomite) elevating the Ca^{2+} and Mg^{2+} contents. In the process acid mine drainage (AMD) is prevented. Ion exchange of Ca^{2+} and Mg^{2+} on the sodium zeolite analcime increases the Na^+ contents. We anticipate similar in-mine processes will occur in the Mill Fork Area.

(2) Spring Canyon Member

The solute chemical composition of groundwater in the Spring Canyon Member beneath existing mine workings is highly variable (Appendix B Table 4). Conductivities range from 500 to 2,287 µS/cm. Ca^{2+} concentrations range from 5.5 to 64 mg/l and Mg2+ concentrations range from 5.1to 41 mg/l. Na^+ concentrations range from 14 to 550.6 mg/l and Cl^- concentrations range from 5.0 to 221.3 mg/l. The large spatial variations in solute chemistry are attributed to the influence of inter-bedded Mancos Shale tongues which are present in some locations and not in others and are known to contain soluble minerals. The variations in Na^+ are likely the result of the presence or absence of clays with ion exchange capacity. Ion exchange commonly results in elevated Na^+ concentrations at the expense of decreased Ca^{2+} or Mg^{2+} concentrations.

That the solute chemistry in the Spring Canyon Member is not uniform beneath existing mines suggests that there is a partitioning of groundwater systems in the member. This

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

condition is likely the result of inter-bedded lower-permeability layers in the Star Point Sandstone which partition individual sandstone bodies. These findings are substantiated by monitoring well data from 6 wells in the Trail and East Mountain areas and are significant in that they strongly suggest that the Spring Canyon Member does not act as a single regionally continuous aquifer, but rather it supports a series of smaller, discrete groundwater systems.

(3) Joes Valley Fault System

Ground waters in the Joes Valley Fault system and associated sympathetic faults and fractures have been observed in the Crandall Canyon Mine. Data from a public domain document (Mayo and Associates, 1997a, c) indicate the water is of the Ca^{2+} -Mg^{2+} - HCO_3^- type. This water type is consistent with the dissolution of carbonate minerals in the presence of soil zone CO_2 (gas). Slightly elevated SO_4^{2-} concentrations are consistent with dissolution of minor amounts of gypsum. The relatively low mean Na+ concentration (3.7 mg/l; 0.17 meq/l) indicates that appreciable ion exchange has not occurred. Na^+ and Cl^- contents, in meq/l, are essentially the same, indicating halite dissolution as the Na^+ source.

δ^2H and $\delta^{18}O$

The δ^2H and $\delta^{18}O$ composition of a water molecule falling as precipitation is determined by the temperature at which nucleation of the water droplet occurs. However, other effects related to the bulk composition of the water vapor phase, such as cloud rainout and orographic effects, also can affect the isotopic composition of precipitation.

The stable isotopic compositions of waters are usually analyzed relative to the Meteoric Water Line (MWL). The MWL is empirically derived from the worldwide plotting locations of coastal zone precipitation and is defined by the equation $\delta^2H = 8\ \delta^2O + 10$). Precipitation that forms under cooler conditions will plot lower (i.e. more negatively) along the MWL than will precipitation that forms under warmer conditions.

Except for unusual conditions such as geothermal heating above about 100°C, the δ^2H and $\delta^{18}O$ composition of a groundwater is set at the time of recharge and is not affected by subsurface conditions such as groundwater residence time and mineral dissolution and precipitation reactions. In other words, the recharge and flow history of a groundwater can be evaluated independently of the solute content of the water using stable isotopic compositions.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

All ground waters in the study area plot near the meteoric water line indicating a meteoric recharge origin (i.e. rain and snow).

Based on their stable isotopic compositions, ground waters from within both the Energy West and Crandall Canyon Mines are readily distinguishable from each other and from springs and creeks in the Mill Fork Area. These three populations are statistically different from each other at the 95% confidence level. The Mill Fork Spring samples tend to plot more positively relative to the meteoric water line than do the in-mine waters, indicating that the near-surface ground waters recharged under different climatic conditions. The more negative composition of the in-mine ground waters is probably the result of paleo-recharge during cooler, wetter times. The stable isotopic composition of water seldom changes significantly after infiltration into the groundwater system. What this suggests is that modern groundwater systems in the upland areas overlying the mine area are not the primary source of recharge to the groundwater systems encountered in the mines.

Groundwater Ages (^{3}H and ^{14}C)

The concept of groundwater age is difficult to define because water arriving at a well or spring seldom travels via pure piston flow. Instead it is usually a mixture of water molecules that recharged at different locations and at different times, thus water has no unique age. It is therefore best to think of a groundwater "age" as the mean residence time of the water sampled at the well or spring.

In this investigation, two unstable isotopes, tritium (^{3}H) and carbon-14 (^{14}C) have been used to evaluate mean residence times. Tritium is a qualitative tool indicating if groundwater has a component of water that recharged since about 1954. Groundwater that recharged prior to about 1954 will contain essentially no tritium. Carbon-14 provides information regarding the number of years that have elapsed since the groundwater became isolated from soil zone gases and near-surface waters. Like tritium, ^{14}C can indicate if groundwater has a component that recharged since the 1950s. Ground waters with ^{14}C contents greater than about 50 percent modern carbon (pmc) contain anthropogenic (i.e., human-induced) carbon associated with atmospheric nuclear weapons testing. It is not uncommon for groundwater issuing from a spring or occurring in a well to be a mixture of old (i.e. containing no ^{3}H) and modern water.

Groundwater ages have been calculated for 27 springs, 14 in-mine locations, and 6 Star Point Sandstone wells. All spring waters, except for spring 18-4-1 which is located in the southwestern portion of Trail Mountain, contain anthropogenic carbon and appreciable amounts of ^{3}H and are, therefore, modern. These springs issue from alluvial systems, the North Horn Formation, the Price River Formation, the Castlegate Sandstone, and Blackhawk Formation.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Spring 18-4-1 issues from the Blackhawk Formation-Castlegate Sandstone contact at the down plunge end of the Straight Canyon Syncline and is not in the Mill Fork Area. The spring water does not contain water that recharged since 1954; however, the water was likely recharged less than a few hundred years ago as is indicated by its ^{14}C content.

Most groundwaters collected inside the Cottonwood/Wilberg and Deer Creek Mines contain essentially no tritium (Appendix B Table 5) and have mean ^{14}C ages ranging from 2,000 to 12,000 years. Roof drip waters associated with faults (i.e., 1.5N X 29, 6W X 20, and MN-ME) contain waters 2,000 to 7,000 years old and are not in hydraulic communication with the surface. Both roof drip (i.e. Blackhawk Formation) and wells in the Spring Canyon Member of the Star Point Sandstone in the Crandall Canyon Mine generally have groundwater ages of 13,000 – 19,000 years. These waters contain essentially no tritium and thus represent groundwater systems that are essentially hydraulically isolated from modern near surface hydrologic phenomena.

Two in-mine roof drip samples associated with faults, TW-10 (Roans Canyon) in the Deer Creek Mine and 5th West (Joes Valley Fault) in the Crandall Canyon mine, have ^{3}H contents indicating a component of modern recharge.

Active and Inactive Groundwater Zones

The overall pattern of groundwater flow and surface water-groundwater interactions in the Mill Fork Area and adjacent areas can be described by a fairly simple conceptual model involving both active and inactive groundwater flow regimes (Mayo and Morris, 2000).

Active zone groundwater flow systems contain abundant ^{3}H, have excellent hydraulic communication with the surface, are dependent on annual recharge events, and are affected by short term climatic variability. Tritium and carbon-14 "age" dating of spring waters in the study area demonstrate that all springs, except 18-4-1, issue from active zone groundwater systems and are of modern origin. Groundwater in the active zone generally circulates shallowly and has short flow paths. Because the springs in the Mill Fork Area and adjacent areas are not part of large, regional groundwater systems, hydrographs of their discharge rates show both seasonal and climatic fluctuations. During drought cycles, it is not uncommon for discharge from some springs in the active zone to completely cease.

The $\delta^{2}H$ and $\delta^{18}O$ compositions of Mill Fork Area springs relative to in-mine ground waters demonstrate that the Mill Fork Area springs are not part of the same groundwater systems that discharge in the mines.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

The active regime includes alluvial groundwater, all of the Flagstaff Limestone, and the near-surface exposures of all other bedrock formations. The "near surface" extends a few hundred feet vertically into the subsurface, about 500 to 1,000 feet into cliff faces and is controlled by fracturing, weathering, and the surface exposures of fluvial channel sands. Further into the cliff faces the discontinuous character of the channel sands prevents active groundwater flow.

Except for mountain fronts and cliff faces, the coal bearing lower Blackhawk Formation and the Star Point Sandstone are generally not exposed at the surface in the Mill Fork Area and are not part of the active zone. In Cottonwood Canyon, located south of Mill Fork Area, the Star Point Sandstone is within a few hundred feet of land surface and is part of the active zone as evidenced by the tritium content, 1.10 TU, in Well CCCW-1S. Elsewhere Star Point Sandstone samples have groundwater ages of 6,000 to 19,000 years. In the Mill Fork Area the lower Blackhawk Formation and Star Point Sandstone are not exposed near the land surface, except at cliff faces, and are not in the active zone.

Except for mining operations near cliff faces, the in-mine environment is generally not part of the active zone. However, in-mine groundwater containing tritium (i.e., 1 TU or more) in TW-10 (Roans Canyon Fault) and 5th West Fault (Joes Valley Fault-Genwal Mine) indicate that locally the inactive zone extends into the mine environment where fracture zones, that are associated with major faulting, are currently under tensional stress. The extension of the active zone into the mine environment along fractures is localized as evidenced by the absences of tritium and old ^{14}C ages in in-mine groundwater collected elsewhere along the fracture zone.

Inactive zone groundwater systems contain old groundwater (i.e. 2,000 to 19,000 radiocarbon years, have very limited hydraulic communication with the surface and with other active groundwater flow systems, and are not influenced by either annual recharge events or short term climatic variability as evidenced by the decline in roof drip rates. Groundwater in these systems tends to occur in sandstone channels in the North Horn, Price River, and Blackhawk Formations which are not in direct hydraulic communication with the surface (i.e. greater than about 500 to 1,000 feet from cliff faces). These sandstone channels are vertically and horizontally isolated from each other and when encountered in mine workings are usually drained quickly. The blanket sands of the Star Point Sandstone are also largely in the inactive zone.

Except for the immediate vicinity of Joes Valley Fault, we believe that groundwater intercepted in the Mill Fork Area will be part of the inactive zone and will not be in hydraulic communication with either near surface groundwater or surface water systems. Mining within 200 to 300 feet of Joes Valley Fault is problematic in that the area is under tension and deep

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

groundwater may be part of the active zone.

Two fundamentally different groundwater regimes, active (near surface) and inactive (deep subsurface and in-mine) that occur in the vicinity of the Mill Fork Area and elsewhere in the Utah Coal District are due to the vertical and horizontal heterogeneity of the bedrock. The rock formations consist primarily of alternating and interpenetrating layers of somewhat permeable sandstone and impermeable shale and mudstone. Individual rock layers are generally not continuous over great horizontal distances. Rather, one rock facies commonly grades horizontally into another facies. Fluvial deposits consisting of sandstone channels, which locally support groundwater systems, typically interpenetrate with shale and mudstone units. Thus, layers of shale or claystone that have very low permeabilities encase individual sandstone layers both horizontally and vertically. Although the permeability of individual sandstone bodies may locally be relatively high, the ability of these rocks to transmit water horizontally over great distances is low because of the discontinuous nature of the sandstones. Due to the pervasiveness of low permeability shales and mudstones, the potential for vertical groundwater flow is minimal.

Because of the limited potential for groundwater to migrate vertically through the stratigraphic section, active zone recharge waters commonly infiltrate only into the soil zone and shallow, fractured bedrock. Most groundwater moves downward through the shallow subsurface until the first impermeable layer is encountered where it migrates laterally and is discharged at the surface as a spring or seep.

Regional Groundwater Systems

A report by the U.S. Geological Survey (Lines, 1985) states that there exists a regional aquifer in the lower Blackhawk Formation and Star Point Sandstone in the Wasatch Plateau. Lines also postulates that the regional aquifer is recharged by the downward migration of ground waters from overlying perched groundwater systems in the North Horn and Price River Formations. This idea is not correct. Ground waters encountered within mine openings in the lowermost Blackhawk Formation occur primarily within discontinuous sandstone channels. It is not uncommon for some of these channels to be completely dry, while others are partially or completely filled with water. Between these sandstone channels, the surrounding shales and claystones of the Blackhawk Formation are usually dry. The discontinuous nature of the saturated sediments in the lowermost Blackhawk Formation, and the unconfined conditions under which these ground waters exist do not support the idea of a deep, regional system with groundwater flowing from areas of recharge to areas of discharge.

Additionally, radiocarbon and tritium groundwater age dating indicates that groundwater in the

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

shallow perched groundwater systems are modern (post-1954) and in-mine groundwater in the Blackhawk Formation and Star Point Sandstone are thousands of years old.

We believe that the presence of swelling clays and impermeable shales in the rocks in the unsaturated zone between the overlying perched systems and the Blackhawk Formation effectively prohibit downward vertical migration of waters from the perched systems. Lines (1985) analyzed cores taken from well (D-17-6) 27bda-1 and found the hydraulic conductivities of the shales and siltstones to be very low (i.e. 10-7 to 10-8 ft/day). One shale sample was found to be effectively impermeable even when a hydraulic pressure of 5,000 psi was applied.

Because there are no regionally extensive groundwater regimes in the lower Blackhawk Formation or Star Point Sandstone within the lease area, it is not possible to draw meaningful potentiometric surface maps of these systems.

Lines (1985) also reported that water was likely leaking from the Joes Valley Reservoir downward into the "lower Blackhawk / Star Point aquifer" in Straight Canyon. We believe that this is incorrect. Groundwater collected from well TM-3, which is completed in the Star Point Sandstone in Straight Canyon just below the reservoir, has a radiocarbon age of 6,000 years, while water in Joes Valley Reservoir is of modern origin. Water levels in TM-3 do not respond to seasonal fluctuations in the water level in Joes Valley Reservoir, indicating that there is little or no hydraulic communication between the reservoir and water in the Star Point Sandstone. Groundwater was sampled at UG-3 in the lower Blackhawk Formation in the Trail Mountain Mine. This water has a radiocarbon age of 5,500 years, which is likewise not consistent with water from the reservoir.

Summary of 2001 Mayo & Associates Study

In summary, all groundwater encountered in springs monitored in the Mill Fork permit Area discharge from active, shallow groundwater systems. No evidence exists that suggests a large, regional-type aquifer occurs in the area. All of the springs analyzed in the study area exhibit large-scale fluctuations in discharge rates in response to the annual snowmelt event. The springs are also sensitive to longer-term variations in climate. Carbon-14 and tritium dating of spring and stream waters indicate that the springs contain anthropogenic (human-induced) carbon and levels of tritium consistent with recharge in the past 50 years. Stable isotopic δ^2H and $\delta^{18}O$ data from springs and streams at the surface indicate that the recharge sources for these groundwater systems are different from those that recharged the groundwater systems encountered in the mine environment.

Almost all groundwater encountered in in-mine environments is not related to shallow, active zone groundwater systems from which springs and streams discharge. ^{14}C dating indicates that

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

groundwater entering the underground workings in most locations is thousands of years old. When groundwater is encountered in the mine, inflow rates commonly decrease rapidly and most inflows eventually dry up completely. This indicates that the groundwater systems encountered in the mine are not part of large regional groundwater systems. There is no relationship between groundwater inflow rates measured in the mine and the annual snowmelt event or long term climatic trends. This demonstrates a lack of hydraulic communication between the groundwater systems encountered in the mine and active zone groundwater systems near the surface.

Conclusions from 2001 Mayo & Associates Study

- Ground waters discharging from springs are part of active zone groundwater systems. Isotopic analysis indicates that groundwater from the active zone is of modern origin (recharged less than 50 years ago). Seasonal variations in discharge rates from active zone springs indicate that flowpath lengths are short and that groundwater travel times from recharge areas to discharge areas are generally less than one year. The abundance of shale and claystone units in the geologic section prohibits significant downward migration of active zone ground waters into deeper horizons.

- Analysis of the solute chemistry of ground waters discharging from springs and seeps indicate that depths of circulation in these systems are shallow. The modern groundwater ages of shallow ground waters in the study area support this conclusion.

- Groundwater encountered in most locations in the mines is many thousands of years old. Groundwater in the Star Point Sandstone ranges from approximately 1,000 to 19,000 years old. Groundwater in the Blackhawk Formation within the mines ranges in age from about 2,000 to 14,000 years, whereas groundwater in the Joes Valley Fault system ranges in age between about 2,500 and 5,000 years. None of these groundwaters have appreciable tritium concentrations, indicating that no recharge has occurred in the past 50 years.

- Groundwater encountered in the northwest corner of the Crandall Canyon Mine discharges from a series of fractures located near the Joes Valley Fault. Tritium data indicate that a component of this water recharged in the past 50 years, whereas ^{14}C data indicate that another component recharged more than 3,500 years ago. This groundwater appears to originate from a sandstone channel in the mine roof.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

- More than two-thirds of all non-alluvial springs in the Mill Fork Area discharge from the North Horn Formation. The abundance of springs in the North Horn Formation is the result of the large area of exposed North Horn in the upland areas where precipitation is greatest, and the presence of the abundant claystone and shale layers which inhibit significant downward migration of precipitation into the formation.

- The fact that Little Bear Spring discharges modern water and has large variations in discharge rates suggests that it is the discharge location of an active zone groundwater system. Because inactive zone groundwater systems in the Star Point Sandstone beneath the mine are tens of thousands of years old and do not exhibit seasonal variations in discharge, these groundwater systems are precluded as potential contributors to the discharge from Little Bear Spring. The very low permeability in the Star Point Sandstone beneath the mine indicates that diffuse flow through the Star Point Sandstone beneath the mine cannot contribute significant groundwater to the discharge from the spring.

  Limited data suggest the possibility that Little Bear Spring may receive significant recharge where the fracture system from which it emanates crosses streams and active zone groundwater systems in drainages south of Little Bear Canyon. The conditions in Mill Fork Canyon seem favorable for recharge to the spring.

WATER MONITORING – MILL FORK AREA

A. GROUNDWATER

Groundwater within the Mill Fork Area was monitored according to the schedules in established in the Deer Creek MRP. PacifiCorp has conducted baseline and operational monitoring of spring sources in and adjacent to the lease area. The data collected have provided information useful in the understanding of potential hydrologic consequence of mining.

East Mountain Springs - Mill Fork

In preparation for coal leasing, Genwal Resources conducted baseline spring and seep surveys from 1994-1996 (northern portions of the lease were surveyed in 1989-90). With PacifiCorp's acquisition of the Mill Fork State Coal Lease (reverted to the BLM on August 1, 2011 and now designated as federal lease UTU-88554), a complete re-evaluation of groundwater resources was initiated in 2000 and continued through 2001. During the 2000-2002 baseline evaluation, a total of 198 springs were identified within and adjacent to the lease plan area. Federal Coal Lease UTU-84285 was created on November 1, 2006, immediately adjacent to the western boundary of

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

UTU-88554. Each spring site on East Mountain has been studied to determine the geologic circumstances that cause the springs to occur. The mode of occurrence for each spring was tabulated on the "Springs Geologic Conditions Inventory" sheets located in the Deer Creek MRP. The springs on East Mountain originate in several different ways (see Springs and Hydrologic Drainage Maps and HM-1A Hydrology Data Map); however, many springs share the same mode of occurrence and, in some cases, are related.

The ground water monitoring plan in Appendix A includes a selection of springs based on the following criteria:

- Stratigraphic position
- Area of potential influence from subsidence
- Aerial distribution
- Established water rights
- Measurable flow based on historical surveys
- Reliable measuring point(s)

The following table outlines the rationale for springs selected for long term monitoring. Selection of the springs to be monitored was based upon the factors listed along with discussions with the water users (CVSSD, Emery Conservancy District, NEWUSSD) and the surface management agency.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

MILL FORK GROUNDWATER MONITORING PLAN - SPRINGS							
Spring	Stratigraphic Position	Projected Subsidence Zone	Regional Location	Water Rights	Historical Measurable Flow	Reliable Measuring Point	Comment
SP1-29	✓	✓	✓		✓	✓	
UJV-213	✓		✓	✓	✓	✓	
UJV-101	✓		✓		✓	✓	
JV-34	✓		✓			✓	Located outside projected zone of subsidence. Monitored to detect impacts to the Joes Valley alluvium
JV-9	✓		✓			✓	Located outside projected zone of subsidence. Monitored to detect impacts to the Joes Valley alluvium
UJV-206	✓	✓	✓	✓	✓	✓	
MF-219	✓	✓	✓	✓	✓	✓	
SP1-26	✓	✓	✓	✓	✓	✓	
MF-10	✓	✓	✓	✓	✓	✓	
MF-19B	✓		✓	✓	✓	✓	
RR-5	✓	✓	✓	✓	✓	✓	
EM-216	✓		✓	✓	✓	✓	Located outside projected zone of subsidence
GRANTS SPRING					✓	✓	Added to the spring monitoring program at the request of the USFS
RR-15	✓	✓	✓		✓	✓	
RR-23A	✓		✓		✓	✓	Large spring within a series of springs located downdip from projected mining
EM POND					✓	✓	Added to the spring monitoring program at the request of the USFS
MFR-30	✓	✓	✓		✓	✓	
MFR-10	✓	✓	✓		✓	✓	Large spring denoted by USGS
MF-7	✓		✓		✓	✓	Located outside projected zone of subsidence
MF-213	✓		✓	✓	✓	✓	Large spring located in the Blackhawk Formation downdip from projected mining
LITTLE BEAR SPRING	✓		✓	✓	✓	✓	Located outside projected zone of subsidence. Added to the spring monitoring program at the request of the DOGM

Water samples were collected and analyzed during the months of July and October. Parameters analyzed are those listed in the "DOGM Guidelines for Groundwater Water Quality". Monitoring of groundwater sites will continued for a minimum of three years after the last date of mining (date of last mining - January 2015). PacifiCorp will submit a formal application to reduce hydrologic monitoring after the minimum three year time period.

INCORPORATED

AUG 17 2018

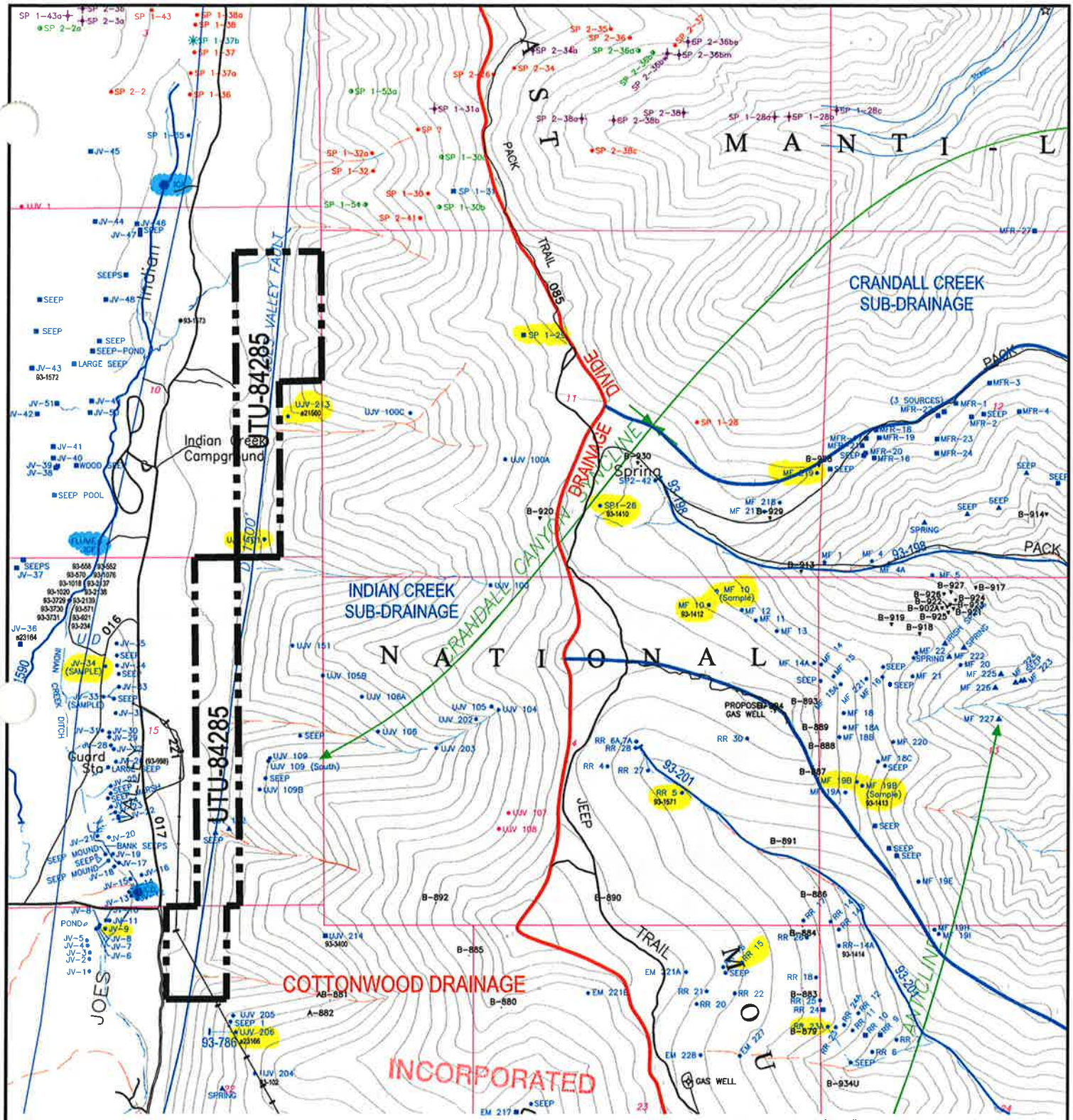
Div. of Oil, Gas & Mining

S*urface Hydrology*

The East Mountain mine area is located in the headwater region of the San Rafael River Basin. The surface drainage system of the Federal Lease UTU-84285 forms part of the Cottonwood Creek drainage.

All drainages in and adjacent to Lease UTU-84285 are ephemeral. The majority of the surface flow from the lease block drains to the west in un-named drainages of Upper Joes Valley which report to Cottonwood Creek. As detailed in Appendices A and B, subsidence is limited and affects of subsidence did not alter surface flow characteristics of the ephemeral drainages.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



AUG 17 2018

Div. of Oil, Gas & Mining

CAD FILE NAME/DISK#: UTU-84285

SPRING LEGEND

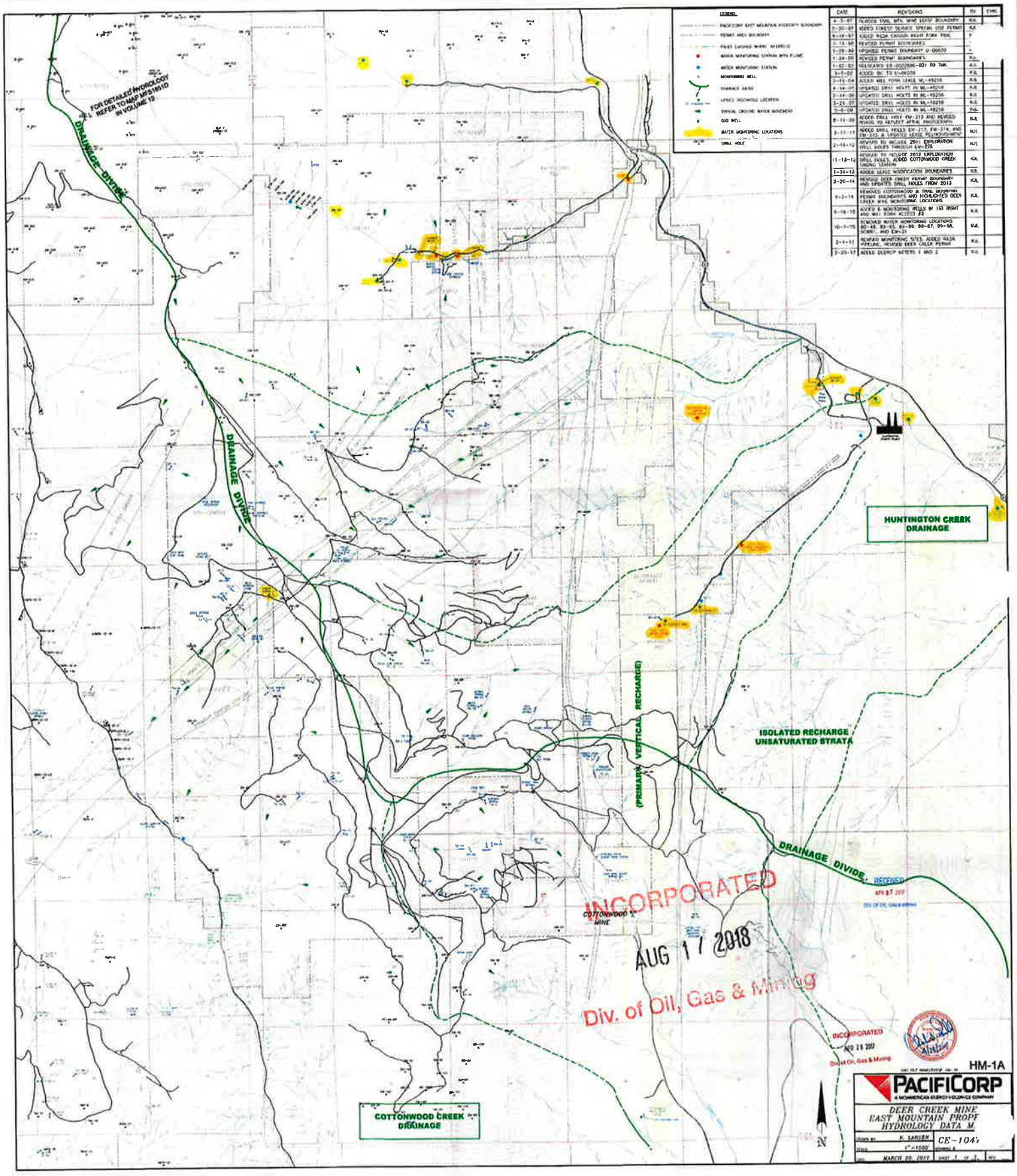
- SURFACE WATER MONITORING LOCATION
- SPRING LOCATAION (1994-1995 SURVEY)
- GPS LOCATED 2000
- GPS LOCATED 2001
- GPS LOCATED 2002
- GPS LOCATED 2010-2011
- SPRING LOCATION (1992 SURVEY)
- SPRING MONITORING LOCATION (ENERGY WEST)
- 93-2139 GROUND WATER RIGHTS
- 93-198 SURFACE WATER RIGHTS
- MONITORING LOCATIONS (GENWAL RESOURCES)
- SPRING LOCATION (1991 SURVEY)
- SPRING LOCATION (1989-1990 SURVEY)
- SPRING LOCATION (1987 SURVEY)
- SPRING LOCATION (1985 SURVEY)
- FEDERAL LEASE ACREAGE RELINQUISHED

N

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY - DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-84285
HYDROLOGIC DRAINAGE MAP

DRAWN BY:	K. LARSEN	*APPENDIX C*	
SCALE:	1" =2000'	DRAWING #:	
DATE:	APRIL 23, 2018	SHEET 1 OF 1	REV.


FOR DETAILED HYDROLOGY REFER TO MAP MP81901D IN VOLUME 12
DRAINAGE DIVIDE
DRAINAGE DIVIDE
HUNTINGTON CREEK DRAINAGE
ISOLATED RECHARGE UNSATURATED STRATA
(PRIMARY VERTICAL RECHARGE)
DRAINAGE DIVIDE
COTTONWOOD CREEK DRAINAGE
COTTONWOOD MINE
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining
INCORPORATED
APR 28 2017
Div of Oil, Gas & Mining
HM-1A
PACIFICORP
DEER CREEK MINE
EAST MOUNTAIN PROPF
HYDROLOGY DATA M
K. SARSEN
CE-104
1"=1000'
MARCH 20, 2017

EAST MOUNTAIN SPRING DATA Mill Fork Area							
Federal Lease UTU-88554 and UTU-84285							
SPRING	MINING HISTORY		STATUS	LOCATION			Approximate Subsidence (feet)
	Type of Mining	Date of Mining (Pre/Post water quality analysis based on dates listed for each spring)		Sec.	T.	R.	
UJV-213	First Mining	Hiawatha: 25th West Bleeder Feb. 2012	Within Relinquishment	10	16S	6E	NA
UJV-101	First Mining	Hiawatha: 22nd West Bleeder Mar. 2011	Within ½ mile Offset Within Lease UTU-84285	10	16S	6E	NA
JV-34	Not Undermined	NA Nearest second mining: 2670' Aug. 2008	Within ½ mile Offset	15	16S	6E	NA
JV-9	Not Undermined	NA Nearest second mining: 1940' Jun. 2005	Within ½ mile Offset	22	16S	6E	NA
UJV-206	Not Undermined	NA Nearest second mining: 1825' Dec. 2005	Within Relinquishment	22	16S	6E	NA
MF-219	First Mining - BC Longwall – BC First Mining – Hia.	Blind Canyon: First Mining 7th Left Sep. 2009 Second Mining 7th Left Apr. 2010 Hiawatha: 23rd West Feb. 2011	Within Relinquishment	11	16S	6E	1

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN SPRING DATA
Mill Fork Area

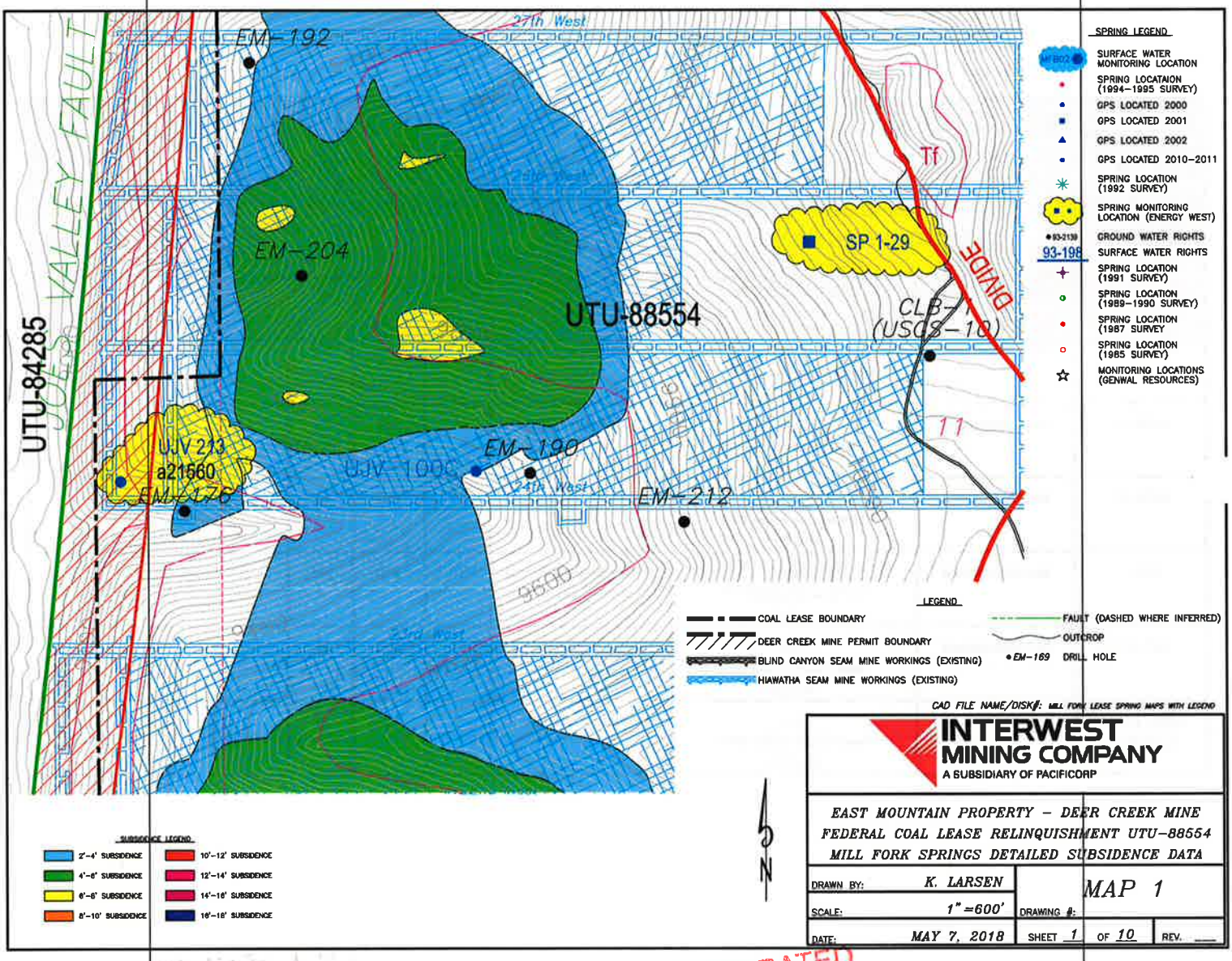
Federal Lease UTU-88554 and UTU-84285

SPRING	MINING HISTORY		STATUS	LOCATION			Approximate Subsidence (feet)
	Type of Mining	Date of Mining (Pre/Post water quality analysis based on dates listed for each spring)		Sec.	T.	R.	
SPI-26	Not Undermined	NA Nearest second mining: 460' Feb. 2010	Within Relinquishment	11	16S	6E	NA
MF-10	Longwall Panels	Blind Canyon: 5th Left Jul. 2009 Hiawatha: 21st West Jan. 2011	Within Relinquishment	14	16S	6E	7
MF-19B	First Mining	Hiawatha: 7th North Sump Feb. 2006	Within Relinquishment	13	16S	6E	0
RR-5	Not Undermined	NA Nearest second mining: 1000' Feb. 2009	Within Relinquishment	14	16S	6E	NA
EM-216	Not Undermined	NA Nearest second mining: 975' Sep. 2005	Within Relinquishment	23	16S	6E	NA
GRANTS SPRING	Not Undermined	NA Nearest second mining: 1560' Nov. 2005	Within Relinquishment	23	16S	6E	NA
RR-15	Not Undermined	NA Nearest second mining: 55' Mar. 2006	Within Relinquishment	14	16S	6E	NA

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN SPRING DATA Mill Fork Area							
Federal Lease UTU-88554 and UTU-84285							
SPRING	MINING HISTORY		STATUS	LOCATION			Approximate Subsidence (feet)
	Type of Mining	Date of Mining (Pre/Post water quality analysis based on dates listed for each spring)		Sec.	T.	R.	
EMPOND	Not Undermined	NA Nearest second mining: 1620' Dec. 2005	Within Relinquishment	23	16S	6E	NA
MFR-30	Not Undermined	NA Nearest second mining: 4000' Mar. 2014	Within Relinquishment	7	16S	7E	NA
MFR-10	Not Undermined	NA Nearest second mining: 2380' Mar. 2014	Within Relinquishment	12	16S	6E	NA
MF-7	Not Undermined	NA Nearest second mining: 1707' Jul. 2010	Within Relinquishment	12	16S	6E	NA
MF-213	Not Undermined	NA Nearest second mining: 7915' Jul. 2010	Within ½ mile Offset	17	16S	7E	NA
LB10/ LB-11 Little Bear	Not Undermined	NA Nearest second mining: 13050' Mar. 2014	Adjacent to Lease	9	16S	7E	NA

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 1	
SCALE:	1"=600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 1 OF 10	REV. ___

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 11, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring SPI-29 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat on February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of SPI-26 in the Hiawatha Seam, 26th West gateroad, on October 2012. Spring SPI-29 is located in barrier pillar south of 26th West. Nearest seconding mining is approximately 295' north, 27th West longwall panel.

Subsidence: No subsidence has been detected near SPI-29. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. SPI-29 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring SPI-29. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - SPI-29 is a low volume spring/seep located below trail in a small clearing on west facing slope surrounded with conifers and aspens. Spring drains to small shallow basin adjacent to source. Crandall Canyon Mine developed the trail into an access road during the 2007 mine collapse. Roadway reclaimed in 2013. Flow from spring SPI-29 generally ranges from 0.0/seep to a maximum of <3.0 gpm. Area near and spring site disturbed/re-developed post Crandall Canyon mine collapse. Wet area developed on nearby access road, flow from original source dissipated (see following Geologic Occurrence – photos).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring SPI-29:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 150' below top.

Justification for removal from monitoring: SPI-29 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site SPI-29 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **SP1-29**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1630' S.	3070' E.	NW	11	16S	6E	10360

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	1 ½ " Steel Pipe Non-functioning post Crandall Canyon drill hole disturbance	None	150' below top

Location Comments: Spring located below trail in a small clearing on west facing slope surrounded with conifers and aspens.

Probable Recharge Area: Areas of higher elevation located to the east (recharge limited).

Relationship to Adjacent Springs: This spring occurs in the same manner as SP1-31.

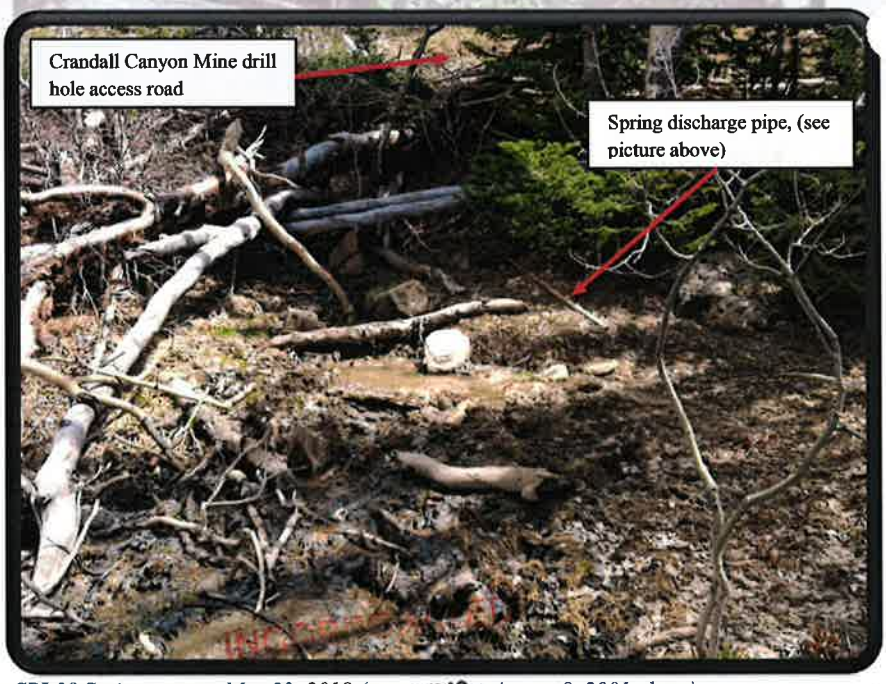
RECEIVED
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

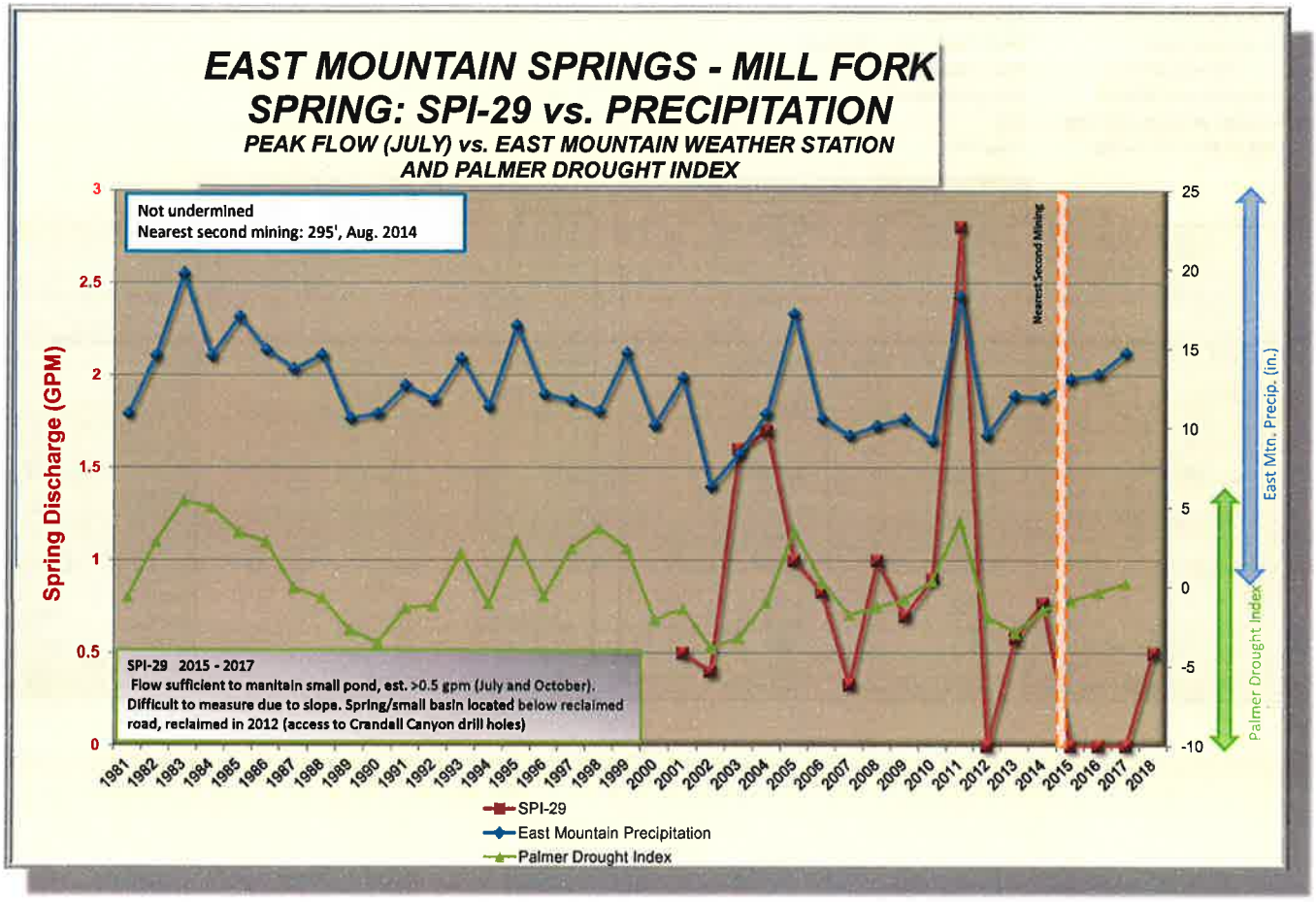
SPI-29 spring source, August 9, 2001

Small basin below SPI-29 post Crandall Canyon drill hole disturbance. View from reclaimed road, May 23, 2018



SPI-29 Spring source, May 23, 2018 (same as August 9, 2001 photo)

AUG 17 2018
Div. of Oil, Gas & Mining



RECEIVED
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: SP1-29
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 295'
Date of Nearest Mining: Aug. 2014

	Pre-Mining Data: 20000101 THROUGH 20140701				Post-Mining Data: 20140701 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	322	238	271	18	- No Sample Data -				BICARBONATE
CALCIUM	76.6	64	69.1122	18					CALCIUM
CARBONATE	0	0	0	8					CARBONATE
CHLORIDE	3	2	2.17222	18					CHLORIDE
CONDUCTIVITY	555	457	501.777	18					CONDUCTIVITY
DISSOLVED OXYGEN	0								DISSOLVED OXYGEN
FLOW	2.8	0.09	0.89444	18					FLOW
HARDNESS	288	246	266.277	18					HARDNESS
TOTAL IRON	0.06	0	0.0075	8					TOTAL IRON
DISSOLVED IRON	0	0	0	8					DISSOLVED IRON
MAGNESIUM	24.78	20.7	22.7277	18					MAGNESIUM
DISSOLVED MANGANESE	0.015	0	0.00225	8					DISSOLVED MANGANESE
MANGANESE	0.012	0	0.0015	8					MANGANESE
OIL AND GREASE	0								OIL AND GREASE
PH	7.96	7.24	7.64611	18					PH
POTASSIUM	2	0.98	1.35277	18					POTASSIUM
SET SOLIDS	0								SET SOLIDS
SODIUM	7.41	2.57	3.34393	18					SODIUM
SULFATE	9	5	6.74444	18					SULFATE
SUSPENDED SOLIDS	255	255	255	1					SUSPENDED SOLIDS
TEMPERATURE	8.8	3.6	5.04444	18					TEMPERATURE
TOTAL DISSOLVED SOLIDS	315	249	269.555	18					TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 10, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring UJV-213 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat on February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of UJV-213 in the Hiawatha Seam, 25th West Bleeder, in February 2012.

Subsidence: No subsidence has been detected near UJV-213. **Maximum subsidence in area 400' east of UJV-213 has stabilized at approximately 2 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2012. UJV-213 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring UJV-213. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 – 2001 and 2007 – 2017 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - UJV-213 is a low volume spring/seep located above drainage near Joes Valley Fault on south facing slope covered with aspens and mountain brush. Spring not identified during previous surveys. Below spring, drainage diverted through 1" poly pipe to trough located approximately 300' to the west. Flow from spring UJV-213 generally ranges from 0.0/seep to a maximum of 3.0 gpm. Spring flow dissipates rapidly below spring source.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring UJV-213:

- Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Castle Gate (refer to Geologic Occurrence sheet).

- Stratigraphic Position: Mid-formation.

Justification for removal from monitoring: UJV-213 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-213 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **UJV-213**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
261' N.	889' W.	SW	10	16S	6E	8960

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Castle Gate	None	a21560 Change application is to allow the applicant the right to develop the 3 unnamed springs to draw a portion of the stock away from the Spoon Creek riparian area.	Middle

Location Comments: Spring located above drainage near Joes Valley Fault on south facing slope covered with aspens and mountain brush. Spring not identified during previous surveys. Below spring, drainage diverted through 1" poly pipe to trough located approximately 300' to the west.

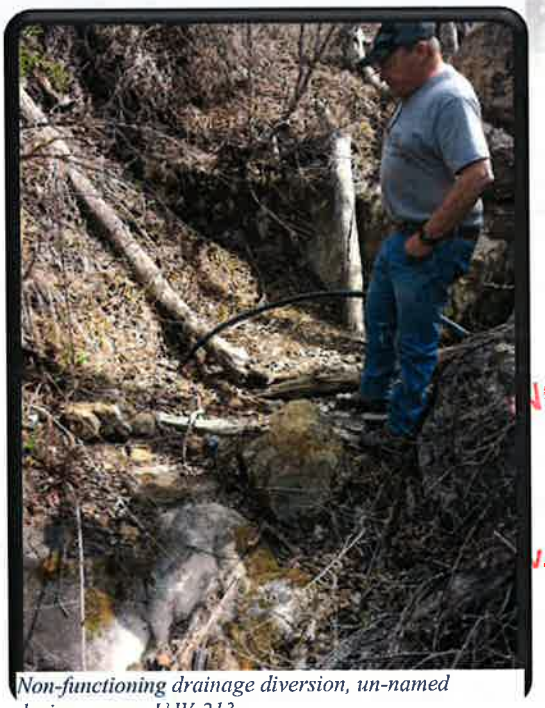
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Probable Recharge Area: Areas of higher elevation located to the east.

Relationship to Adjacent Springs: This spring is not related to other springs within the immediate area

Geologic Occurrence of Spring:

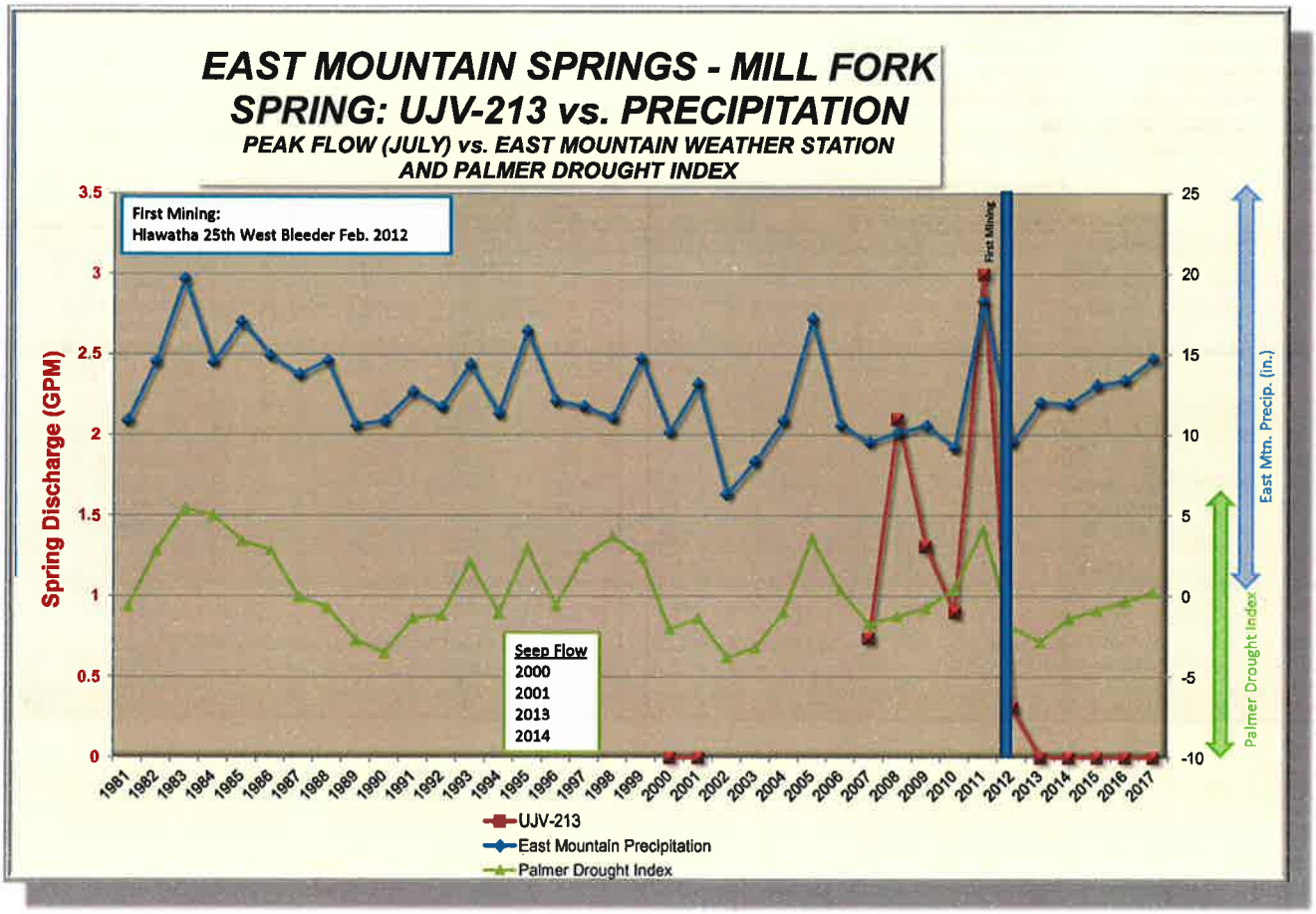
Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.



Non-functioning drainage diversion, un-named drainage near UJV-213

Non-functioning trough below UJV-213, source from un-named drainage

NCORPORATED
AUG 17 20
v. of Oil, Gas & Mining

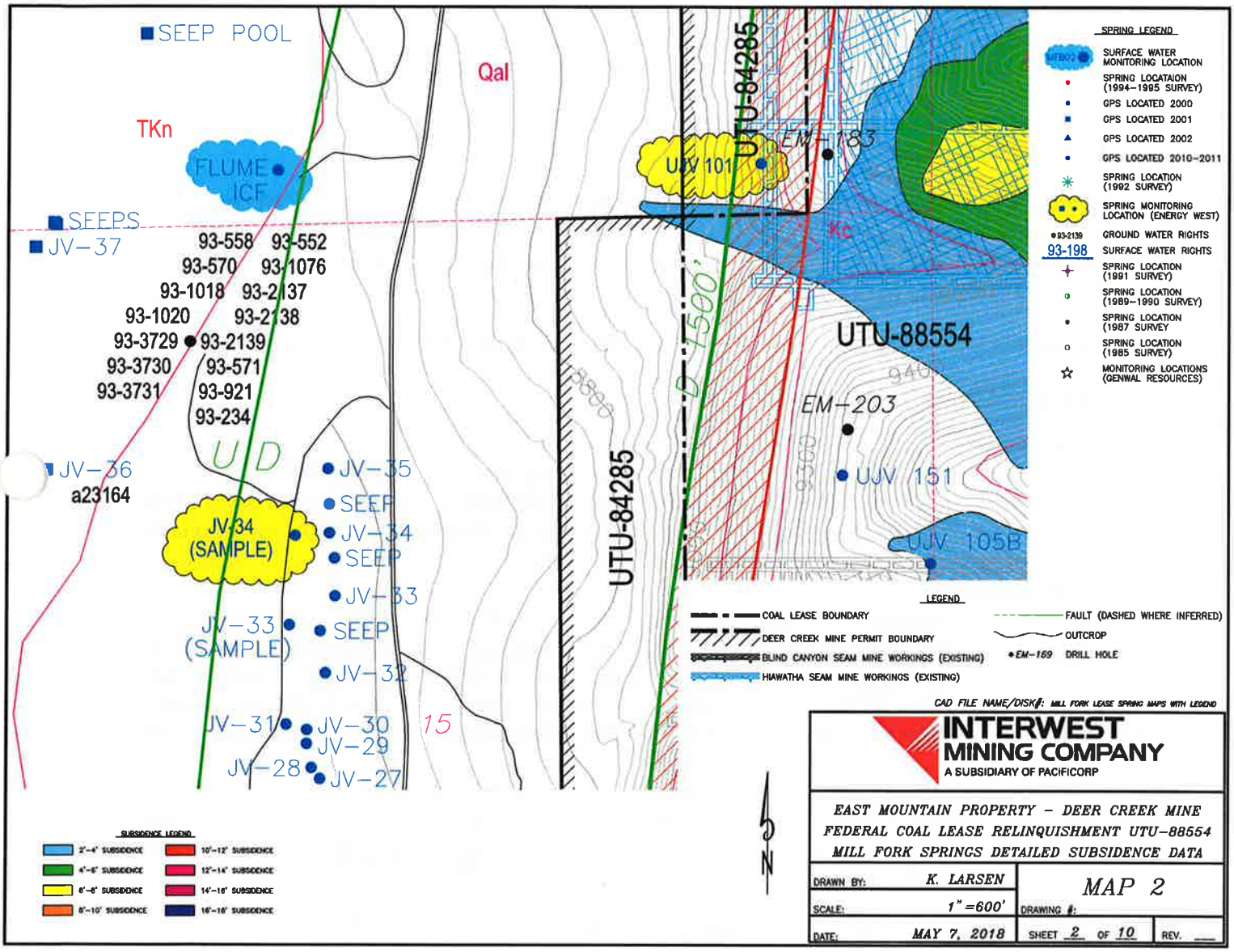


INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: UJV-213
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Feb. 2012
Date of Second Mining: Not undermined
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20120131				Post-Mining Data: 20120201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	241	220	227.888	9	220	217	218.5	2	BICARBONATE
CALCIUM	71.32	62.92	68.4644	9	67.09	62.63	64.86	2	CALCIUM
CARBONATE	0	0	0	7	0	0	0	2	CARBONATE
CHLORIDE	4	3	3.66666	9	4	4	4	2	CHLORIDE
CONDUCTIVITY	583	478	511.222	9	489	467	478	2	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	3	0.21	1.12777	9	0.31	0.16	0.235	2	FLOW
HARDNESS	275	240	263.777	9	262	241	251.5	2	HARDNESS
TOTAL IRON	0.44	0	0.19333	9	0.97	0.15	0.56	2	TOTAL IRON
DISSOLVED IRON	0	0	0	7	0	0	0	2	DISSOLVED IRON
MAGNESIUM	23.81	20.15	22.5577	9	23.01	20.47	21.74	2	MAGNESIUM
DISSOLVED MANGANESE	0.011	0	3.44444	9	0.031	0.019	0.025	2	DISSOLVED MANGANESE
MANGANESE	0	0	0	7	0.003	0	0.0015	2	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.17	7.68	7.90888	9	8.18	7.64	7.91	2	PH
POTASSIUM	1.52	0.97	1.15555	9	1.3	1.11	1.205	2	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8.94	5.78	7.00222	9	5.85	5.77	5.81	2	SODIUM
SULFATE	40	33	36.5555	9	33	31	32	2	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	9.9	6.5	7.94444	9	10.3	9.5	9.9	2	TEMPERATURE
TOTAL DISSOLVED SOLIDS	320	284	298.222	9	277	273	275	2	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 10, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-84285.

Lease Association: Spring UJV-101 is located within Federal Coal lease UTU-84285 adjacent to UTU-88554. The lease was originally acquired from Bureau of Land Management on November 1, 2006. Mining in Lease UTU-84285 was prohibited to first mining only. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in April 2006 under the provisions of a Federal Exploration License. Blind Canyon seam development began in November 2007. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production in Lease UTU-84285 occurring in August 2013. First mining occurred in vicinity of UJV-101 in the Hiawatha Seam, 23rd West Bleeder, in March 2011.

Subsidence: **An area of minor subsidence occurs adjacent to spring UJV-101. Maximum subsidence in area 200' south of UJV-101 has stabilized at approximately 2 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2013. UJV-101 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring UJV-101. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1993 through 1995 by Genwal Resources and 2000 through 2017 by PacifiCorp. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - UJV101 is a low volume spring/seep located above drainage near Joes Valley Fault on south facing slope covered with aspens and mountain brush. Flow from spring UJV-101 generally ranges from 0.0/seep to a maximum of 10.0 gpm. Spring flow dissipates rapidly below spring source.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring UJV-101:

- Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Castle Gate (refer to Geologic Occurrence sheet).
- Stratigraphic Position: Mid-formation.

Justification for removal from monitoring: UJV-101 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-101 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **UJV-101**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
261' N.	889' W.	SW	10	16S	6E	8960

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Castle Gate	None	None	Middle

Location Comments: Spring located above small cliff (Joes Valley Fault) overlooking Joes Valley on west facing slope covered with aspens and mountain brush.

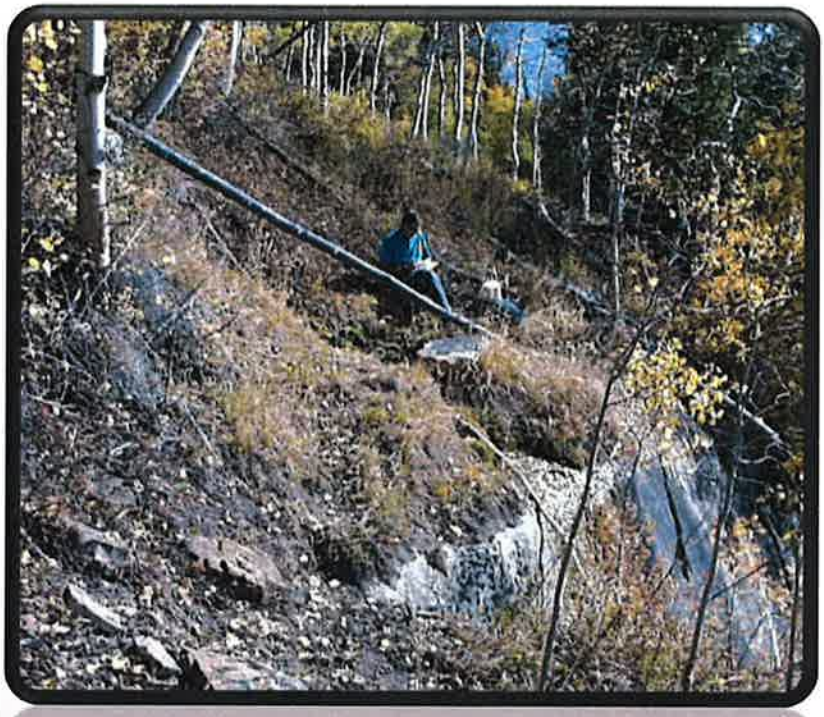
Probable Recharge Area: Areas of higher elevation located to the east.

Relationship to Adjacent Springs: This spring is not related to other springs within the immediate area

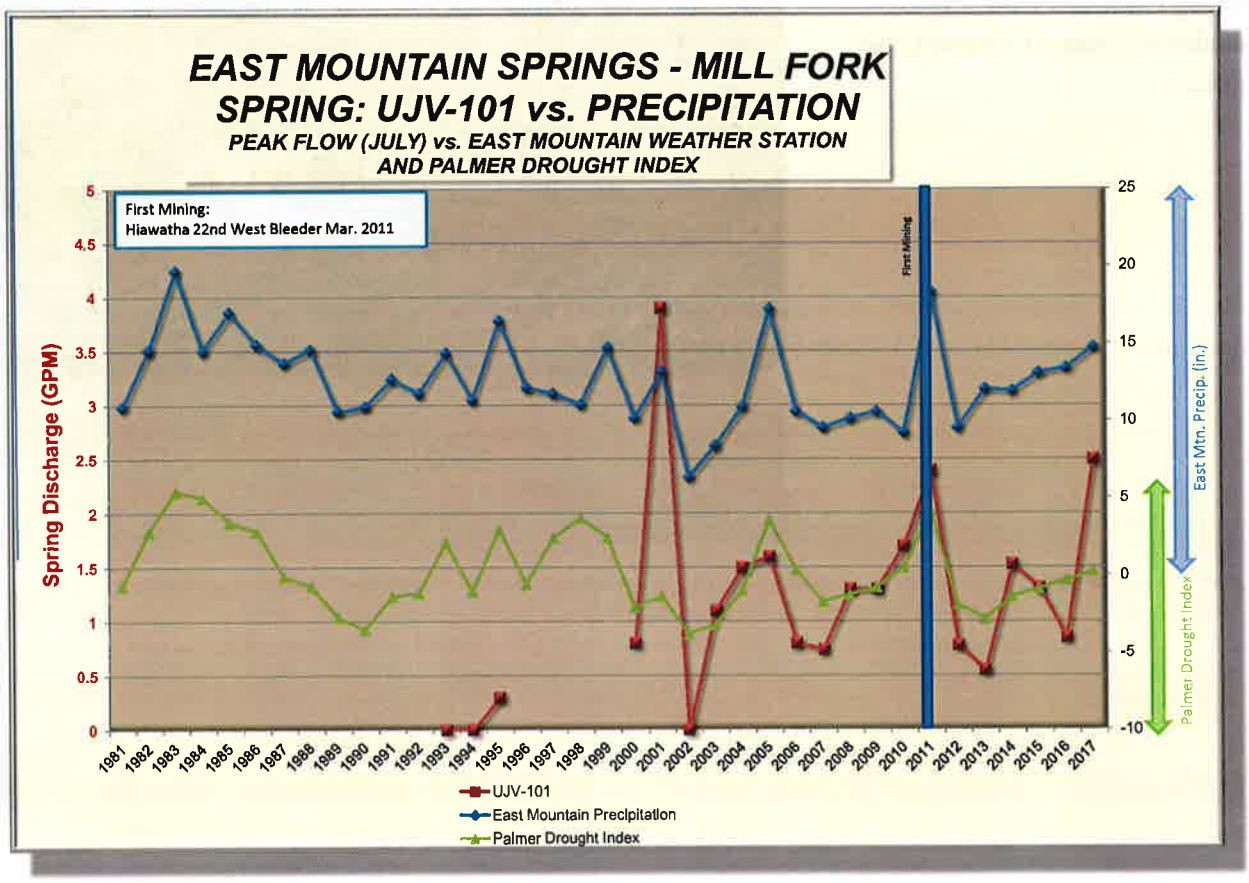
RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the Price River Formation intersects the top of the Castle Gate Sandstone and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**UJV-101**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Mar-11**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**NA**
Date of Nearest Mining:	**NA**

	Pre-Mining Data: 20000101 THROUGH 20110228				Post-Mining Data: 20110228 THROUGH 20171231				
PARAMETER	**MAXIMUM**	**MINIMUM**	**AVERAGE**	**# ANALYSIS**	**MAXIMUM**	**MINIMUM**	**AVERAGE**	**# ANALYSIS**	
BICARBONATE	295	212	239.5625	16	249	216	230.428	14	**BICARBONATE**
CALCIUM	74.22	64.9	70.0531	16	81.82	66.61	72.7107	14	**CALCIUM**
CARBONATE	0	0	0	6	0	0	0	14	**CARBONATE**
CHLORIDE	6	4	4.525	16	4	3	3.92857	14	**CHLORIDE**
CONDUCTIVITY	690	475	533.0625	16	570	494	537.571	14	**CONDUCTIVITY**
DISSOLVED OXYGEN	0				0				**DISSOLVED OXYGEN**
FLOW	1.69	0.2	1.049375	16	2.5	0.38	1.04285	14	**FLOW**
HARDNESS	286	253	269.9375	16	317	257	285.571	14	**HARDNESS**
TOTAL IRON	0.88	0	0.28788	9	1.98	0	0.3	14	**TOTAL IRON**
DISSOLVED IRON	0	0	0	6	0	0	0	14	**DISSOLVED IRON**
MAGNESIUM	24.68	21.8	23.0556	16	27.32	22.04	25.2585	14	**MAGNESIUM**
DISSOLVED MANGANESE	0.019	0	6.11111	9	0.088	0	1.25714	14	**DISSOLVED MANGANESE**
MANGANESE	0.002	0	2.85714	7	0	0	0	14	**MANGANESE**
OIL AND GREASE	0				0				**OIL AND GREASE**
PH	8.38	7.5	7.9275	16	8.41	8.12	8.25142	14	**PH**
POTASSIUM	2	0.92	1.24875	16	1.82	1.17	1.37571	14	**POTASSIUM**
SET SOLIDS	0				0				**SET SOLIDS**
SODIUM	6.45	5.22	5.73625	16	6.66	5	6.085	14	**SODIUM**
SULFATE	51	27	39.34375	16	65	39	52.4285	14	**SULFATE**
SUSPENDED SOLIDS	293	293	293	1	0				**SUSPENDED SOLIDS**
TEMPERATURE	9.6	5.2	6.9125	16	10.6	4.1	7.38571	14	**TEMPERATURE**
TOTAL DISSOLVED SOLIDS	330	259	303.0625	16	365	289	325.142	14	**TOTAL DISSOLVED SOLIDS**

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 15, Township 16 South, Range 6 East, SLB&M. This site is located within the ½ mile offset of the Deer Creek mine permit boundary adjacent to Federal Coal leases UTU-84285 and UTU-88554.

Lease Association: Spring JV-34 is located adjacent to Federal Coal leases UTU-84285 and UTU-88554. The lease UTU-88554 was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Lease UTU-84285 was originally acquired from Bureau of Land Management on November 1, 2006. Mining in Lease UTU-84285 was prohibited to first mining only. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began the Hiawatha Seam in April 2006 under the provisions of a Federal Exploration License. Blind Canyon seam development began in November 2007. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production in Lease UTU-84285 occurring in August 2013. No mining occurred in the vicinity of JV-34.

Subsidence: No subsidence has been detected near JV-34. For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring JV-34. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - JV-34 spring located in Joes Valley alluvial basin near the 345 kV powerline. A series of springs emerge vertically through the alluvium creating marsh/wetland area. Flow from spring JV-34 varies dramatically based on winter pack on spring runoff, generally ranges from 0.0/seep to a maximum of 80.0 gpm.

INCORPORATED
AUG 7 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring JV-34:

- Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.
- Geologic Formation: Joes Valley Alluvium (refer to Geologic Occurrence sheet).

- Stratigraphic Position: NA.

Justification for removal from monitoring: UJV-34 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-34 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **JV-34**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1565' S.	1860' E	NW	15	16S	6E	8692

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Joes Valley Alluvium	None	None	NA

Location Comments: Spring with multiple sources located near power line. Measured flow at confluence of several sources near road. Brass tag attached to brush.

Probable Recharge Area: Areas of higher elevation located to the north and east.

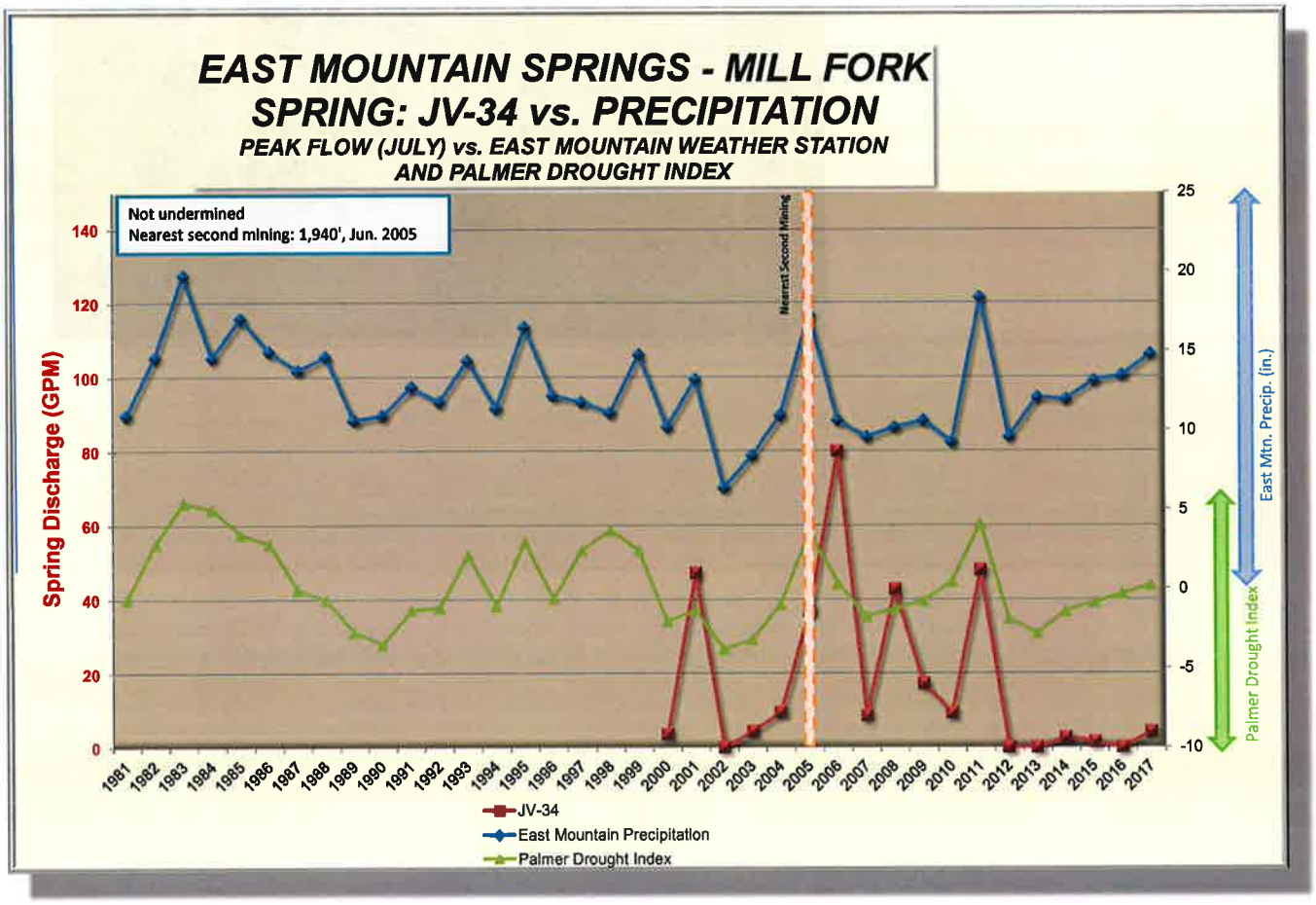
Relationship to Adjacent Springs: This spring occurs in the same manner as numerous springs in the immediate vicinity.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

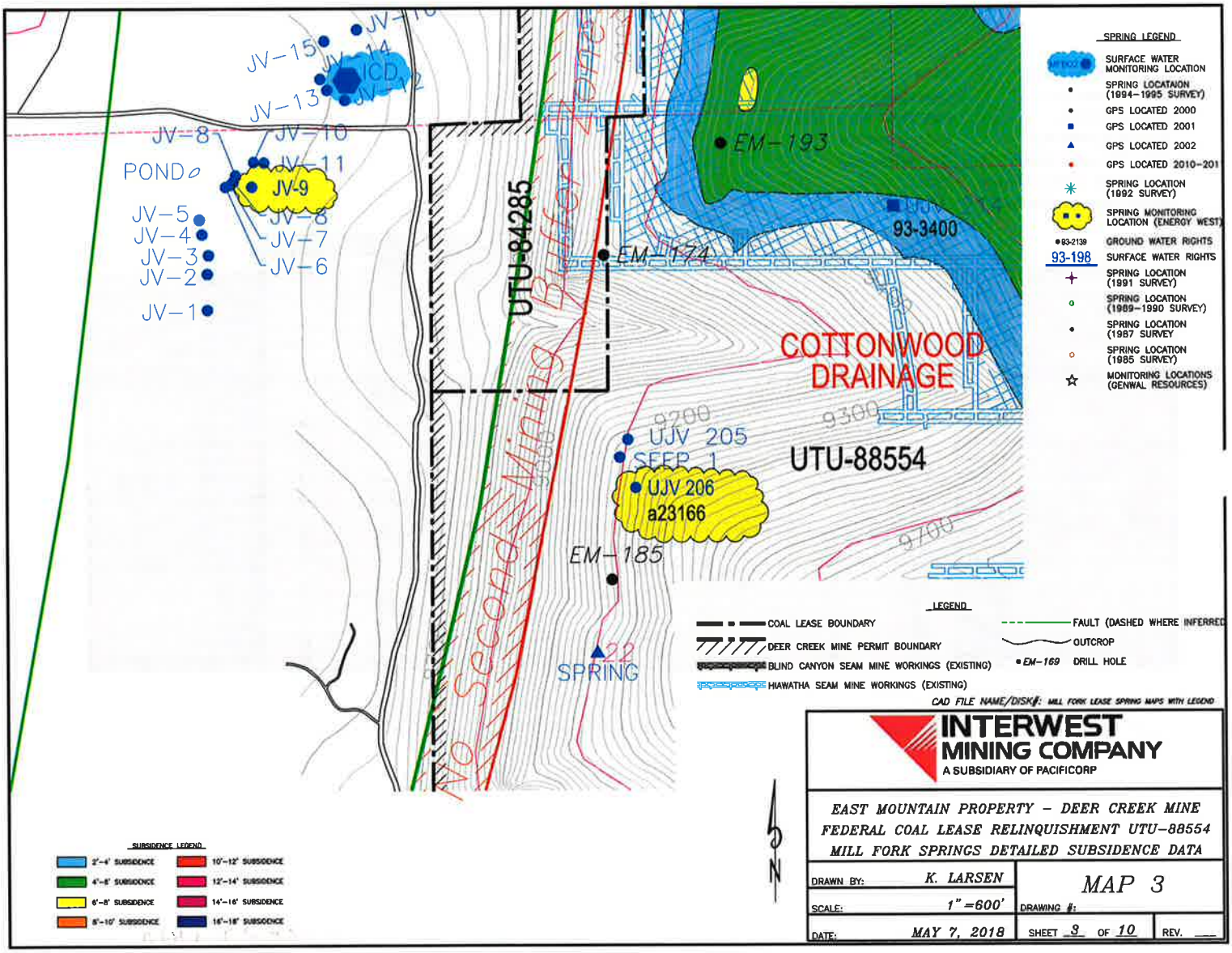


RECEIVED
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**JV-34**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**2670'**
Date of Nearest Mining:	**Aug-08**

	Pre-Mining Data: 20000101 THROUGH 20080801				Post-Mining Data: 20080831 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	400	282	323.285	14	351	278	310.538	13	BICARBONATE
CALCIUM	96.8	77	83.2414	14	101.05	73.39	87.3284	13	CALCIUM
CARBONATE	0	0	0	1	0	0	0	13	CARBONATE
CHLORIDE	5	1	3.02142	14	6	2	2.92307	13	CHLORIDE
CONDUCTIVITY	706	539	602.5	14	708	533	608.769	13	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	80	2.3	19.5071	14	48	0.23	8.82461	13	FLOW
HARDNESS	350	281	308.928	14	366	276	324.307	13	HARDNESS
TOTAL IRON	2.45	0.2	0.59161	13	1.36	0	0.23384	13	TOTAL IRON
DISSOLVED IRON	0.008	0	0.004	2	0	0	0	13	DISSOLVED IRON
MAGNESIUM	28.6	21	24.5685	14	28.54	22.51	25.83	13	MAGNESIUM
DISSOLVED MANGANESE	0.131	0.005	0.0495	10	0.074	0.004	2.56923	13	DISSOLVED MANGANESE
MANGANESE	0.052	0.003	0.0128	10	0.038	0	9.30769	13	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.26	7.84	8.06428	14	8.36	7.9	8.11615	13	PH
POTASSIUM	3.5	0.26	1.38615	13	2.1	0.4	1.13384	13	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8.75	6	7.41	14	8.78	6.65	7.88461	13	SODIUM
SULFATE	30	8	17.15	14	51	10	21.3846	13	SULFATE
SUSPENDED SOLIDS	304	304	304	1	0				SUSPENDED SOLIDS
TEMPERATURE	20.3	5	8.68571	14	20	9.8	11.3153	13	TEMPERATURE
TOTAL DISSOLVED SOLIDS	377	255	325.071	14	403	310	354.846	13	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 3	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 3 OF 10	REV.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 22, Township 16 South, Range 6 East, SLB&M. This site is located within the ½ mile offset of the Deer Creek mine permit boundary adjacent to Federal Coal leases UTU-84285 and UTU-88554.

Lease Association: Spring JV-9 is located adjacent to Federal Coal leases UTU-84285 and UTU-88554. Lease UTU-88554 was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Lease UTU-84285 was originally acquired from Bureau of Land Management in November 1, 2006. Mining in Lease UTU-84285 was prohibited to first mining only. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in April 2006 under the provisions of a Federal Exploration License. Blind Canyon seam development began in November 2007. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production in Lease UTU-84285 occurring in August 2013. No mining occurred in the vicinity of JV-9.

Subsidence: No subsidence has been detected near **JV-9.** For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring JV-9. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - JV-9 spring is located in Joes Valley alluvial basin south of the Joes Valley cutoff road. A series of springs emerge vertically through the alluvium creating marsh/wetland area. Flow from spring JV-9 varies dramatically based on winter pack on spring runoff, and generally ranges from 0.0/seep to a maximum of 3.0 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring JV-9:

- Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.

- Geologic Formation: Joes Valley Alluvium (refer to Geologic Occurrence sheet).
- Stratigraphic Position: NA.

Justification for removal from monitoring: JV-9 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-9 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **JV-9**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
299' S.	1836' E	NW	22	16S	6E	8618

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Joes Valley Alluvium	None	None	NA

Location Comments: Spring (boiling up from small hole) located in Joes Valley south of FDR 040.

Probable Recharge Area: Areas of higher elevation located to the north and east.

Relationship to Adjacent Springs: This spring occurs in the same manner as numerous springs in the immediate vicinity.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

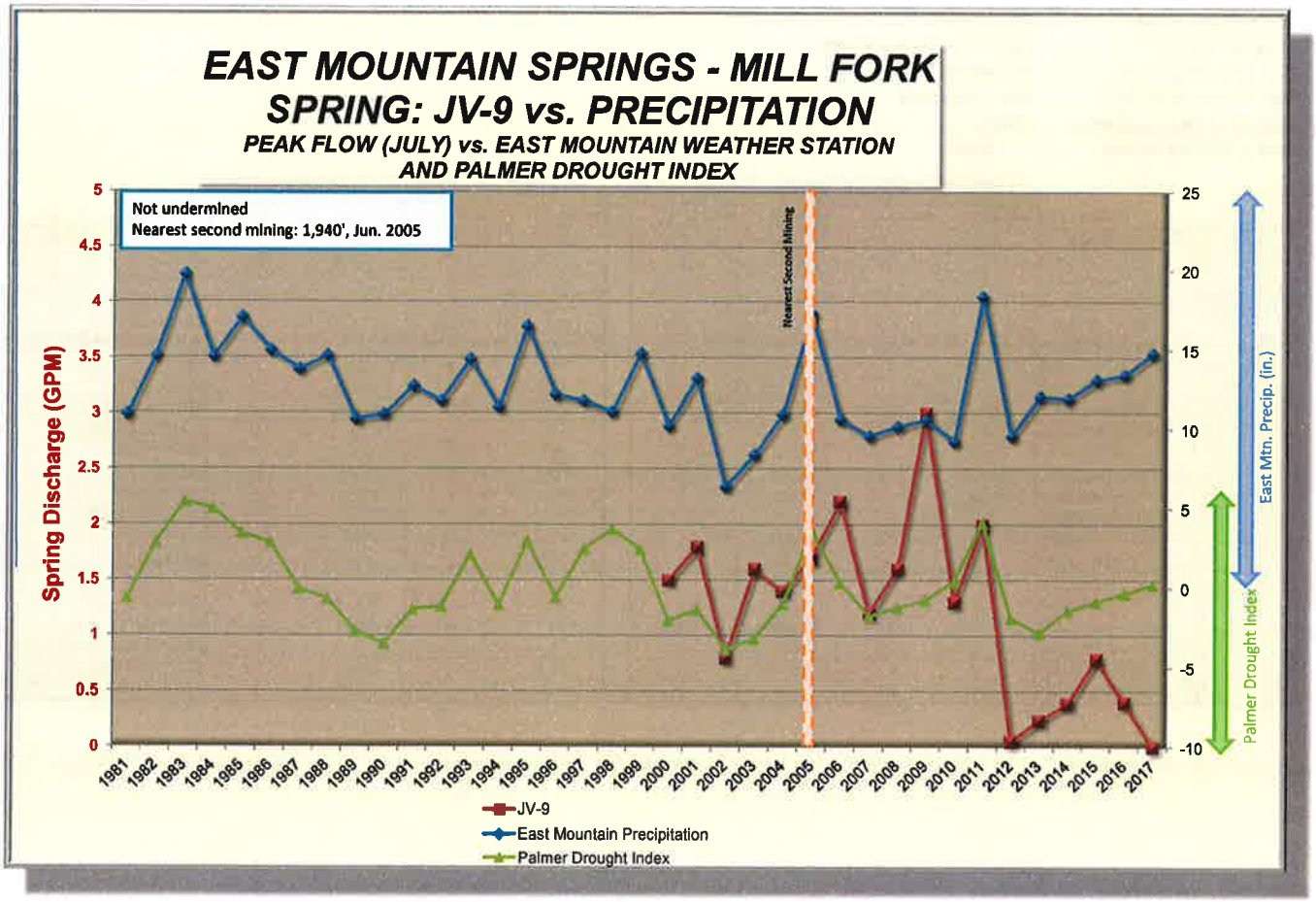
Geologic Occurrence of Spring:

Water flowing through the alluvial deposits intersects un-named fault and migrates vertically to the land surface forming a spring.

Field reconnaissance October 19, 2000

Field reconnaissance May 9, 2018

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mi



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: JV-9
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1940'
Date of Nearest Mining: Jun-05

	Pre-Mining Data: 20000101 THROUGH 20050601				Post-Mining Data: 20050630 THROUGH 201712311				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	395	318	371.444	9	330	293	310.3	20	BICARBONATE
CALCIUM	89.7	80	86.0333	9	91.7	81.62	87.961	20	CALCIUM
CARBONATE	0				0	0	0	14	CARBONATE
CHLORIDE	5	4	4.36666	9	9	4	4.85	20	CHLORIDE
CONDUCTIVITY	750	639	676.333	9	762	516	677.95	20	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	1.8	0.8	1.29222	9	3	0.24	1.206	20	FLOW
HARDNESS	371	262	345.888	9	377	344	362.45	20	HARDNESS
TOTAL IRON	0.298	0.298	0.298	1	0.51	0	9.88235	17	TOTAL IRON
DISSOLVED IRON	0				0	0	0	14	DISSOLVED IRON
MAGNESIUM	35.8	33	34.5111	9	36.7	31.88	34.671	20	MAGNESIUM
DISSOLVED MANGANESE	0.014	0.002	0.008	2	0.054	0	0.01	18	DISSOLVED MANGANESE
MANGANESE	0.005	0.005	0.005	1	0.02	0	4.61111	18	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	7.64	7.22	7.35888	9	8.06	6.88	7.4085	20	PH
POTASSIUM	1.5	1	1.17888	9	2.66	1.22	1.4335	20	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8	6.83	7.14222	9	8.42	6.71	7.4375	20	SODIUM
SULFATE	59	48	52.0888	9	58	38	50.05	20	SULFATE
SUSPENDED SOLIDS	387	387	387	1	0				SUSPENDED SOLIDS
TEMPERATURE	6.9	4.9	6.13333	9	12.3	5.6	8.095	20	TEMPERATURE
TOTAL DISSOLVED SOLIDS	404	357	380	9	411	241	378	20	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 22, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring UJV-206 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred near spring UJV-206.

Subsidence: No subsidence has been detected near UJV-206. **The 2017 Annual Subsidence Report reported that the subsidence north of the spring has been stable since at least 2009. UJV-206 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring UJV-206. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1993 through 1995 by Genwal Resources and by PacifiCorp from 2000 through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - UJV-206 is located along power line corridor on a west facing slope overlooking Joes Valley surrounded by aspens and conifers. Spring drains to a trough adjacent to the spring. In 2003, Division of Water Rights approved a Change Application (a23166) was approved allowing the right to develop UJV-206 for use in recreational cabin and stock watering from a trough in the vicinity of the cabin.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring UJV-206:

- Water flowing down through fractures in the lower section of the Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Upper Price River (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 80' above base.

Justification for removal from monitoring: UJV-206 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site UJV-206 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN
MILL FORK SPRING & SEEP SURVEY
GEOLOGIC OCCURRENCE

Spring Name/Number: **UJV-206**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
3567' N.	3604' W	SE	22	16S	6E	9200

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Upper Price River	Developed With Vertical CMP, Diverted To Trough (not functioning)	93-3400 A23166	80' above base

Location Comments: Spring located along power line corridor on west facing slope overlooking Joes Valley surrounded with aspens and conifers.

Probable Recharge Area: Areas of higher elevation located to the east.

Relationship to Adjacent Springs: This spring occurs in the same manner as UJV-204 and UJV-205.

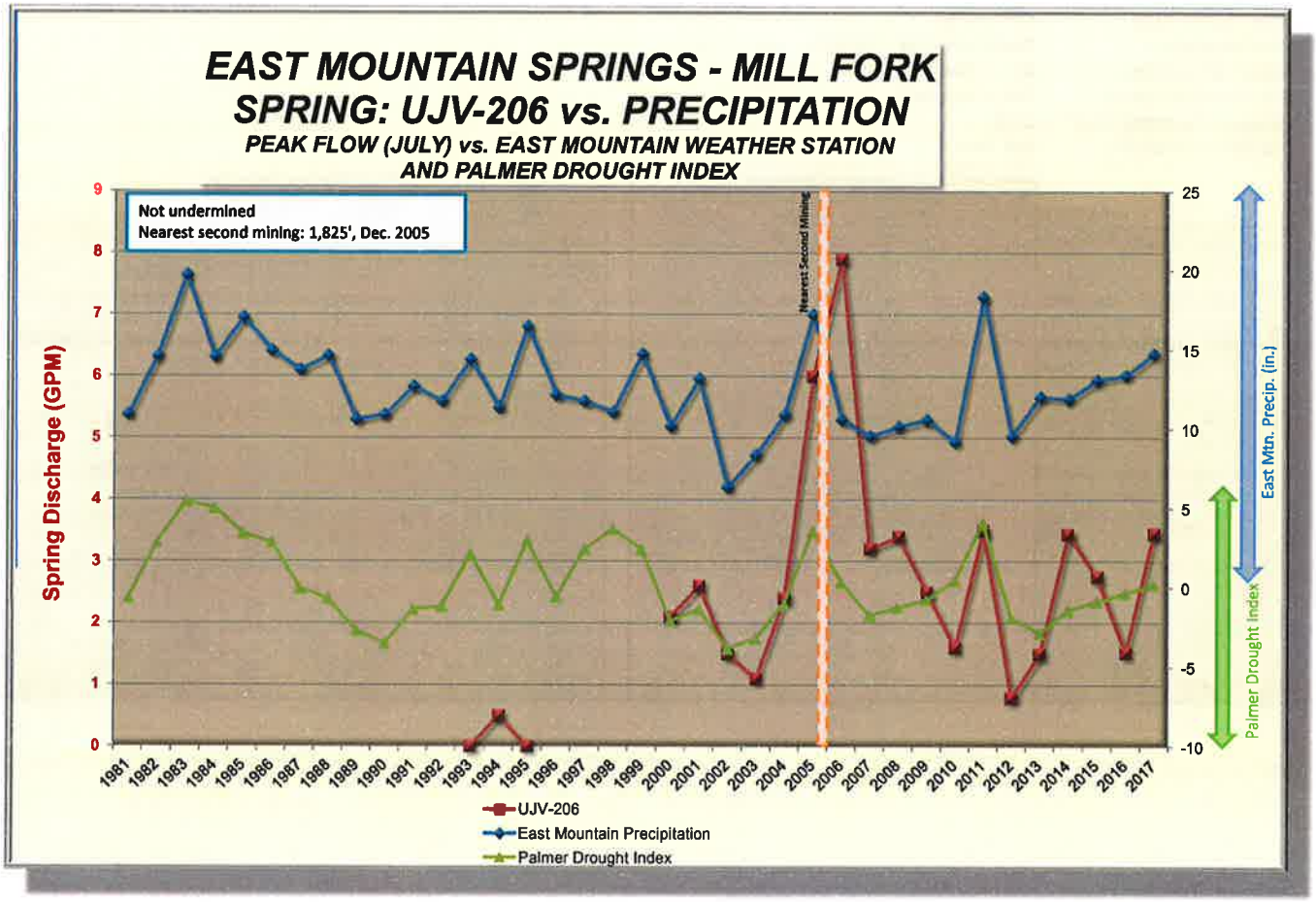
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring: Water flowing down through fractures in the lower section of the Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

Spring UJV-206

UJV-206 Trough

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

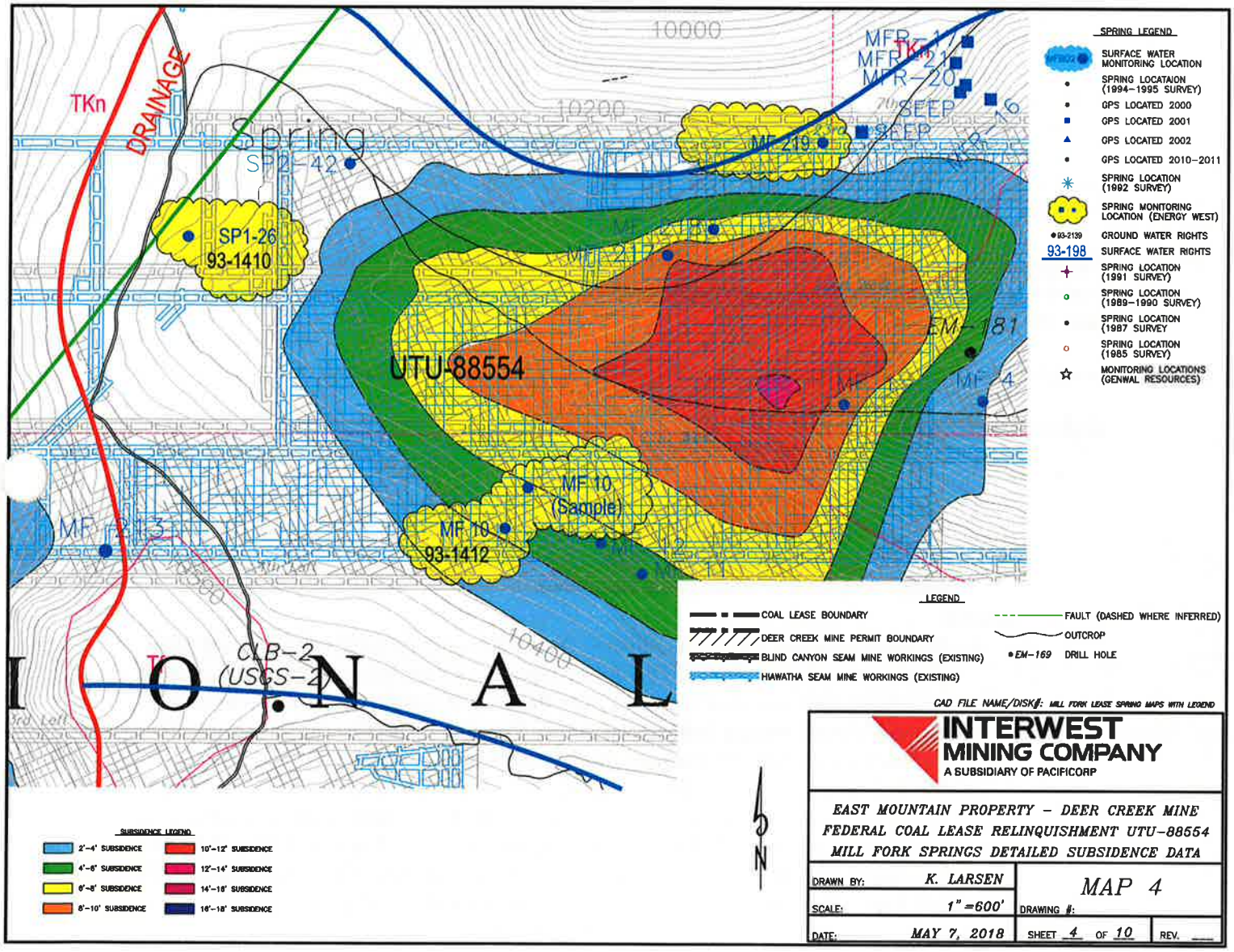
East Mountain Spring:	**UJV-206**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**1825'**
Date of Nearest Mining:	**Dec. 2005**

	Pre-Mining Data: 20000101 THROUGH 20051130				Post-Mining Data: 20051201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	294	239	270.545	11	259	221	235.086	23	BICARBONATE
CALCIUM	69.7	61	66.5727	11	76.27	61.98	67.7221	23	CALCIUM
CARBONATE	0				0	0	0	20	CARBONATE
CHLORIDE	6	4	4.5	11	6	4	4.7826	23	CHLORIDE
CONDUCTIVITY	615	490	521.727	11	672	438	521.26	23	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	6	0.5	2.33181	11	8.5	0.38	2.58608	23	FLOW
HARDNESS	271	243	262	11	303	243	267.086	23	HARDNESS
TOTAL IRON	0.11	0.1	0.105	2	0.06	0	2.85714	21	TOTAL IRON
DISSOLVED IRON	0				0	0	0	20	DISSOLVED IRON
MAGNESIUM	24.9	22	23.2636	11	27.45	21.31	23.796	23	MAGNESIUM
DISSOLVED MANGANESE	0				0.006	0	0.0003	20	DISSOLVED MANGANESE
MANGANESE	0				0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.33	7.79	8.04363	11	8.1	7.35	7.88956	23	PH
POTASSIUM	2	1	1.49	11	2.03	1.42	1.68434	23	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	8	5.83	6.37909	11	6.73	5.16	6.29652	23	SODIUM
SULFATE	42	23	31.809	11	46	21	33.6956	23	SULFATE
SUSPENDED SOLIDS	290	290	290	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.4	4.7	5	11	8.2	4.6	6.26956	23	TEMPERATURE
TOTAL DISSOLVED SOLIDS	309	257	288	11	328	246	297.217	23	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 4	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 4 OF 10	REV. ___

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 11, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MF-219 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First and second mining occurred in vicinity of MF-219 in both the Blind Canyon and Hiawatha seams, (Blind Canyon, second mining 7th Left longwall panel April 2010 and Hiawatha, first mining 23rd West gateroad, on February 2011).

Subsidence: No subsidence has been detected near MF-219. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. MF-219 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-219. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-219 is a spring/seep located along the reclaimed access road to Mill Fork Ridge originally developed as a fire access road and later used to access coal exploration sites for ARCO Coal. Access road reclaimed in the 1980's. MF-219 is located on a south facing slope surrounded with conifers. Flow from spring MF-219 generally ranges from 0.0/seep to a maximum of <5.0 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-219:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 260' below top.

Justification for removal from monitoring: MF-219 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-219 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-219**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1508' N.	47' W.	SE	11	16S	6E	10220

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	None	260' below top

Location Comments: Spring located above reclaimed road on south facing slope covered with conifers. Seep located between MF-218 and MF-219.

Probable Recharge Area: Areas of higher elevation located to the northwest.

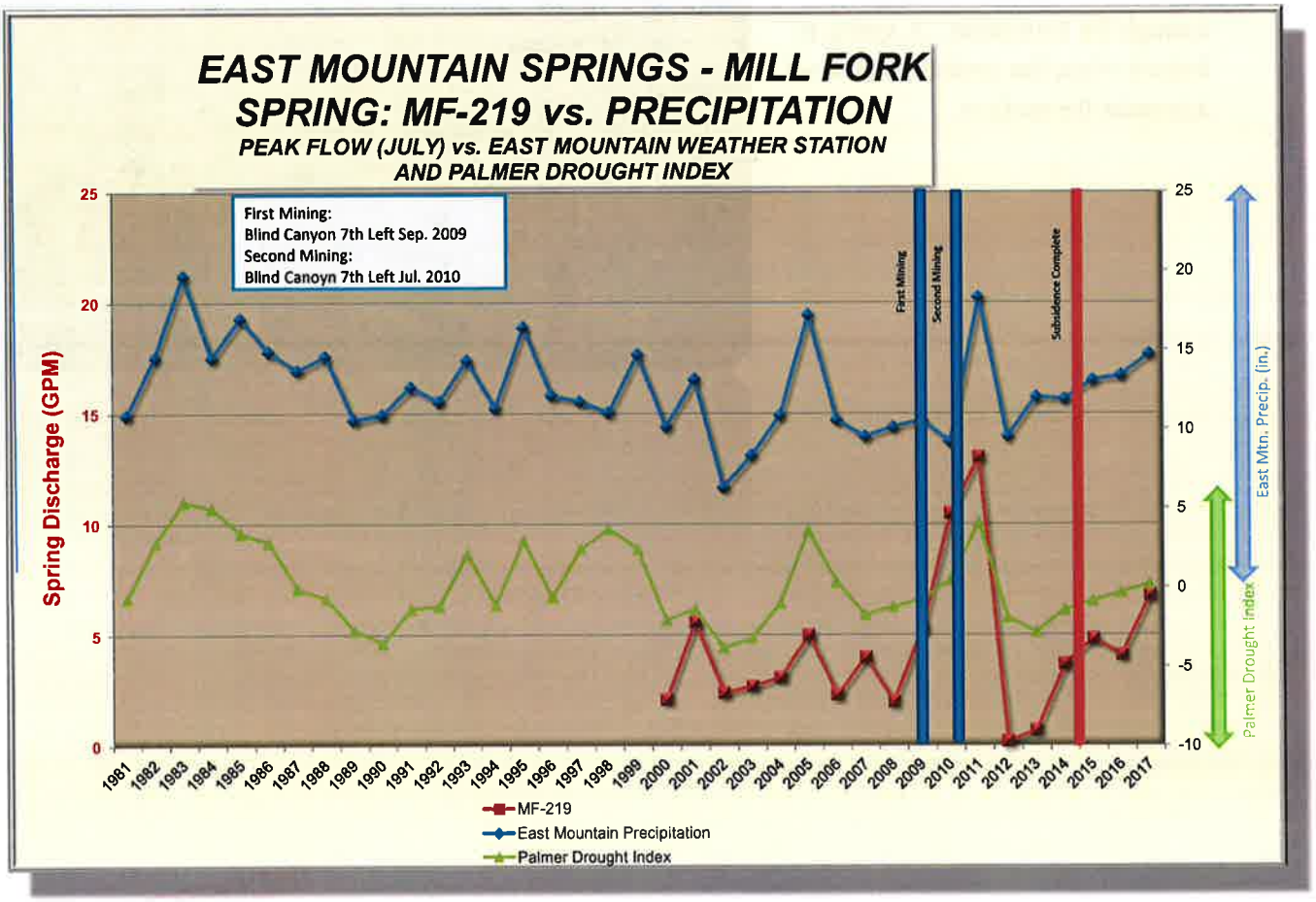
Relationship to Adjacent Springs: This spring occurs in the same manner as MF-217 and MF-218.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MF-219
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Feb-11 Hiawatha 23rd West
Date of Second Mining: Apr-10 Blind Canyon 7th Left
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20110201 THROUGH 201712311				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	292	210	240.833	18	258	207	225.357	14	BICARBONATE
CALCIUM	70.7	59	66.1916	18	75.08	55.59	63.0285	14	CALCIUM
CARBONATE	0	0	0	4	0	0	0	14	CARBONATE
CHLORIDE	3	1	1.98333	18	3	1	1.85714	14	CHLORIDE
CONDUCTIVITY	557	417	500.611	18	574	410	479.714	14	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	5.5	2	3.24277	18	13.04	0.09	4.04	14	FLOW
HARDNESS	285	224	261.666	18	320	239	262.571	14	HARDNESS
TOTAL IRON	1.04	0.06	0.285	12	0.09	0	0.01	14	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0	0	0	14	DISSOLVED IRON
MAGNESIUM	26.4	16.4	23.4016	18	32.29	22.14	25.5328	14	MAGNESIUM
DISSOLVED MANGANESE	0.134	0.002	1.94166	12	0.009	0	2.64285	14	DISSOLVED MANGANESE
MANGANESE	0.04	0	8.22222	9	0.004	0	5.71428	14	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.15	7.45	7.83888	18	8.52	7.82	8.11	14	PH
POTASSIUM	1.6	1	1.17352	17	2.52	1.34	1.69357	14	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	1.7	2.40333	18	3.01	1.99	2.44071	14	SODIUM
SULFATE	36	8	27.65	18	65	19	32.5	14	SULFATE
SUSPENDED SOLIDS	268	268	268	1	0				SUSPENDED SOLIDS
TEMPERATURE	8.7	2	5.41666	18	48.4	2.9	11.9928	14	TEMPERATURE
TOTAL DISSOLVED SOLIDS	331	205	272.555	18	322	204	273.714	14	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 11, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring SPI-26 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of SPI-26 in both the Blind Canyon and Hiawatha seams, (Blind Canyon, 7th Left longwall panel bleeder June 2009 and Hiawatha, 23rd West inter-panel barrier, in November 2010).

Subsidence: No subsidence has been detected near SPI-26. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. SPI-26 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring SPI-26. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - SPI-26 is a spring located near the main Mill Fork ridge road. SPI-26 is located on east facing slope surrounded with conifers. Site crudely developed with 1" PVC diverting flow to old steel bath tub. Flow from spring SPI-26 generally ranges from ~ 2 gpm to a maximum of 55.0 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring SPI-26:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 260' below top.

Justification for removal from monitoring: SPI-26 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site SPI-26 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **SP1-26**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1041' N.	3349' W.	SE	11	16S	6E	10340

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	1" PVC Pipe Feeds Old Bath Tub	93-1410	170' below top

Location Comments: Spring near main reclaimed road on east facing slope covered with conifers. Flow measured below multiple sources.

Probable Recharge Area: Areas of higher elevation located to the west (recharge limited).

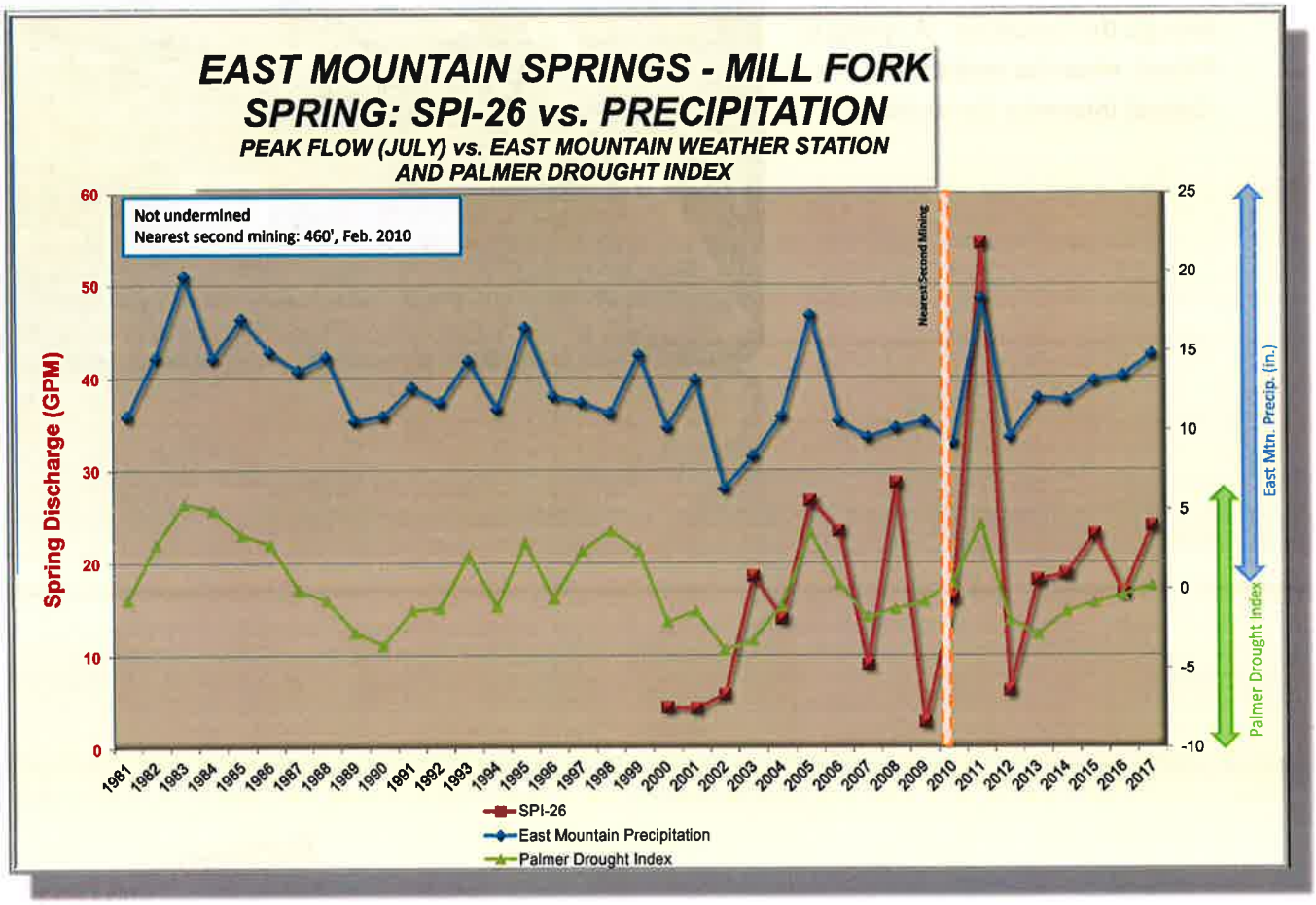
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Relationship to Adjacent Springs: This spring occurs in the same manner as SP2-42.

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: SP1-26
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 460'
Date of Nearest Mining: Feb. 2010

	Pre-Mining Data: 20000101 THROUGH 20100131				Post-Mining Data: 20100201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	253	185	213.21	19	226	184	203.588	17	BICARBONATE
CALCIUM	66	55	60.2105	19	72.65	49.56	59.9947	17	CALCIUM
CARBONATE	0	0	0	4	0	0	0	17	CARBONATE
CHLORIDE	4	1	2.57368	19	3	1	2.17647	17	CHLORIDE
CONDUCTIVITY	525	391	431.157	19	530	378	419.176	17	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	28.6	2.5	9.41666	18	54.5	0.7	12.85875	16	FLOW
HARDNESS	238	199	213.789	19	282	204	217.058	17	HARDNESS
TOTAL IRON	1.63	0	0.44571	7	0.31	0	0.11058	17	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0.04	0	2.35294	17	DISSOLVED IRON
MAGNESIUM	17.8	14	15.4068	19	24.68	14.09	16.3558	17	MAGNESIUM
DISSOLVED MANGANESE	0.07	0	1.95714	7	0.047	0	9.7647	17	DISSOLVED MANGANESE
MANGANESE	0.003	0	0.0018	5	0	0	0	17	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.4	7.44	7.79526	19	8.57	7.69	8.04117	17	PH
POTASSIUM	1.06	0.566	0.71464	14	1.51	0.51	0.79823	17	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3	1.79	2.22	19	6.43	1.61	2.47235	17	SODIUM
SULFATE	10	5	7.06842	19	58	5	9.11764	17	SULFATE
SUSPENDED SOLIDS	214	214	214	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.5	3.8	4.67894	19	12.6	4.1	5.85882	17	TEMPERATURE
TOTAL DISSOLVED SOLIDS	273	206	233.052	19	336	217	239	17	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 14, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MF-10 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred in vicinity of MF-10 in both the Blind Canyon and Hiawatha seams, (Blind Canyon, 5th Left longwall panel, July 2009 and Hiawatha, 21st West panel, January 2011).

Subsidence: Approximately 4' of subsidence has been detected near MF-10. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2013.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-10. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-10 is a spring located along natural bench directly below a massive sandstone channel on north facing slope covered with conifers. Flow from spring MF-10 generally ranges from ~ 5 gpm to a maximum of 60 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-10:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 200' below top.

Justification for removal from monitoring: MF-10 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-10 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-10**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
282' S.	1572' W.	NE	14	16S	6E	10250

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-1412	200' below top

Location Comments: Spring located along natural bench directly below a massive sandstone channel on north facing slope covered with conifers.

Probable Recharge Area: Areas of higher elevation located to the southwest.

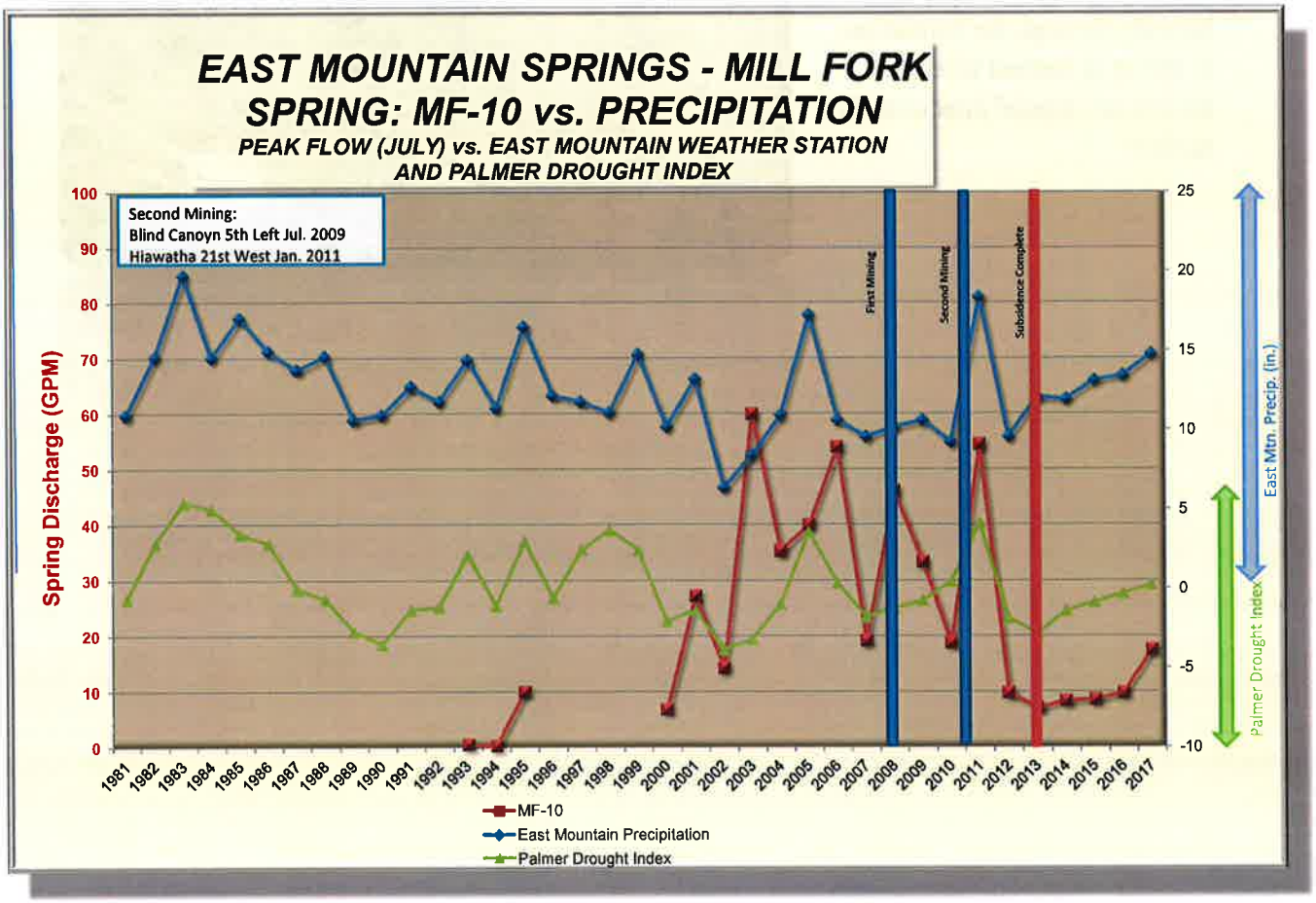
Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

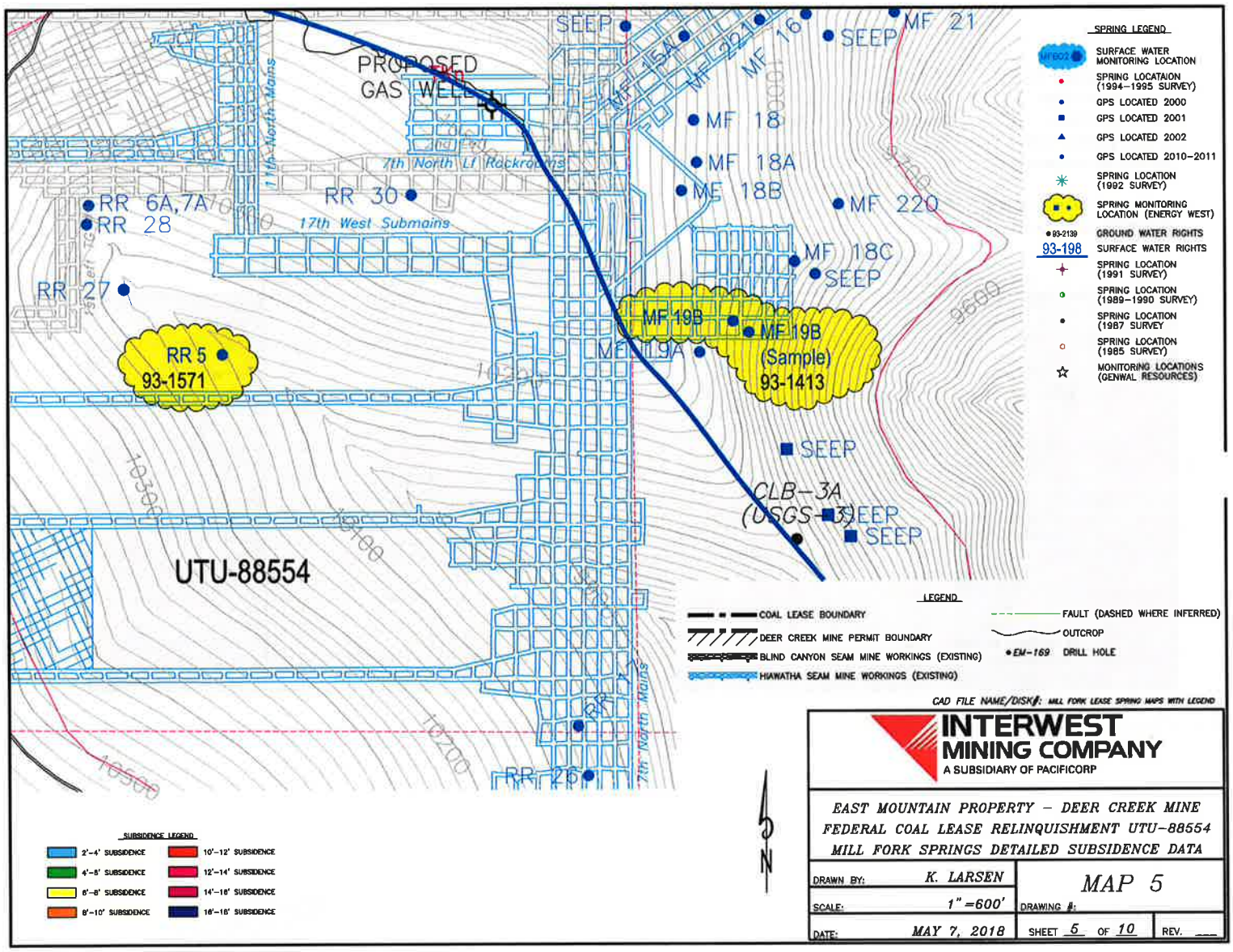


RECEIVED
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MF-10
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Na
Date of Second Mining: Jul-09 Blind Canyon 5th Left
Jan-11 Hiawatha 21st West
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20090630				Post-Mining Data: 20090701 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	256	181	217.882	17	228	178	193.941	17	BICARBONATE
CALCIUM	61.3	50	55.6664	17	60.36	46.7	51.0194	17	CALCIUM
CARBONATE	5	0	1.66666	3	10	0	0.58823	17	CARBONATE
CHLORIDE	4	1	1.7125	16	2	0	0.7647	17	CHLORIDE
CONDUCTIVITY	464	394	423.882	17	412	352	388.882	17	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	60	6.8	21.8647	17	54.5	0.41	10.6233	15	FLOW
HARDNESS	234	206	218.411	17	221	193	207.705	17	HARDNESS
TOTAL IRON	0	0	0	2	0	0	0	17	TOTAL IRON
DISSOLVED IRON	0	0	0	2	0	0	0	17	DISSOLVED IRON
MAGNESIUM	21	16.9	19.2717	17	22.17	16.43	19.5064	17	MAGNESIUM
DISSOLVED MANGANESE	0.006	0	0.002	3	0.01	0	8.23529	17	DISSOLVED MANGANESE
MANGANESE	0.006	0	0.002	3	0.01	0	5.88235	17	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.46	7.41	8.09764	17	8.46	7.76	8.18823	17	PH
POTASSIUM	2.18	0.49	0.9065	12	1.89	0.49	0.91	17	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	1.57	2.23235	17	2.66	1.64	2.13176	17	SODIUM
SULFATE	9	5	7.45294	17	11	4	6.94117	17	SULFATE
SUSPENDED SOLIDS	216	216	216	1	0				SUSPENDED SOLIDS
TEMPERATURE	23	1.6	4.15294	17	6.4	0.2	3.3	17	TEMPERATURE
TOTAL DISSOLVED SOLIDS	254	199	229.764	17	241	193	221.47	17	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 5	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 5 OF 10	REV.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 13, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MF-19B is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of MF-19B in the Hiawatha seam, (7th North Sump, January 2006).

Subsidence: No subsidence has been detected near MF-19B. **The 2017 Annual Subsidence Report reported that the subsidence north of the spring has been stable since at least 2013. MF-19B is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-19B. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-19B is located along natural bench directly below a massive sandstone channel on an east facing slope covered with conifers. Sampled approximately 100' below spring source. Flow from spring MF-19B generally ranges from 0 gpm to a maximum of 2.5 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-19B:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 400' below top.

Justification for removal from monitoring: MF-19B has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-19B be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-19B**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2136' N.	529' E.	SW	13	16S	6E	10111

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-1413	400' below top

Location Comments: Spring located along natural bench directly below massive sandstone channel on east facing slope covered with conifers. Sampled approximately 100' below spring source.

Probable Recharge Area: Areas of higher elevation located to the west.

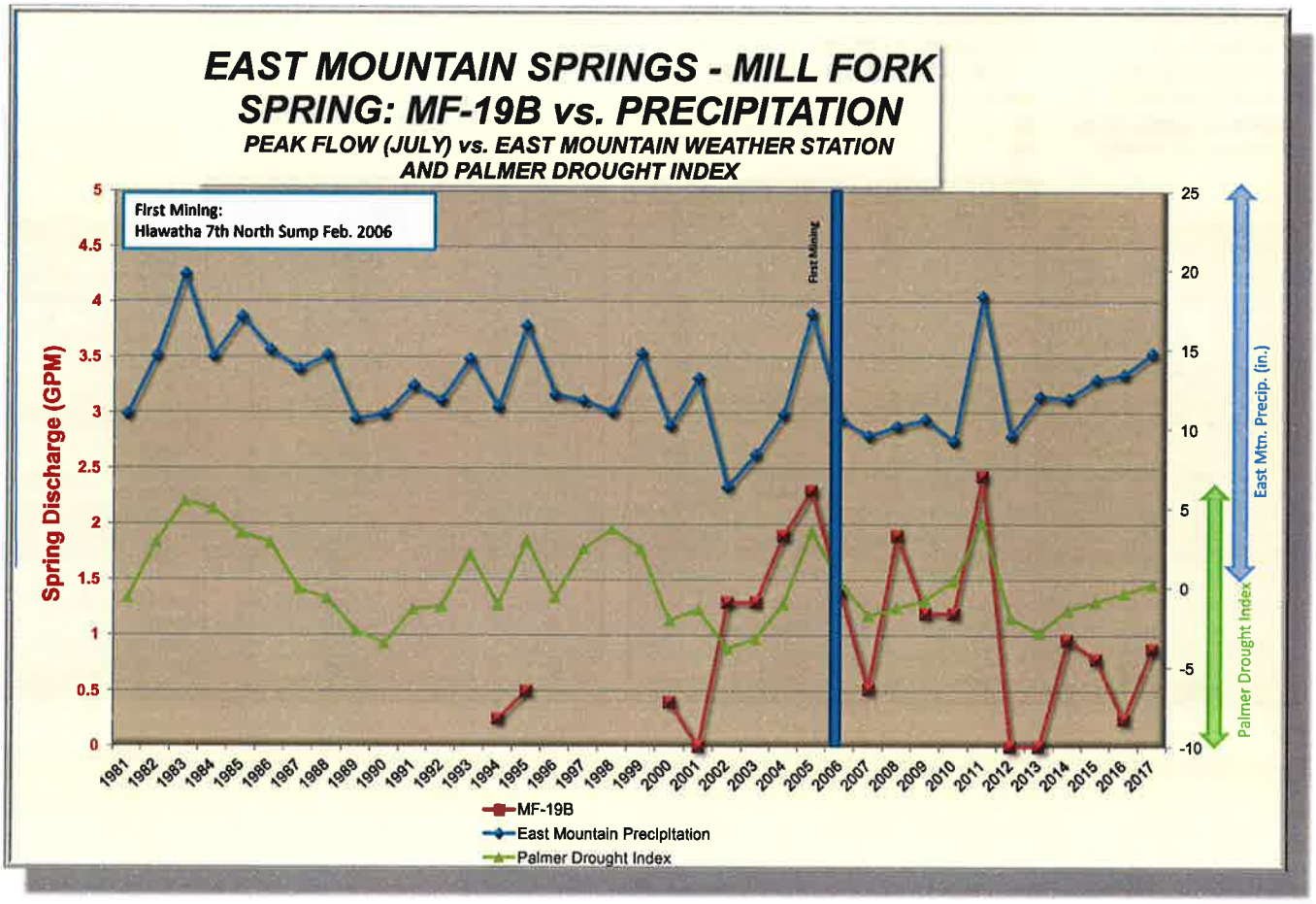
Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

RECEIVED
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MF-19B
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Feb-10 Hiawatha 7th North Sump
Date of Second Mining: Not undermined
Location of Nearest Mining: Na
Date of Nearest Mining: Na

	Pre-Mining Data: 20000101 THROUGH 20060131				Post-Mining Data: 20060201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	286	215	245.857	7	246	209	226.944	18	BICARBONATE
CALCIUM	67.3	58	64.7285	7	78.71	62.6	66.6505	18	CALCIUM
CARBONATE	0				19	0	2.86666	15	CARBONATE
CHLORIDE	2	1	1.16666	6	6	0	2	18	CHLORIDE
CONDUCTIVITY	462	420	431.428	7	551	430	460.944	18	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	2.3	0.52	1.26142	7	2.48	0.22	0.92588	17	FLOW
HARDNESS	245	231	238.428	7	287	232	246.055	18	HARDNESS
TOTAL IRON	4.59	0.18	1.1488	5	0.31	0	0.088125	16	TOTAL IRON
DISSOLVED IRON	0				0	0	0	14	DISSOLVED IRON
MAGNESIUM	21	17.5	18.6428	7	21.99	17.2	19.325	18	MAGNESIUM
DISSOLVED MANGANESE	0.055	0.005	0.02275	4	0.02	0	7.26666	15	DISSOLVED MANGANESE
MANGANESE	0.293	0.002	0.10366	3	0.003	0	3.33333	15	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.39	8.06	8.27857	7	8.52	8	8.29611	18	PH
POTASSIUM	1.28	0.32	0.6372	5	2.1	0.31	0.97222	18	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3	1.53	1.83571	7	4.44	1.09	1.95888	18	SODIUM
SULFATE	7	4	6.14285	7	12	4	6.38888	18	SULFATE
SUSPENDED SOLIDS	237	237	237	1	0				SUSPENDED SOLIDS
TEMPERATURE	9.6	3.9	6.18571	7	12.8	3.7	8.16666	18	TEMPERATURE
TOTAL DISSOLVED SOLIDS	252	211	235.571	7	287	222	258.444	18	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 14, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring RR-5 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of RR-5 in the Hiawatha seam, (17th West gateroad development, December 2006).

Subsidence: No subsidence has been detected near RR-5. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2011. RR-5 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring RR-5. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - RR-5 is located in a clearing on an east facing slope surrounded by conifers. Flow from spring RR-5 generally ranges from 0/seep to a maximum of 34 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring RR-5:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 360' below top.

Justification for removal from monitoring: RR-5 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site RR-5 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **RR-5**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1952' N.	2140' W.	SE	14	16S	6E	10160

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-1571	360' below top

Location Comments: Spring located in clearing on east facing slope surrounded with conifers.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

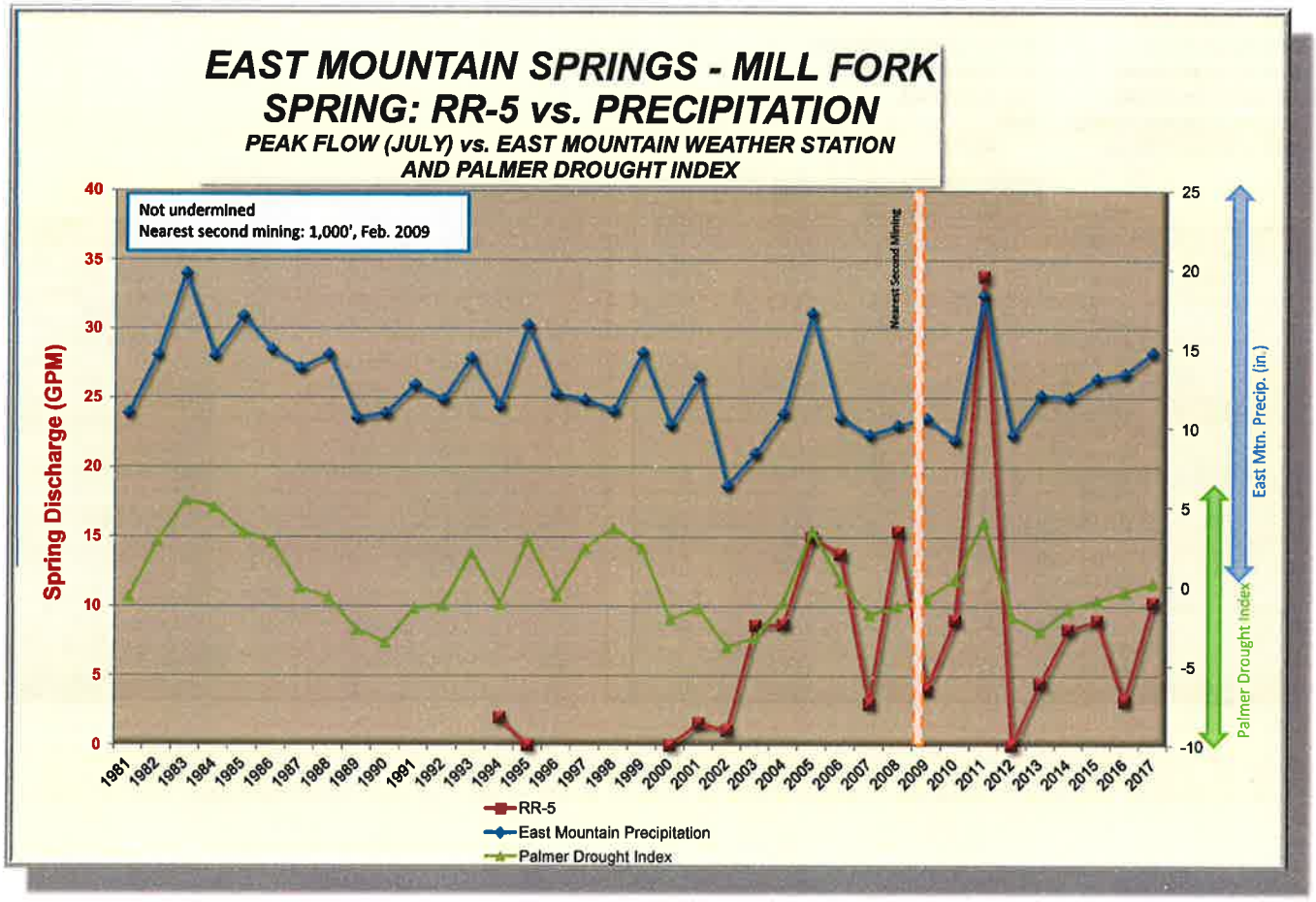
Probable Recharge Area: Areas of higher elevation located to the west (recharge limited).

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity (RR-28, RR-6, RR-7A, RR-27, RR-4).

Geologic Occurrence of Spring:

Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

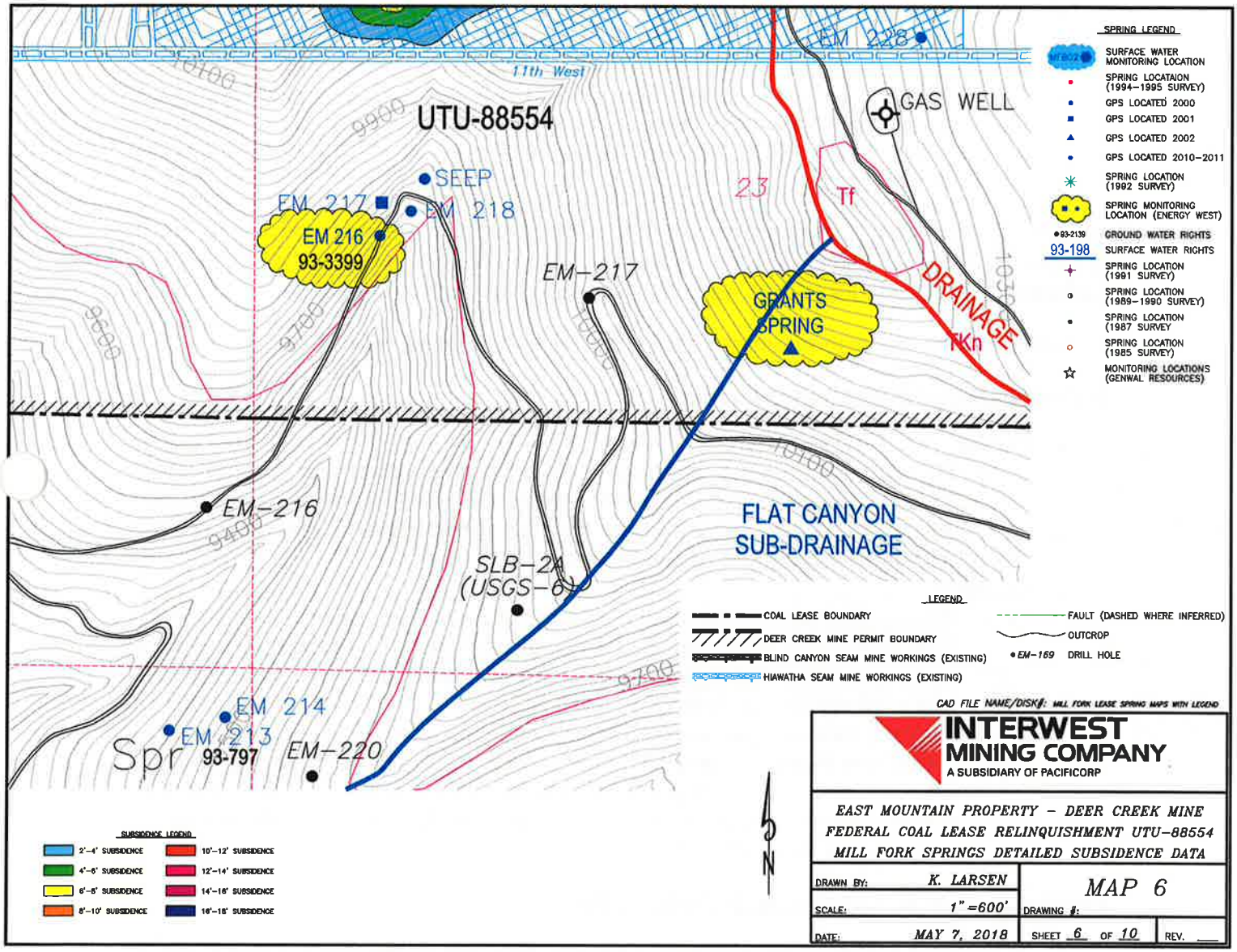


INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: RR-5
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1000'
Date of Nearest Mining: Feb-09

	Pre-Mining Data: 20000101 THROUGH 20090131				Post-Mining Data: 20090228 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	286	192	216.181	11	221	192	205.25	12	BICARBONATE
CALCIUM	74.39	61.7	64.5018	11	66.55	52.85	60.9233	12	CALCIUM
CARBONATE	0	0	0	2	0	0	0	12	CARBONATE
CHLORIDE	2	1	1.72727	11	2	0	0.75	12	CHLORIDE
CONDUCTIVITY	504	407	442.818	11	432	386	409.833	12	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	15.4	0.5	7.22909	11	33.8	0.42	7.58083	12	FLOW
HARDNESS	249	220	229.454	11	235	205	220.333	12	HARDNESS
TOTAL IRON	0.78	0.1	0.300125	8	1.65	0	0.24166	12	TOTAL IRON
DISSOLVED IRON	0	0	0	2	0	0	0	12	DISSOLVED IRON
MAGNESIUM	17.3	15.44	16.6318	11	17.89	14.53	16.62	12	MAGNESIUM
DISSOLVED MANGANESE	0.045	0.002	1.27142	7	0.055	0	1.20833	12	DISSOLVED MANGANESE
MANGANESE	0.013	0	0.0034	5	0.012	0	0.001	12	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.23	7.33	7.8009	11	8.4	7.55	7.96583	12	PH
POTASSIUM	0.99	0.31	0.50444	9	0.99	0.35	0.5675	12	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	3	1.52	1.81	11	2.16	1.52	1.8325	12	SODIUM
SULFATE	10	7	8.72727	11	10	6	8.08333	12	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	5.6	3	4.17272	11	10.4	3.7	5.425	12	TEMPERATURE
TOTAL DISSOLVED SOLIDS	274	209	243.363	11	255	223	238	12	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 6	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 6 OF 10	REV. ___

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring EM-216 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred 975' north of EM-216 in the Hiawatha Seam on September 2005.

Subsidence: **Maximum subsidence in area 975' north of EM-216 has stabilized at approximately 6 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2008. EM-216 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring EM-216. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected since 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. EM-216 is a low volume spring/seep located along the Mill Fork access road. Flow from spring EM-216 generally ranges from 0.0 gpm to a maximum of 1.3 gpm. Flow from EM-216 normally occurs early in the year and dissipates rapidly with recordable flow rarely existing after the month of July.

Geologic Mode of Occurrence for spring EM-216:

- Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 75' above base.

INCORPORATED
AUG 17 2018
DIV. of Oil, Gas & Mining

Justification for removal from monitoring: EM-216 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site EM-216 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **EM-216**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2250' N.	651' E.	SW	23	16S	6E	9740

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	93-3399	75' above base

Location Comments: Spring located on south facing slope adjacent to East Mountain Access Road.

Probable Recharge Area: Highlands area to the north.

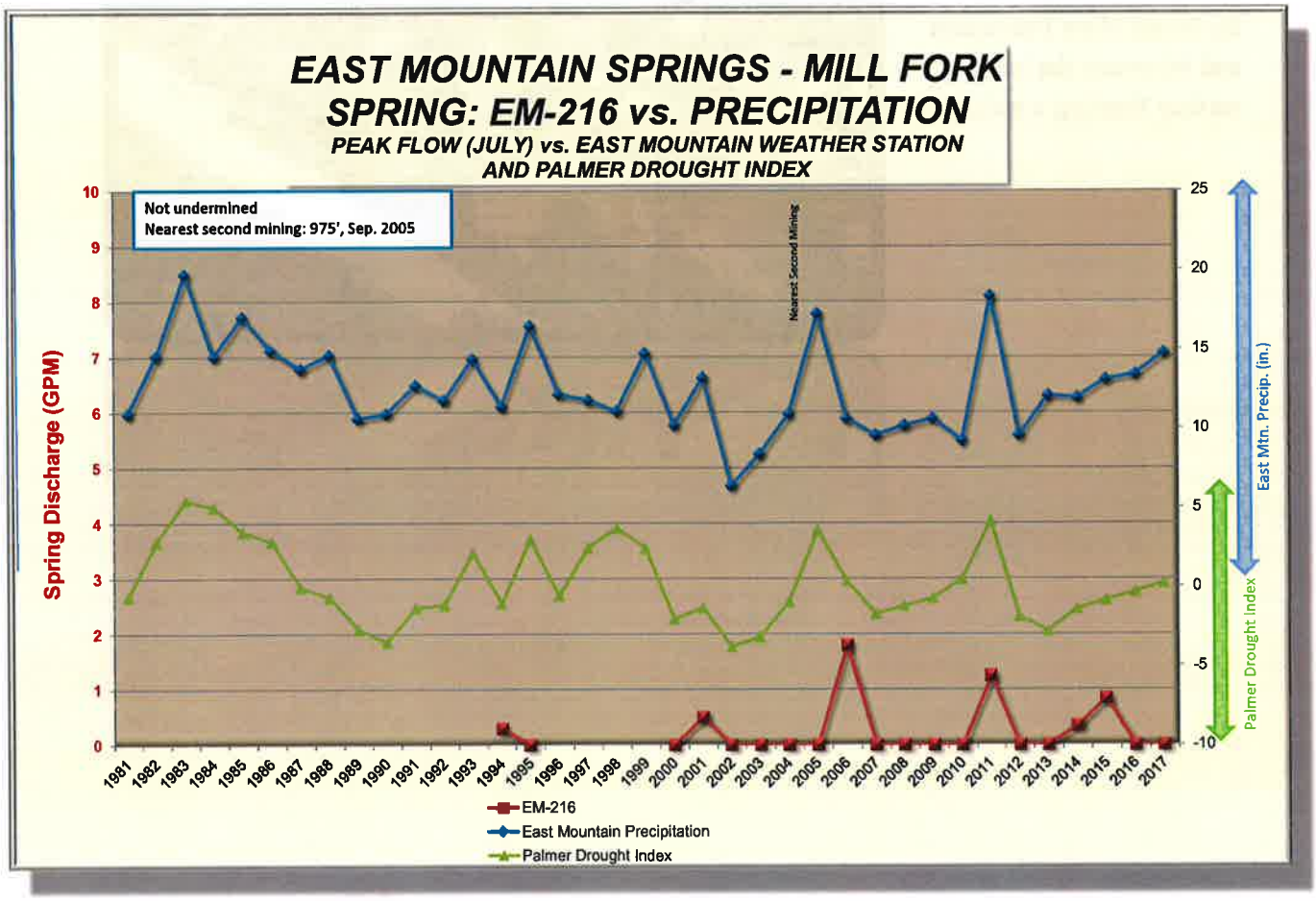
Relationship to Adjacent Springs: This spring occurs in the same manner as EM-218.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: EM-216
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 975'
Date of Nearest Mining: Sep-05

	Pre-Mining Data: 2000101 THROUGH 20050801				Post-Mining Data: 20050831 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	- No Sample Data -				298	240	272.75	4	BICARBONATE
CALCIUM					94.6	70.16	81.235	4	CALCIUM
CARBONATE					0	0	0	3	CARBONATE
CHLORIDE					3	2	2.5	4	CHLORIDE
CONDUCTIVITY					663	502	579.25	4	CONDUCTIVITY
DISSOLVED OXYGEN					0				DISSOLVED OXYGEN
FLOW					1.8	0.35	1.06	4	FLOW
HARDNESS					344	273	304.25	4	HARDNESS
TOTAL IRON					0.19	0	8.66666	3	TOTAL IRON
DISSOLVED IRON					0	0	0	3	DISSOLVED IRON
MAGNESIUM					26.2	22.52	24.6675	4	MAGNESIUM
DISSOLVED MANGANESE					0.022	0	0.00825	4	DISSOLVED MANGANESE
MANGANESE					0.012	0	0.0055	4	MANGANESE
OIL AND GREASE					0				OIL AND GREASE
PH					8.36	7.66	7.965	4	PH
POTASSIUM					0.89	0.57	0.75	4	POTASSIUM
SET SOLIDS					0				SET SOLIDS
SODIUM					4.31	3.76	4.025	4	SODIUM
SULFATE					31	13	22.75	4	SULFATE
SUSPENDED SOLIDS					0				SUSPENDED SOLIDS
TEMPERATURE					17.7	9.3	13.575	4	TEMPERATURE
TOTAL DISSOLVED SOLIDS					319	278	304	4	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Grants Spring is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred 1,560' north of Grants Spring in the Hiawatha Seam in November 2005.

Subsidence: **Maximum subsidence in area 1,560' north of Grants Spring has stabilized at approximately 6 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2008. Grants Spring is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring Grants Spring Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected since 2002 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. Grants Spring is a low volume spring/seep located below ridge on west facing slope above main Mill Fork access road vegetated with conifers and aspens. Flow from spring Grants Spring generally ranges from 0.5 gpm to a maximum of <3 gpm.

Geologic Mode of Occurrence for spring Grants Spring:

- Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 160' below top.

Justification for removal from monitoring: Grants Spring has been monitored by PacifiCorp since 2002. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site Grants Spring be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **GRANTS SPRING**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1692' N.	2542' W.	SE	23	16S	6E	10280

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	Developed With Steel Pipe Diverted to Trough (not functioning)	None	160' below top

Location Comments: Spring located below ridge on west facing slope above main access road. Area surrounding the spring source vegetated with conifers and aspens.

RECEIVED
AUG 17 2018
DIV. OF OIL, GAS & MINING

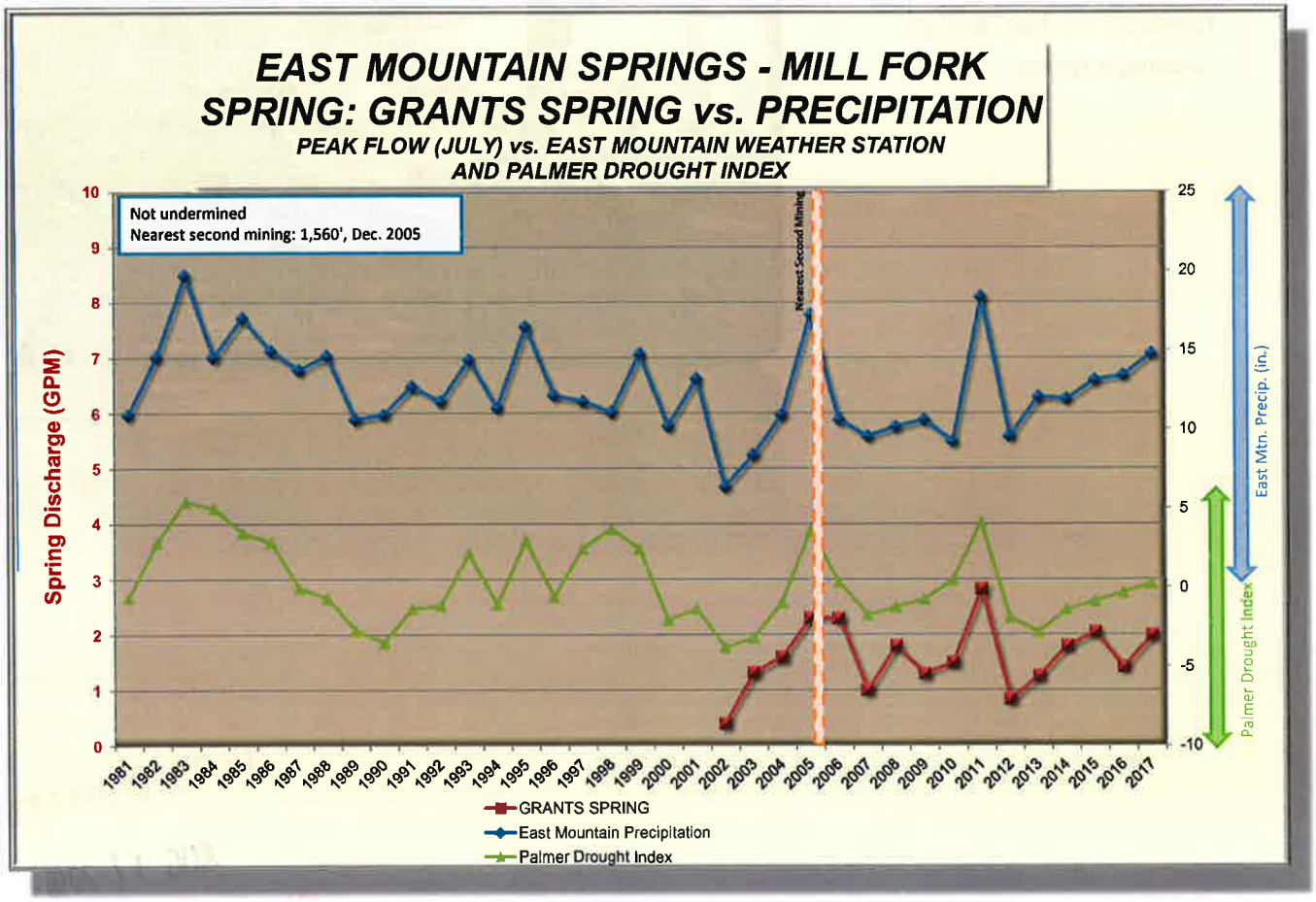
Probable Recharge Area: Highlands area to the northeast (recharge limited).

Relationship to Adjacent Springs: This spring occurs in the same manner as EMPOND.

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

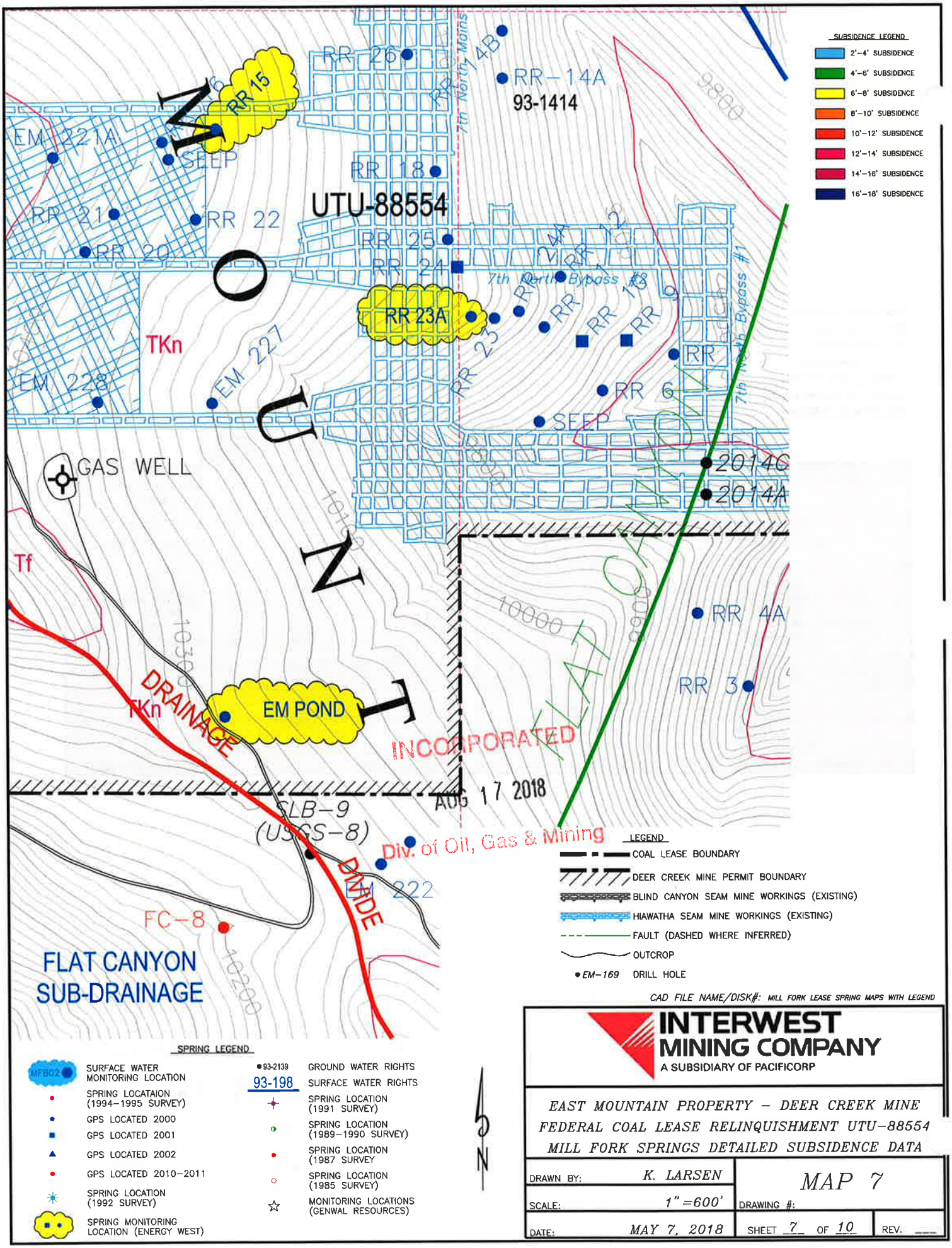


RECEIVED
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**GRANTS SPRING**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**1560'**
Date of Nearest Mining:	**Nov-05**

	Pre-Mining Data: 20000101 THROUGH 20051101				Post-Mining Data: 20051201 THROUGH 201712313				
PARAMETER	**MAXIMUM**	**MINIMUM**	**AVERAGE**	**# ANALYSIS**	**MAXIMUM**	**MINIMUM**	**AVERAGE**	**# ANALYSIS**	
BICARBONATE	290	221	253.428	7	235	205	221.916	24	**BICARBONATE**
CALCIUM	56.7	54.1	55.7571	7	58.97	48.46	52.7758	24	**CALCIUM**
CARBONATE	0				8	0	0.4	20	**CARBONATE**
CHLORIDE	4	3	3.57142	7	7	2	3.20833	24	**CHLORIDE**
CONDUCTIVITY	491	457	473.285	7	508	422	454.791	24	**CONDUCTIVITY**
DISSOLVED OXYGEN	0				0				**DISSOLVED OXYGEN**
FLOW	2.31	0.3	1.11285	7	2.83	0.58	1.25541	24	**FLOW**
HARDNESS	256	241	248.857	7	255	211	235.708	24	**HARDNESS**
TOTAL IRON	0				0	0	0	20	**TOTAL IRON**
DISSOLVED IRON	0				0	0	0	20	**DISSOLVED IRON**
MAGNESIUM	27.7	25.4	26.6	7	28.1	15.59	25.2425	24	**MAGNESIUM**
DISSOLVED MANGANESE	0				0.002	0	0.0001	20	**DISSOLVED MANGANESE**
MANGANESE	0				0	0	0	20	**MANGANESE**
OIL AND GREASE	0				0				**OIL AND GREASE**
PH	8.01	7.51	7.74428	7	7.94	7.47	7.77041	24	**PH**
POTASSIUM	1.34	1.11	1.24857	7	5.36	0.65	1.5	24	**POTASSIUM**
SET SOLIDS	0				0				**SET SOLIDS**
SODIUM	3.62	3.41	3.48857	7	3.85	1.45	3.49416	24	**SODIUM**
SULFATE	15	11	13	7	12	6	10.2083	24	**SULFATE**
SUSPENDED SOLIDS	258	258	258	1	0				**SUSPENDED SOLIDS**
TEMPERATURE	5.4	4.3	4.81428	7	8.3	4.7	6.3625	24	**TEMPERATURE**
TOTAL DISSOLVED SOLIDS	272	226	248.714	7	377	217	251.583	24	**TOTAL DISSOLVED SOLIDS**

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU–88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 7	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 7 OF 10	REV. ___

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring RR-15 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of RR-15 in the Hiawatha seam, (14th West, June 2005). Extraction face of the 14th West longwall panel is 55' west of RR-15.

Subsidence: No subsidence has been detected near RR-15. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2008. RR-15 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring RR-15. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1994 through 1995 by Genwal Resources and 2000 through 2017 by PacifiCorp. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - RR-15 located on northeast facing slope surrounded with conifers. Flow from springs RR-16 and RR-15 diverted to weir with recorder (Emery Water Conservancy District). Per request from Emery Conservancy District, PacifiCorp removed the weir and recorder in August 2002. Flow from spring RR-15 generally ranges from 10 gpm to a maximum of 55 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring RR-15:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 170' below top.

Justification for removal from monitoring: RR-15 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site RR-15 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **RR-15**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
610' S.	1257'W.	NE	23	16S	6E	10350

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	Diverted To Weir (not functioning)	None	170' below top

Location Comments: Spring located on northeast facing slope surrounded with conifers. Flow from springs RR-16 and RR-15 diverted to weir with recorder (Emery Water Conservancy District).

Probable Recharge Area: Areas of higher elevation located to the west.

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate area.

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

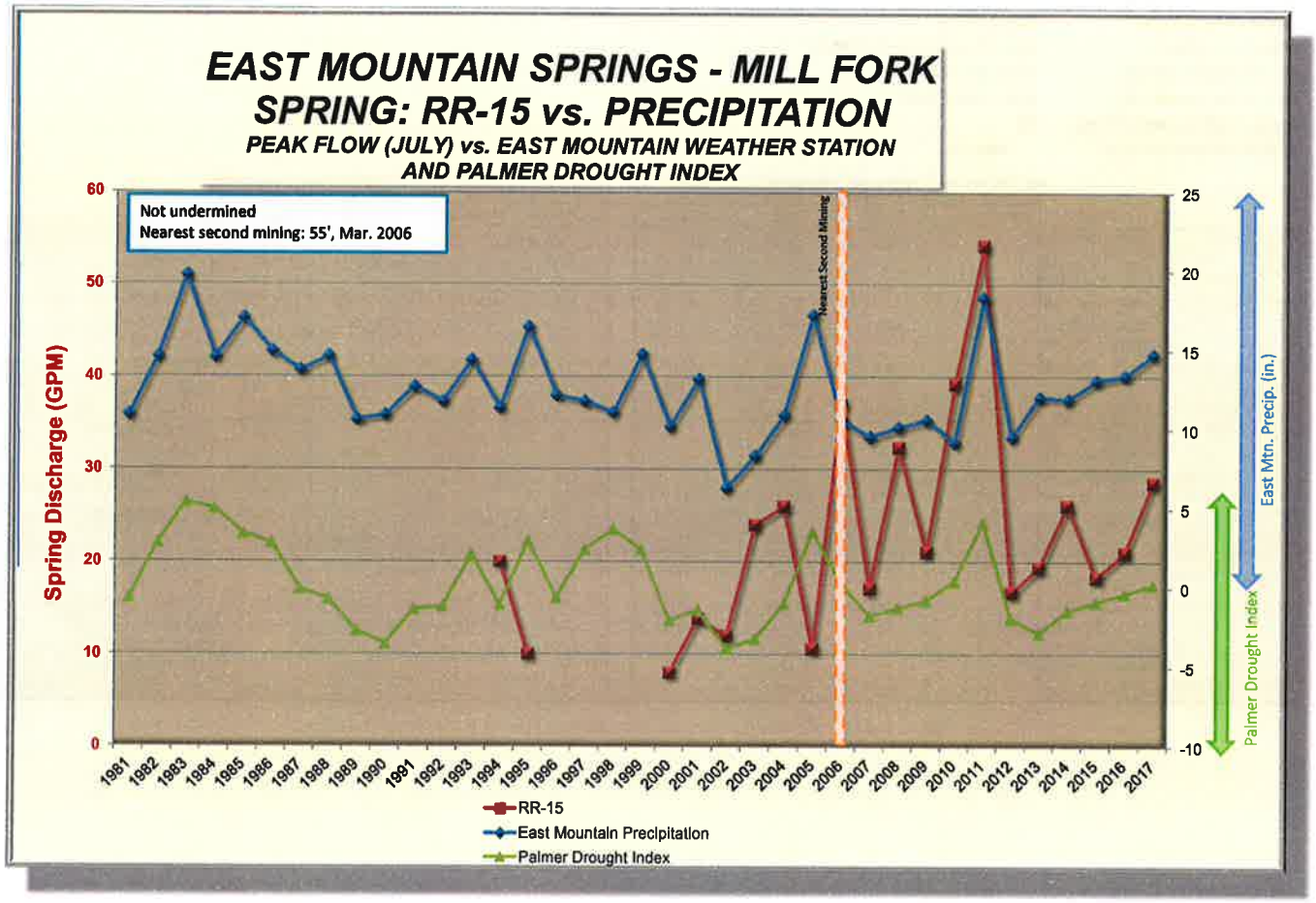
Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

RR-15 spring source

RR-15 Weir and recorder (removed August 22, 2002)

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: RR-15
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 55'
Date of Nearest Mining: May-06

	Pre-Mining Data: 20000101 THROUGH 20060430				Post-Mining Data: 20060501 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	285	207	253.727	11	233	204	216.608	23	BICARBONATE
CALCIUM	65.8	55	59.3181	11	60.9	54	57.4321	23	CALCIUM
CARBONATE	0				0	0	0	20	CARBONATE
CHLORIDE	2	1	1.12	10	2	0	0.91304	23	CHLORIDE
CONDUCTIVITY	498	419	440	11	479	356	430.956	23	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	26	6	12.2363	11	54.2	0.52	19.3426	23	FLOW
HARDNESS	241	218	229.636	11	243	210	226.739	23	HARDNESS
TOTAL IRON	0.832	0.121	0.3106	5	0	0	0	20	TOTAL IRON
DISSOLVED IRON	0.084	0.084	0.084	1	0	0	0	20	DISSOLVED IRON
MAGNESIUM	21.4	16.6	19.809	11	23.2	17.12	20.23	23	MAGNESIUM
DISSOLVED MANGANESE	0.159	0.003	0.058	3	0	0	0	20	DISSOLVED MANGANESE
MANGANESE	0.012	0.003	0.0075	2	0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.43	7.53	8.04181	11	8.03	7.37	7.80695	23	PH
POTASSIUM	0.73	0.34	0.5978	5	1.32	0.59	0.8	23	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	1.96	2.77181	11	6.5	2.23	3.21565	23	SODIUM
SULFATE	11	4	6.04545	11	10	5	6.95652	23	SULFATE
SUSPENDED SOLIDS	214	214	214	1	0				SUSPENDED SOLIDS
TEMPERATURE	5.8	3	4.01818	11	8.5	3.4	4.36086	23	TEMPERATURE
TOTAL DISSOLVED SOLIDS	259	213	237.727	11	272	215	243.086	23	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 24, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring RR-23A is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. First mining occurred in vicinity of RR-23A in the Hiawatha seam, (7th North Mains, August 2004).

Subsidence: No subsidence has been detected near RR-23A. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2009. RR-23A is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring RR-23A. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - RR-23A is located in a clearing on an east facing slope surrounded by aspens. Abundant tufa deposits. Spring forms a small drainage. Flow from spring RR-23A generally ranges from 10 gpm to a maximum of 50 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring RR-23A:

- Water flowing down through fractures in the upper North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 360' above base.

Justification for removal from monitoring: RR-23A has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site RR-23A be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **RR-23A**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1571' S.	64' E.	NW	24	16S	6E	10023

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	None	360' above base

Location Comments: Spring located in clearing on east facing slope surrounded by aspens. Abundant tufa deposits. Spring forms small drainage.

Probable Recharge Area: Areas of higher elevation located to the west.

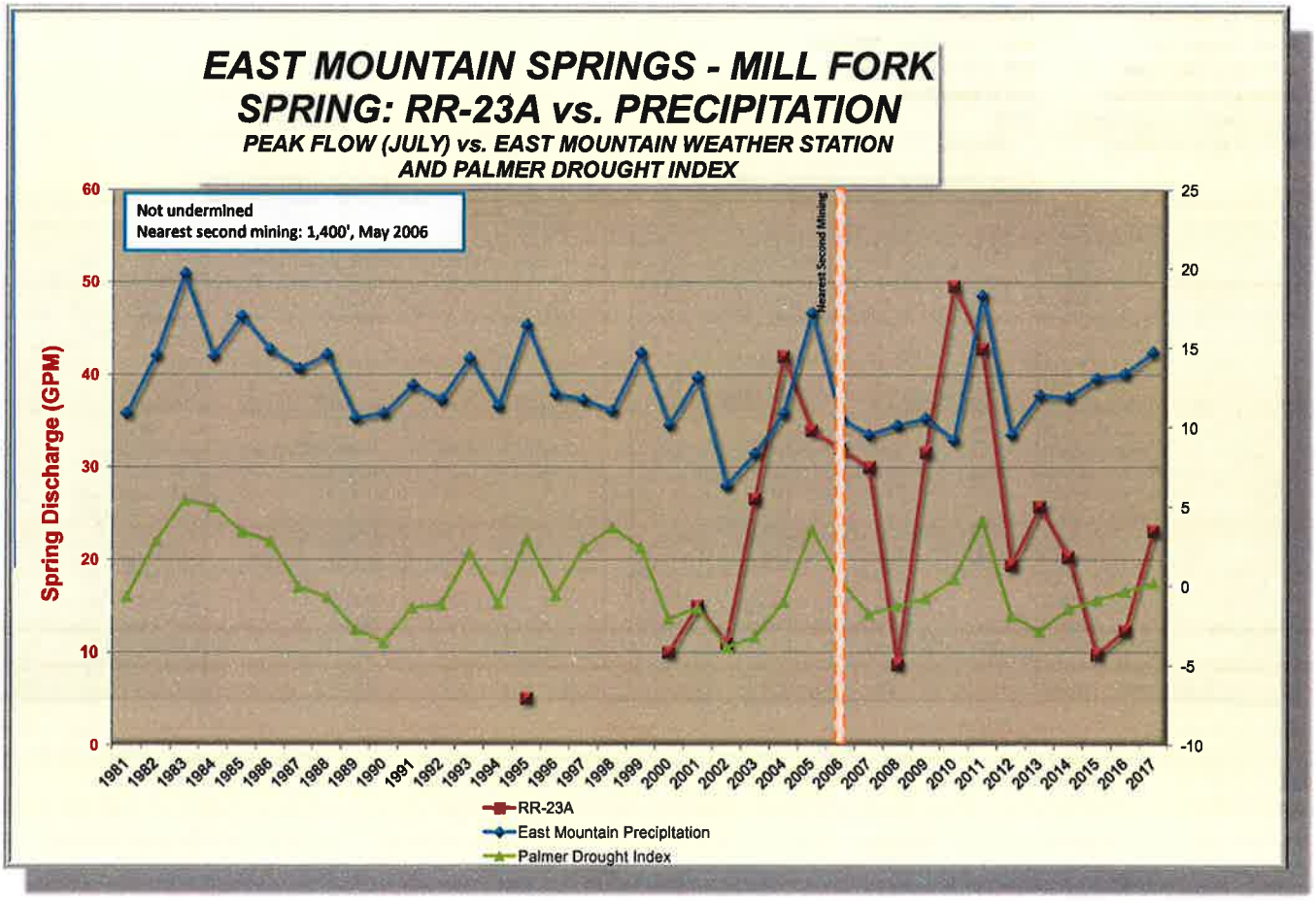
Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate vicinity.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: RR-23A
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1400'
Date of Nearest Mining: May-06

	Pre-Mining Data: 20000101 THROUGH 20060430				Post-Mining Data: 20060501 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	309	237	276.181	11	258	217	240.304	23	BICARBONATE
CALCIUM	73.1	65	68.8454	11	75.2	63.42	69.6313	23	CALCIUM
CARBONATE	0				0	0	0	19	CARBONATE
CHLORIDE	2	1	1.59	10	3	0	1.47826	23	CHLORIDE
CONDUCTIVITY	566	461	493.272	11	560	411	489.173	23	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	42	8.32	17.5381	11	49.6	5.7	18.6495	23	FLOW
HARDNESS	272	245	255.636	11	282	232	258.086	23	HARDNESS
TOTAL IRON	1.12	0.3	0.54725	4	1.19	0	0.12238	21	TOTAL IRON
DISSOLVED IRON	0.008	0.008	0.008	1	0	0	0	19	DISSOLVED IRON
MAGNESIUM	21.7	19.5	20.3181	11	22.8	17.95	20.4526	23	MAGNESIUM
DISSOLVED MANGANESE	0.265	0.012	0.1385	2	0.066	0	4.38095	21	DISSOLVED MANGANESE
MANGANESE	0.011	0.011	0.011	1	0	0	0	19	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.28	7.21	7.69818	11	8.3	7.15	7.53913	23	PH
POTASSIUM	0.714	0.51	0.60866	6	1.1	0.56	0.72043	23	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	2.22	2.89545	11	3.78	1.97	2.78608	23	SODIUM
SULFATE	14	10	11.9181	11	15	8	12.2173	23	SULFATE
SUSPENDED SOLIDS	280	280	280	1	0				SUSPENDED SOLIDS
TEMPERATURE	8.2	4	5.21818	11	8.6	3.9	5.1	23	TEMPERATURE
TOTAL DISSOLVED SOLIDS	304	226	271.545	11	312	249	277.043	23	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 23, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: EMPOND Spring is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat on August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. Second mining occurred 1,620' north of EMPOND in the Hiawatha Seam in December 2005.

Subsidence: Maximum subsidence in area 1,560' north of Grants Spring has stabilized at approximately 6 feet. The 2017 Annual Subsidence Report reported that the subsidence has been stable since at least 2008. EMPOND is outside of the subsided area.

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring Grants Spring Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected since 1993 through 1995 by Genwal Resources and 2000 and through 2017 by PacifiCorp. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, 5, and 6. The East Mountain weather station is located on the southern tip of East Mountain. EMPOND is a located below ridge on east facing slope above small pond adjacent to road. Vegetation of the area surrounding the spring is dominated by conifers. Flow from spring EMPOND generally ranges from 1 gpm to a maximum of <10 gpm.

Geologic Mode of Occurrence for spring EMPOND:

- Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.
- Geologic Formation: North Horn (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 160' below top.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Justification for removal from monitoring: EMPOND has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site EMPOND be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **EMPOND**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1744' N.	1223' W.	SE	23	16S	6E	10280

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	None	None	160' below top

Location Comments: Spring located below ridge on east facing slope above small pond adjacent to road. Vegetation of the area surrounding the spring dominated by conifers.

Probable Recharge Area: Highlands area to the northwest (recharge limited).

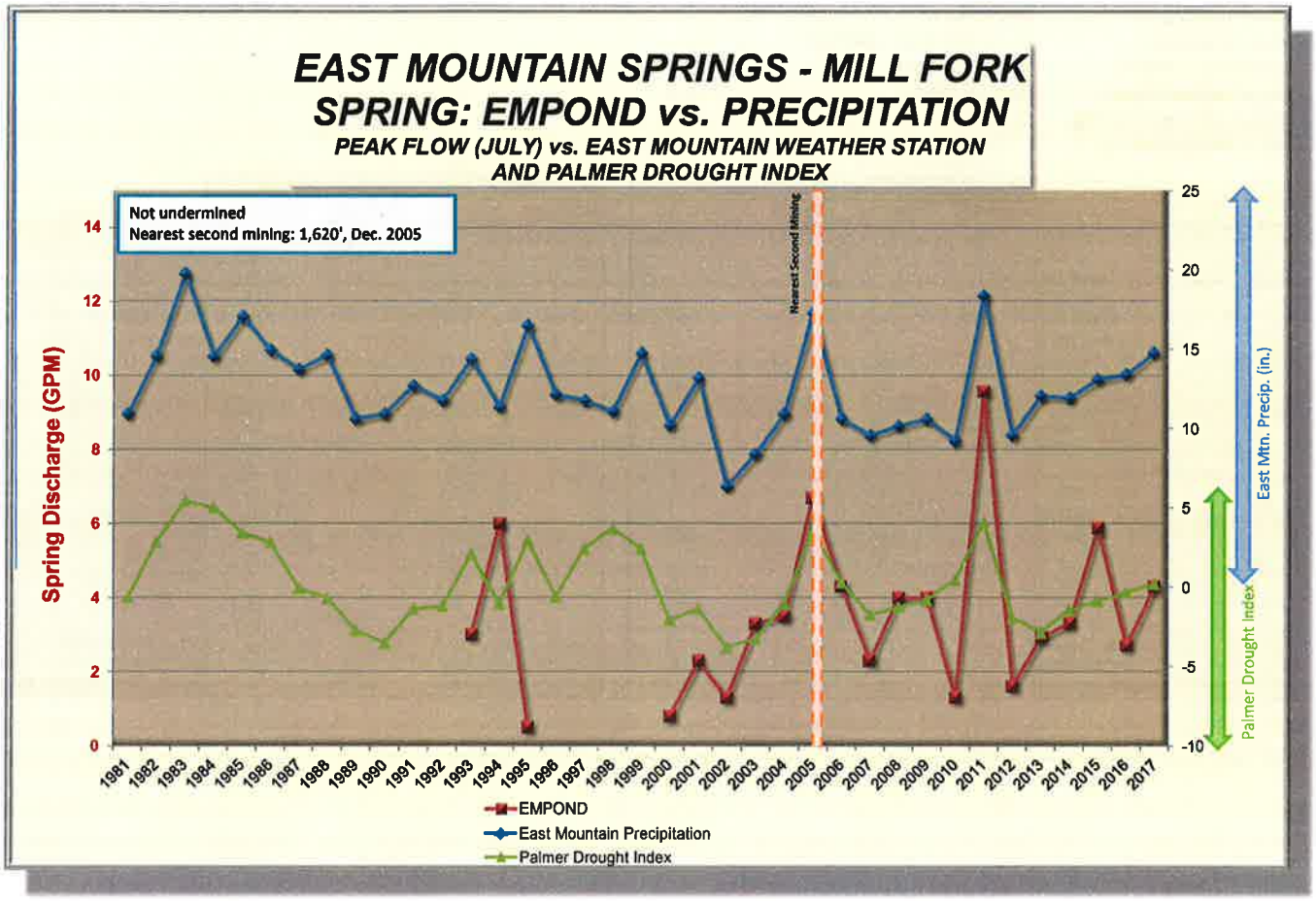
Relationship to Adjacent Springs: This spring occurs in the same manner as EM-222 and EM-223.

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flows laterally through sandstone channels underlain by impermeable mudstones of the North Horn Formation and intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

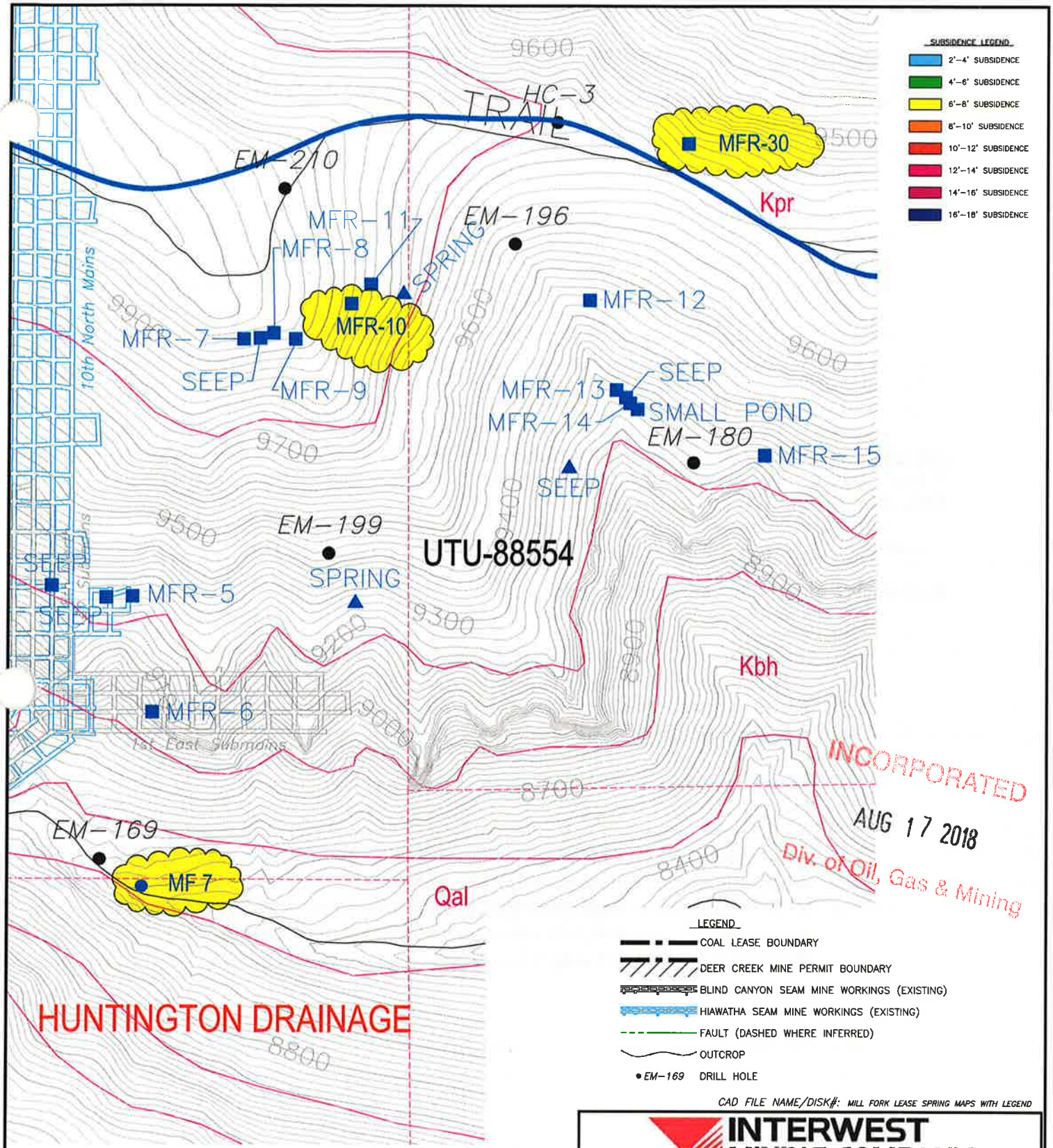


INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: EMPOND
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1620'
Date of Nearest Mining: Dec-05

	Pre-Mining Data: 20000101 THROUGH 20051130				Post-Mining Data: 20051201 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	296	228	269.1	10	239	213	225.875	24	BICARBONATE
CALCIUM	62	57.4	60	10	62.74	54.49	58.16125	24	CALCIUM
CARBONATE	0				12	0	0.6	20	CARBONATE
CHLORIDE	2	1	1.13	10	3	0	1.33333	24	CHLORIDE
CONDUCTIVITY	525	446	468.7	10	491	371	445.125	24	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	6.7	0.5	2.175	10	9.57	0.37	2.78333	24	FLOW
HARDNESS	249	231	242.7	10	254	221	236.375	24	HARDNESS
TOTAL IRON	1.5	0.088	0.4452	5	1.4	0	0.20695	23	TOTAL IRON
DISSOLVED IRON	0.056	0.056	0.056	1	0	0	0	20	DISSOLVED IRON
MAGNESIUM	23.7	21.3	22.57	10	24.1	20.45	22.137	24	MAGNESIUM
DISSOLVED MANGANESE	0.07	0.002	0.02	5	0.063	0	8.29166	24	DISSOLVED MANGANESE
MANGANESE	0.008	0.007	0.0075	2	0	0	0	20	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.21	7.84	7.983	10	8.15	7.67	7.91791	24	PH
POTASSIUM	0.697	0.539	0.60433	6	0.92	0.53	0.65375	24	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	4	2	2.385	10	2.56	1.35	2.06583	24	SODIUM
SULFATE	7	4.8	5.38	10	6	3	3.79166	24	SULFATE
SUSPENDED SOLIDS	239	239	239	1	0				SUSPENDED SOLIDS
TEMPERATURE	6	3.8	5.24	10	10.6	4.9	6.9	24	TEMPERATURE
TOTAL DISSOLVED SOLIDS	280	231	251.6	10	287	204	245.333	24	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 8	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 8 OF 10	REV. ___

Location: Section 7, Township 16 South, Range 7 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MFR-30 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MFR-30.

Subsidence: No subsidence has been detected near MFR-30. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. MFR-30 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MFR-30. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MFR-30 is located in small clearing on a north facing slope. Area surrounding the spring source is vegetated with mountain brush, aspens and conifers. Flow from spring MFR-30 generally ranges from 0/seep to a maximum of <3 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MFR-30:

- Water flowing down through fractures in the Upper Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.
- Geologic Formation: Upper Price River (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 80' below top.

Justification for removal from monitoring: MFR-30 has been monitored by PacifiCorp since 2001. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MFR-30 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MFR-30**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2298' S.	1304' E.	NW	7	16S	7E	9680

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Upper Price River	None	None	80' below top

Location Comments: Spring located in small clearing on north facing slope. Area surrounding the spring source vegetated with mountain brush, aspens and conifers.

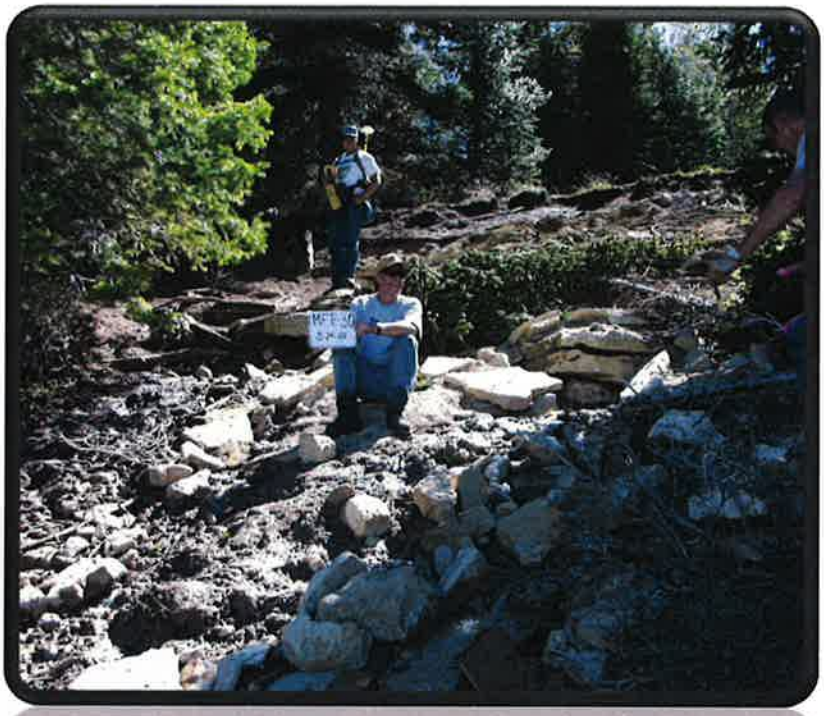
Probable Recharge Area: Areas of higher elevation located to the west.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

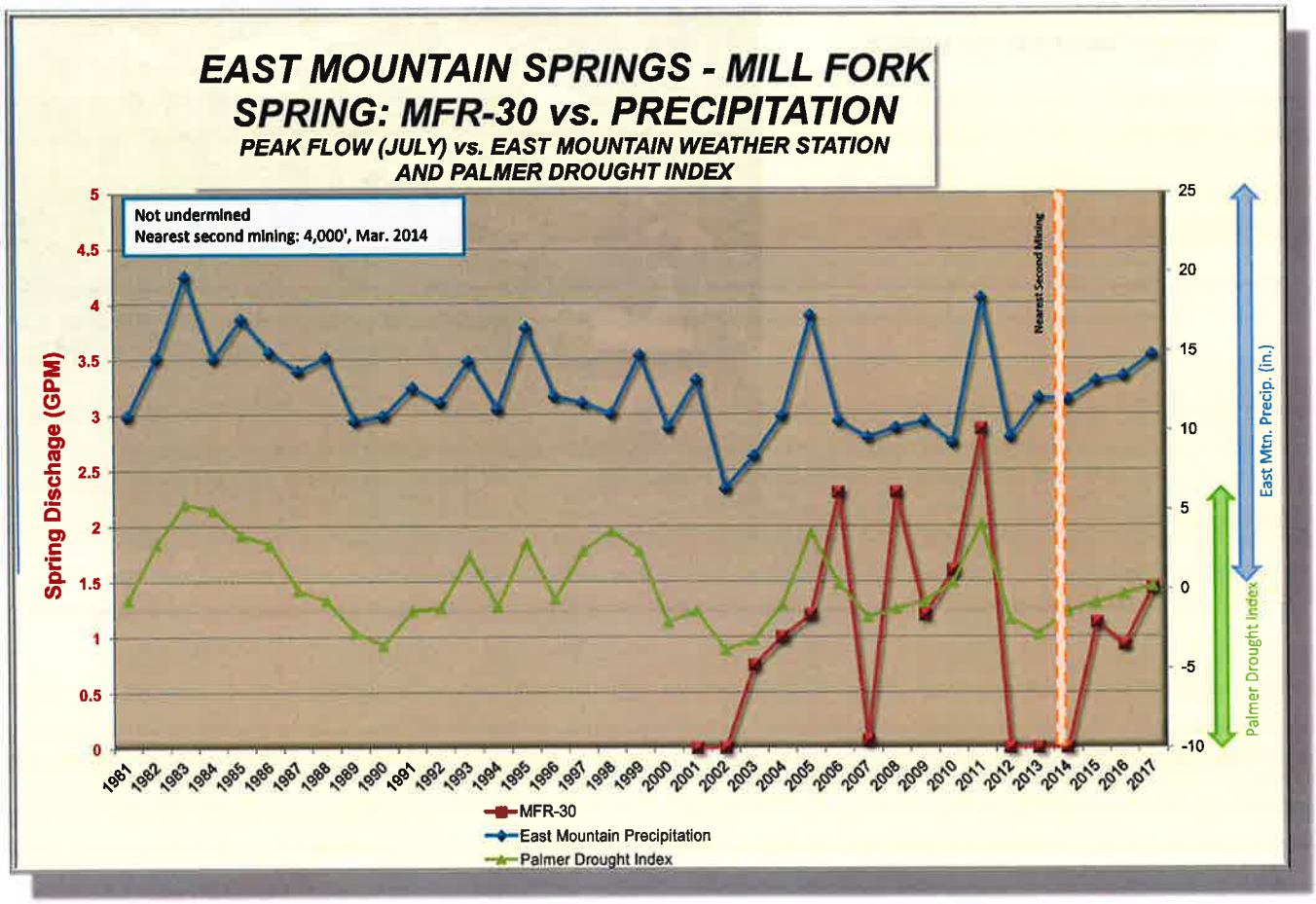
Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate area (MFR-28, MFR-29).

Geologic Occurrence of Spring:

Water flowing down through fractures in the Upper Price River Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel intersects the surface.



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

East Mountain Spring:	**MFR-30**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**4000'**
Date of Nearest Mining:	**Mar-14**

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20140301 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	383	258	305.166	12	316	252	278.666	3	BICARBONATE
CALCIUM	89.22	77	84.275	12	83.94	63.67	71.8366	3	CALCIUM
CARBONATE	0	0	0	5	0	0	0	3	CARBONATE
CHLORIDE	3	1	2.25	12	3	2	2.33333	3	CHLORIDE
CONDUCTIVITY	698	593	624.833	12	633	552	587.333	3	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	26.6	0.22	3.41833	12	1.44	0.93	1.16666	3	FLOW
HARDNESS	327	287	311	12	318	266	283.666	3	HARDNESS
TOTAL IRON	1.23	0	0.4207	10	2.62	0	0.93	3	TOTAL IRON
DISSOLVED IRON	0	0	0	5	0	0	0	3	DISSOLVED IRON
MAGNESIUM	26.11	21	24.4258	12	26.24	23.72	25.33	3	MAGNESIUM
DISSOLVED MANGANESE	0.012	0	0.0036	5	0.061	0	2.13333	3	DISSOLVED MANGANESE
MANGANESE	0.026	0	0.00625	8	0	0	0	3	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.27	7.56	7.95416	12	8.55	7.89	8.19333	3	PH
POTASSIUM	1.04	0.73	0.81072	11	1.35	0.83	1.12	3	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	16.5	8	12.96	12	14.42	12.69	13.4433	3	SODIUM
SULFATE	39	22	32.25	12	36	31	33.6666	3	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	10.2	3	6.28333	12	61.3	6.2	25.6666	3	TEMPERATURE
TOTAL DISSOLVED SOLIDS	400	308	351.083	12	338	283	313	3	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 12, Township 16 South, Range 6 East, SLB&M. This site is located within the Deer Creek mine permit boundary and within the Federal Coal lease UTU-88554.

Lease Association: Spring MFR-10 is located within Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MFR-10.

Subsidence: No subsidence has been detected near MFR-10. **The 2017 Annual Subsidence Report reported that the subsidence west of the spring has been stable since at least 2014. MFR-10 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MFR-10. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2001 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MFR-10 is located at the end of a trail which leads to reclaimed road. Denoted as "Spring" on Rilda Quad. map. Area surrounding the spring source is vegetated with conifers and aspens. Flow from spring MFR-10 generally ranges from 10 gpm to a maximum of 45 gpm (recorded flow of 2001 was 0.0 gpm).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MFR-10:

- Water flowing down through fractures in the lower section of the North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel.
- Geologic Formation: North Horn Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: 140' above base.

Justification for removal from monitoring: MFR-10 has been monitored by PacifiCorp since 2001. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MFR-10 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MFR-10**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2680' N.	270' W	SE	12	16S	6E	9900

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
North Horn	Developed With Steel Pipe, Diverted To Trough (not functioning)	None	140' above base

Location Comments: Spring located at the end of a trail which leads to reclaimed road. Denoted as "Spring" on Rilda Quad. map. Area surrounding the spring source vegetated with conifers and aspens.

Probable Recharge Area: Areas of higher elevation located to the west.

Relationship to Adjacent Springs: This spring occurs in the same manner as several springs in the immediate area.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring: Water flowing down through fractures in the lower section of the North Horn Formation intersects channel sandstones and flows laterally through the formation. A spring is formed when the sandstone channel.

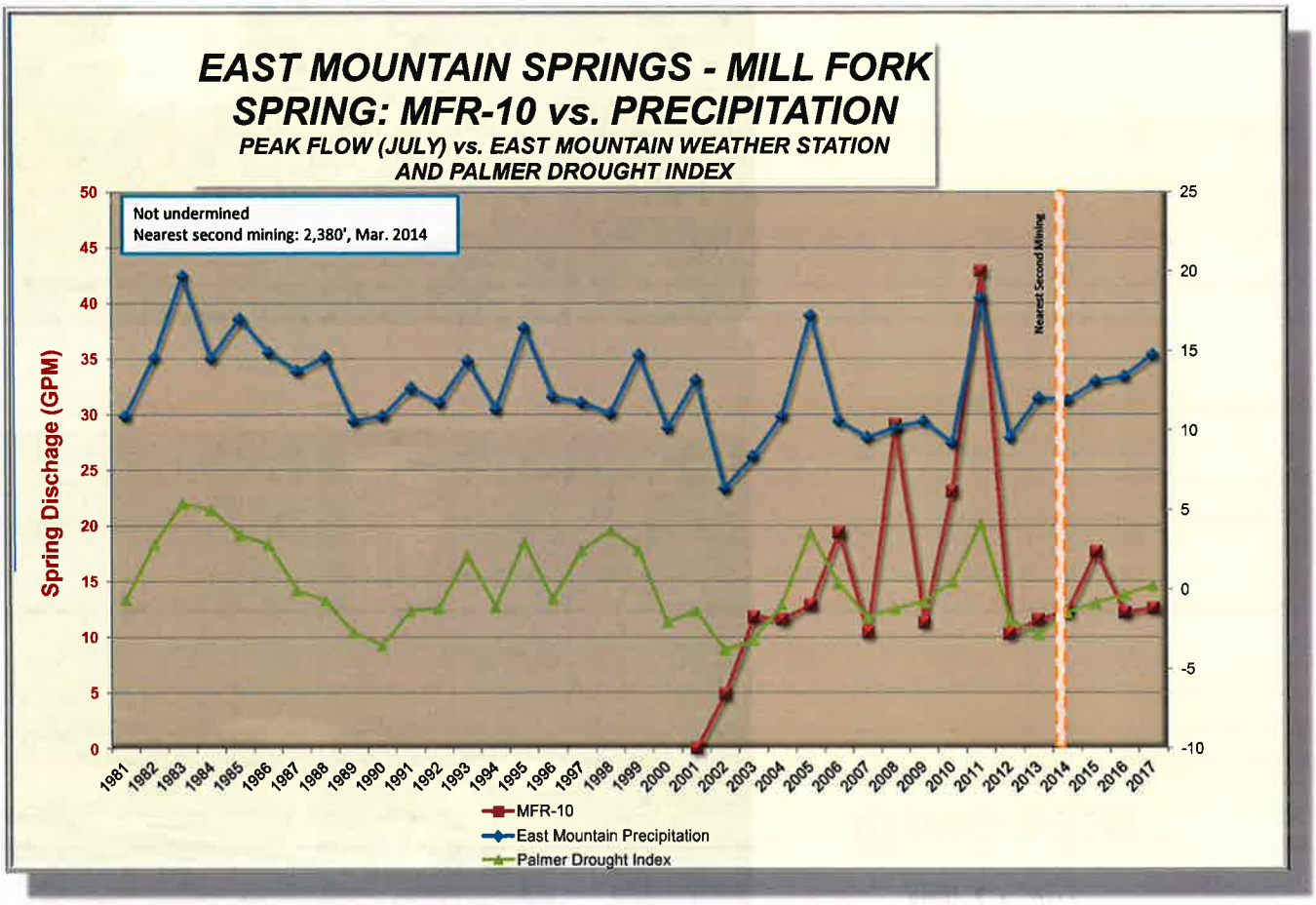
MFR-10 Spring Source

MFR-10 Trough

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**MFR-10**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**2380'**
Date of Nearest Mining:	**Mar-14**

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20140301 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	326	228	263.73	26	260	229	244.75	8	BICARBONATE
CALCIUM	82.6	65	73.1584	26	74.25	58.28	65.83	8	CALCIUM
CARBONATE	6	0	0.46153	13	0	0	0	8	CARBONATE
CHLORIDE	4	2	2.38846	26	2	2	2	8	CHLORIDE
CONDUCTIVITY	618	380	525.5	26	545	497	517.25	8	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	151	2.4	15.4926	26	17.65	1.7	8.1375	8	FLOW
HARDNESS	305	253	279.653	26	288	236	261.75	8	HARDNESS
TOTAL IRON	1.34	0	0.19225	20	0	0	0	8	TOTAL IRON
DISSOLVED IRON	0	0	0	12	0	0	0	8	DISSOLVED IRON
MAGNESIUM	25.8	22	23.563	26	25.76	20.57	23.7175	8	MAGNESIUM
DISSOLVED MANGANESE	0.04	0	0.00431	16	0	0	0	8	DISSOLVED MANGANESE
MANGANESE	0	0	0	12	0	0	0	8	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.41	7.31	8.07038	26	8.54	8.16	8.2625	8	PH
POTASSIUM	1.15	0.48	0.82054	22	1.2	0.64	0.82875	8	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	6	2	4.04692	26	5.86	2.81	4.30125	8	SODIUM
SULFATE	29	11	23.073	26	31	19	25.375	8	SULFATE
SUSPENDED SOLIDS	267	267	267	1	0				SUSPENDED SOLIDS
TEMPERATURE	44.9	3.9	7.99615	26	50.1	2.4	11.675	8	TEMPERATURE
TOTAL DISSOLVED SOLIDS	341	262	295.346	26	314	269	291.75	8	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 13, Township 16 South, Range 7 East, SLB&M. This site is located within the Deer Creek mine permit boundary and Federal Coal lease UTU-88554.

Lease Association: Spring MF-7 is located in Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MF-7.

Subsidence: No subsidence has been detected near MF-7. **Nearest second mining is 1,707' west of MF-7. MF-7 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-7. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-7 is located on hillside near Mill Fork drainage on a north facing slope covered with spruce trees. Flow from spring MF-7 generally ranges from 10 gpm to a maximum of 65 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-7:

- Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.
- Geologic Formation: Blackhawk Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: At base.

Justification for removal from monitoring: MF-7 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-7 be removed from the monitoring program.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-7**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
34' S.	1244' W.	NE	13	16S	6E	8580

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Blackhawk	None	None	320' below top

Location Comments: Spring located on hillside near Mill Fork drainage on north facing slope covered with spruce trees.

Probable Recharge Area: Areas of higher elevation located to the southwest.

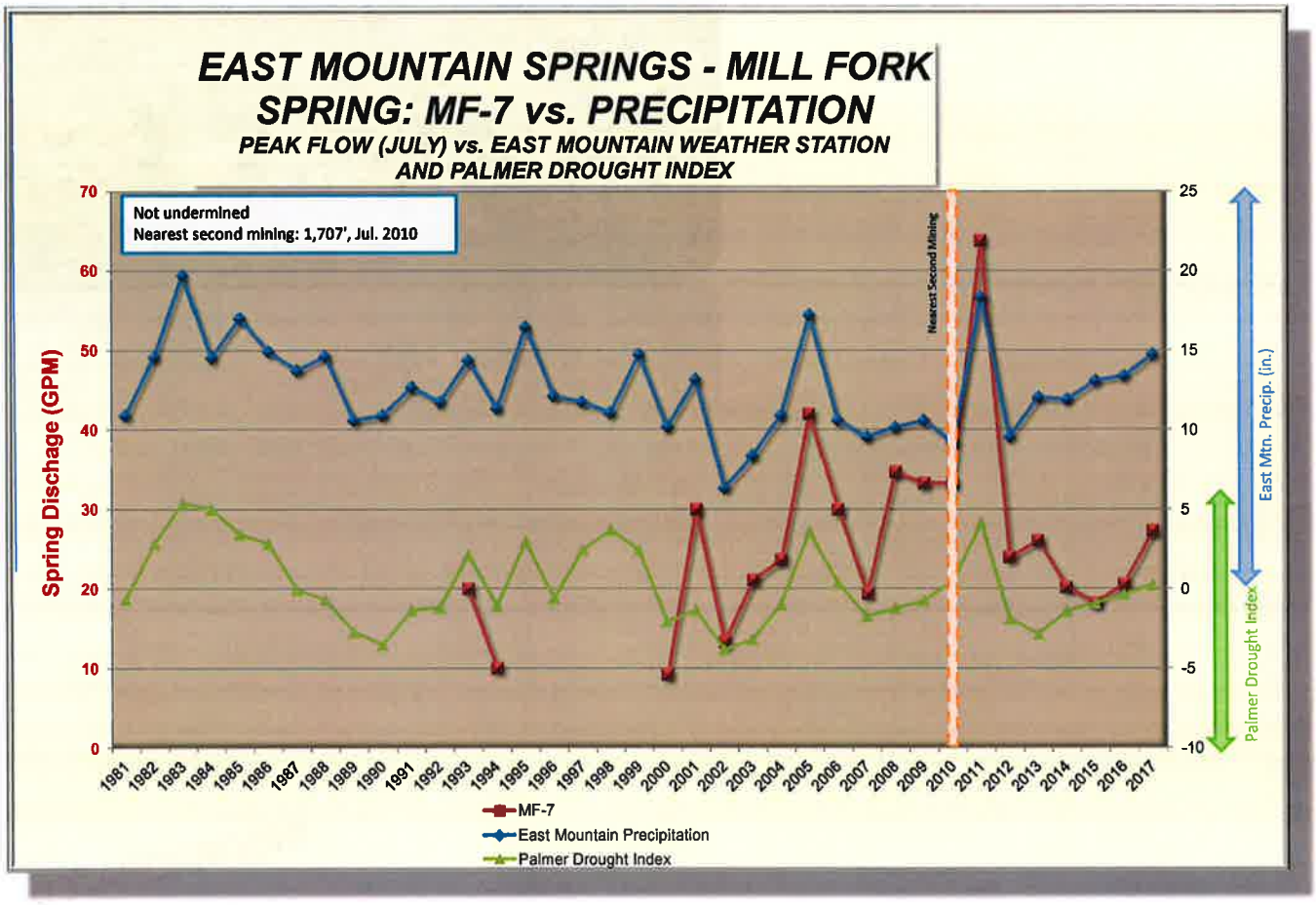
Relationship to Adjacent Springs: This spring occurs in the same manner as MF-8A.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Occurrence of Spring:

Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

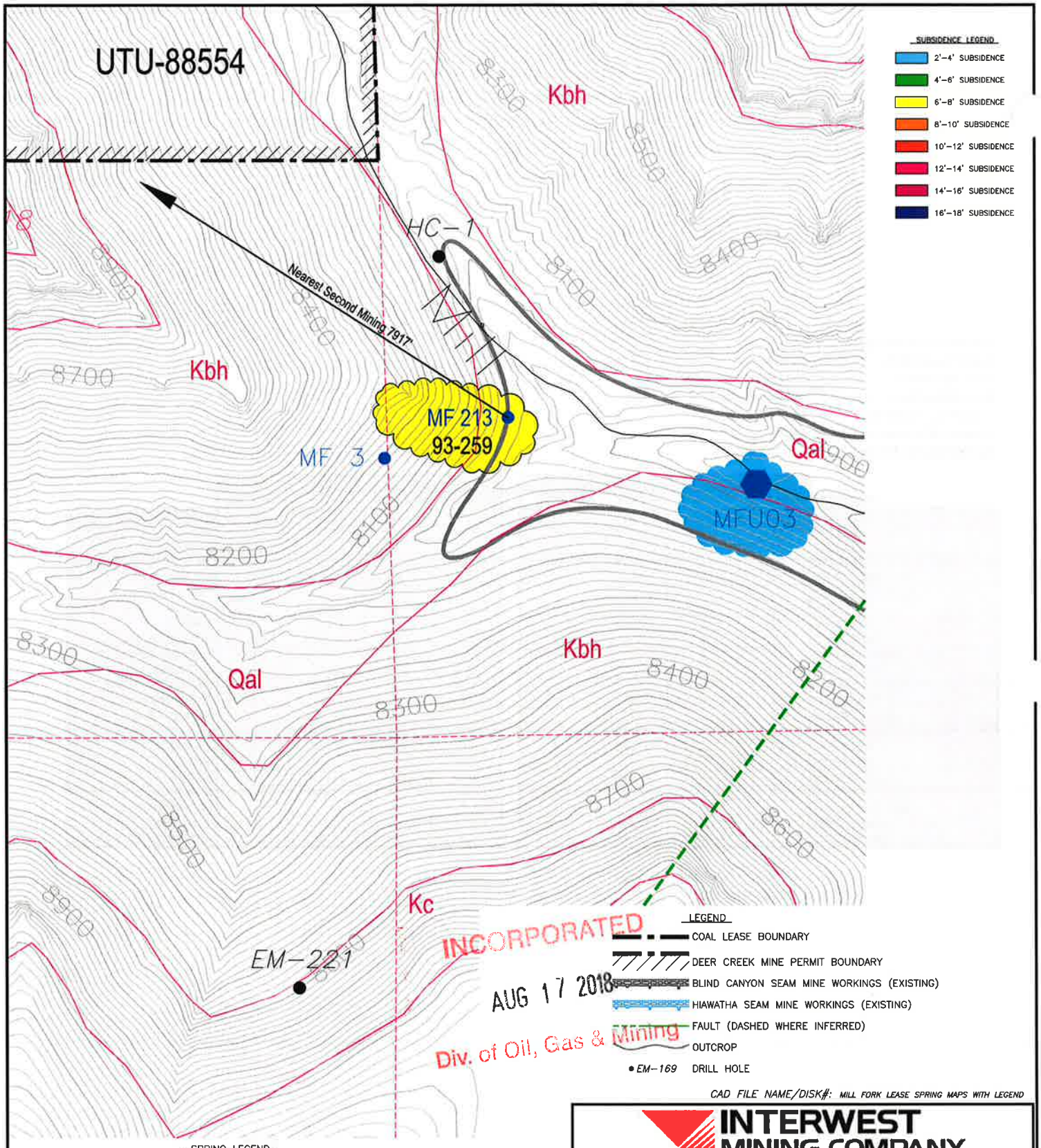


INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MF-7
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 1707'
Date of Nearest Mining: Jul-10

	Pre-Mining Data: 20000101 THROUGH 20100630				Post-Mining Data: 20100701 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	335	242	279.21	19	277	250	262.9375	16	BICARBONATE
CALCIUM	77.1	65	72.901	19	77.13	36.37	70.0975	16	CALCIUM
CARBONATE	0	0	0	4	12	0	0.75	16	CARBONATE
CHLORIDE	4	2	2.71052	19	3	2	2.5	16	CHLORIDE
CONDUCTIVITY	681	512	583.263	19	670	532	593.4375	16	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	42	9.3	21.5315	19	63.8	12.8	24.5931	16	FLOW
HARDNESS	325	269	303.105	19	325	160	293.0625	16	HARDNESS
TOTAL IRON	0.1	0	0.02	5	1.18	0	0.101875	16	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0	0	0	16	DISSOLVED IRON
MAGNESIUM	32.3	26	29.4015	19	32.32	16.75	28.665	16	MAGNESIUM
DISSOLVED MANGANESE	0	0	0	4	0.139	0	0.010125	16	DISSOLVED MANGANESE
MANGANESE	0	0	0	4	0	0	0	16	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8	7.45	7.80842	19	8.5	7.7	7.875625	16	PH
POTASSIUM	1.46	1	1.15833	18	1.84	1.04	1.34625	16	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	7	4	6.07789	19	68.11	6.87	13.59375	16	SODIUM
SULFATE	55	39	45.8315	19	74	29	51.8125	16	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	18.8	3.5	5.38333	18	40.5	4.4	7.25625	16	TEMPERATURE
TOTAL DISSOLVED SOLIDS	360	298	326.947	19	415	298	345.0625	16	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 9	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 9 OF 10	REV. ___

Location: Section 17, Township 16 South, Range 7 East, SLB&M. This site is located within ½ mile offset of the Deer Creek mine permit boundary and Federal Coal lease UTU-88554.

Lease Association: Spring MF-213 is located within ½ mile offset of Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of MF-213.

Subsidence: No subsidence has been detected near MF-213. **Nearest second mining is 7,915' west of MF-213. MF-213 is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring MF-213. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 2000 and has continued through 2017. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - MF-213 is located near drainage bottom (Mill Fork - Right Fork) on an east/southeast facing slope covered with mountain brush, conifers and aspens. Large tufa deposits. Flow from spring MF-213 generally ranges from 15 gpm to a maximum of 70 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Geologic Mode of Occurrence for spring MF-213:

- Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.
- Geologic Formation: Blackhawk Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: At base.

Justification for removal from monitoring: MF-213 has been monitored by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site MF-213 be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **MF-213**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
1489' N.	584' E.	SW	17	16S	R7E	8030

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Blackhawk	None	93-259	At base

Location Comments: Spring located near drainage bottom (Mill Fork - Right Fork) on east/southeast facing slope covered with mountain brush, conifers and aspens. Large tufa deposits.

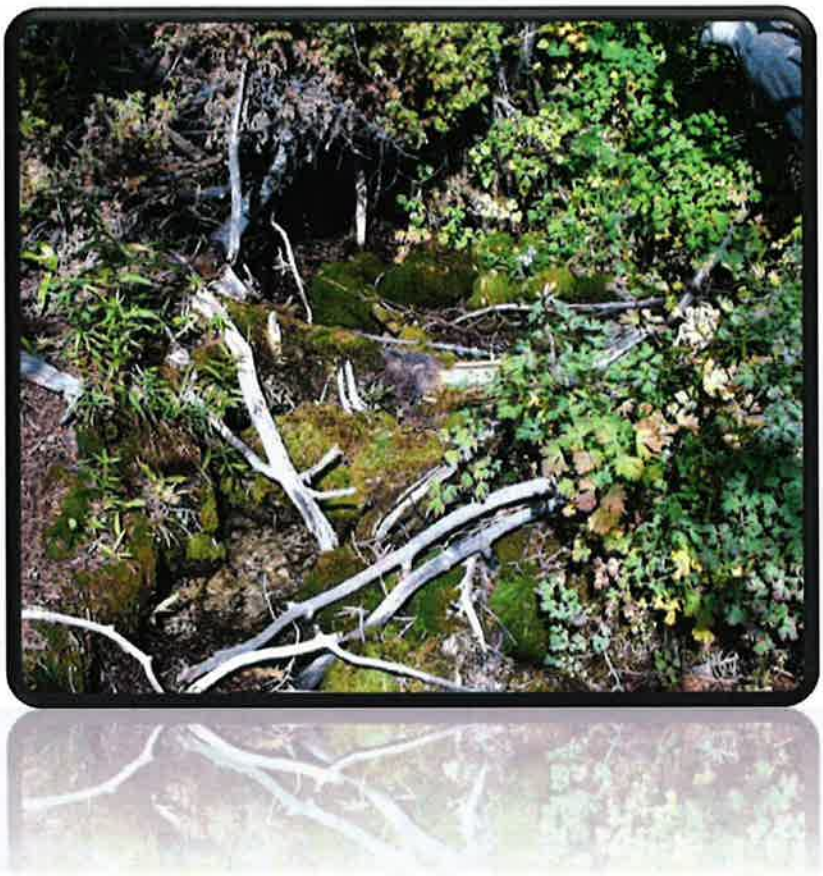
Probable Recharge Area: Areas of higher elevation located to the west.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

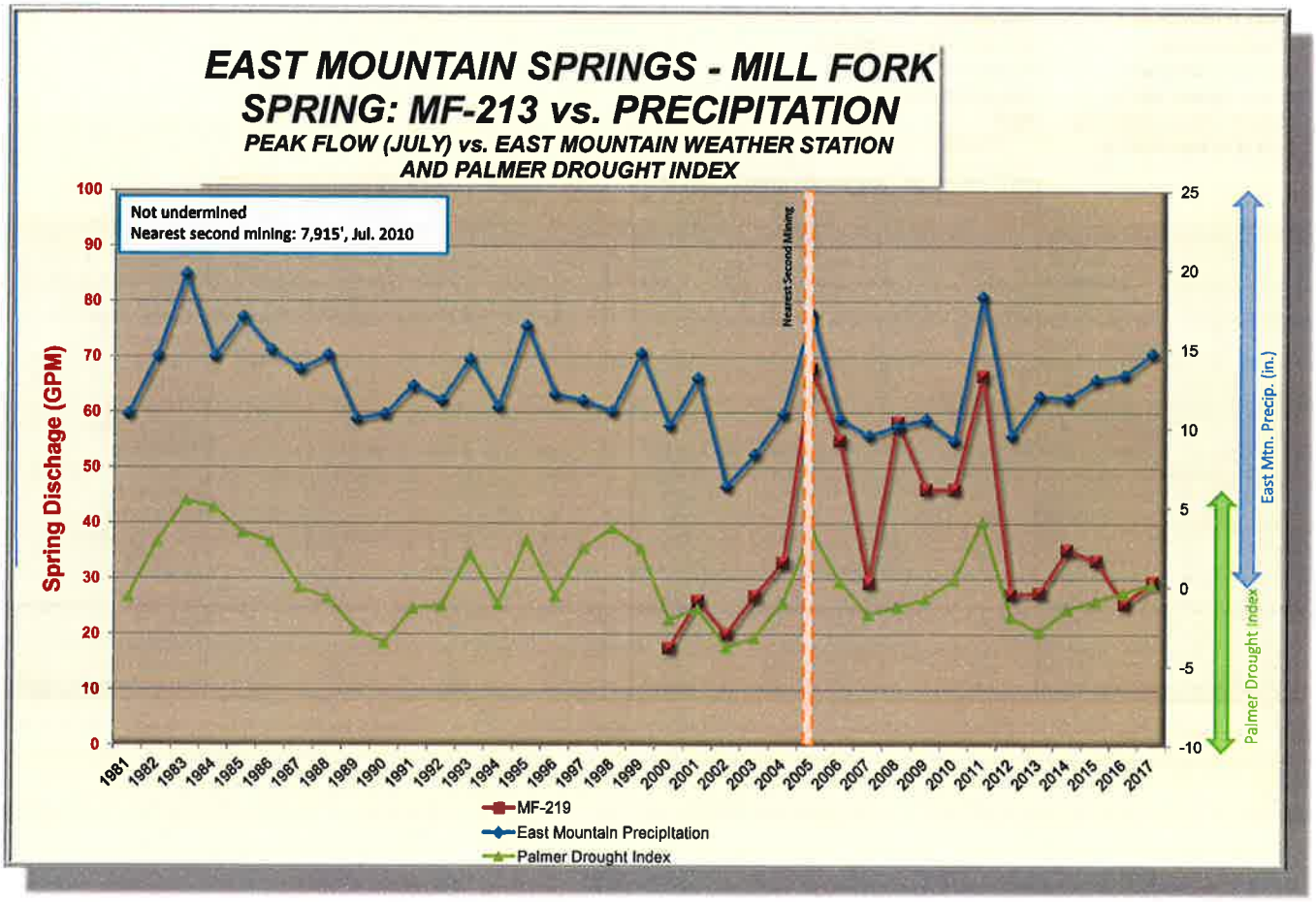
Relationship to Adjacent Springs: This spring occurs in the same manner as MF-3.

Geologic Occurrence of Spring:

Water flowing along fractures in the Blackhawk Formation intersects the land surface forming a spring.



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring: MF-213
Water Quality Data: Operational
Mine Association: Deer Creek Mine - Mill Fork
Date of Development: Not undermined
Date of Second Mining: Not undermined
Location of Nearest Mining: 7915'
Date of Nearest Mining: Jul-10

	Pre-Mining Data: 20000101 THROUGH 20100630				Post-Mining Data: 20100630 THROUGH 20172131				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	332	241	279.842	19	261	226	252.25	16	BICARBONATE
CALCIUM	69.1	61	65.341	19	68.57	52.08	63.3456	16	CALCIUM
CARBONATE	9	0	1.8	5	5	0	0.3125	16	CARBONATE
CHLORIDE	4	2	2.66315	19	3	2	2.4375	16	CHLORIDE
CONDUCTIVITY	752	435	551.105	19	551	497	525.8125	16	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	68	10	28.2315	19	66.7	14.3	28.2075	16	FLOW
HARDNESS	294	272	283.157	19	290	227	273.75	16	HARDNESS
TOTAL IRON	0.313	0	6.88333	6	1.16	0	0.0725	16	TOTAL IRON
DISSOLVED IRON	0	0	0	4	0	0	0	16	DISSOLVED IRON
MAGNESIUM	31	27.4	29.1584	19	29.96	23.53	28.0681	16	MAGNESIUM
DISSOLVED MANGANESE	0.004	0	0.0008	5	0.067	0	0.00418	16	DISSOLVED MANGANESE
MANGANESE	0.004	0	0.0008	5	0	0	0	16	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	8.22	7.21	7.95105	19	8.45	8.03	8.138125	16	PH
POTASSIUM	1.2	0.93	1.02982	17	1.39	0.95	1.085	16	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	7	4.61	5.55	19	8.86	5.08	6.72375	16	SODIUM
SULFATE	29	23	25.4526	19	52	23	28.375	16	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	10.6	5.6	7.85789	19	50.8	6.1	11.4125	16	TEMPERATURE
TOTAL DISSOLVED SOLIDS	324	264	294.473	19	352	280	299.5	16	TOTAL DISSOLVED SOLIDS

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Location: Section 9, Township 16 South, Range 7 East, SLB&M. This site is located 1 ½ mile east of the Deer Creek mine permit boundary and Federal Coal lease UTU-88554.

Lease Association: Little Bear Spring is located 1 ½ mile east of Federal Coal lease UTU-88554. The lease was originally acquired from the State Institutional Trust Lands Administration on April 1, 1999 and designated as ML-48258. State Lease ML-48258 reverted to the Bureau of Land Management on July 11, 2011 and was assigned the lease number of UTU-88554. Both the Hiawatha and Blind Canyon seams have been mined in this lease. Room and pillar mining began in the Hiawatha Seam in December 2003 with the first longwall retreat in August 2003. Blind Canyon seam development began in May 2006 with the first longwall retreat in February 2008. After completion of mining in the Blind Canyon seam, production resumed in the Hiawatha seam with final production occurring on January 7, 2015. No mining occurred in vicinity of Little Bear Spring.

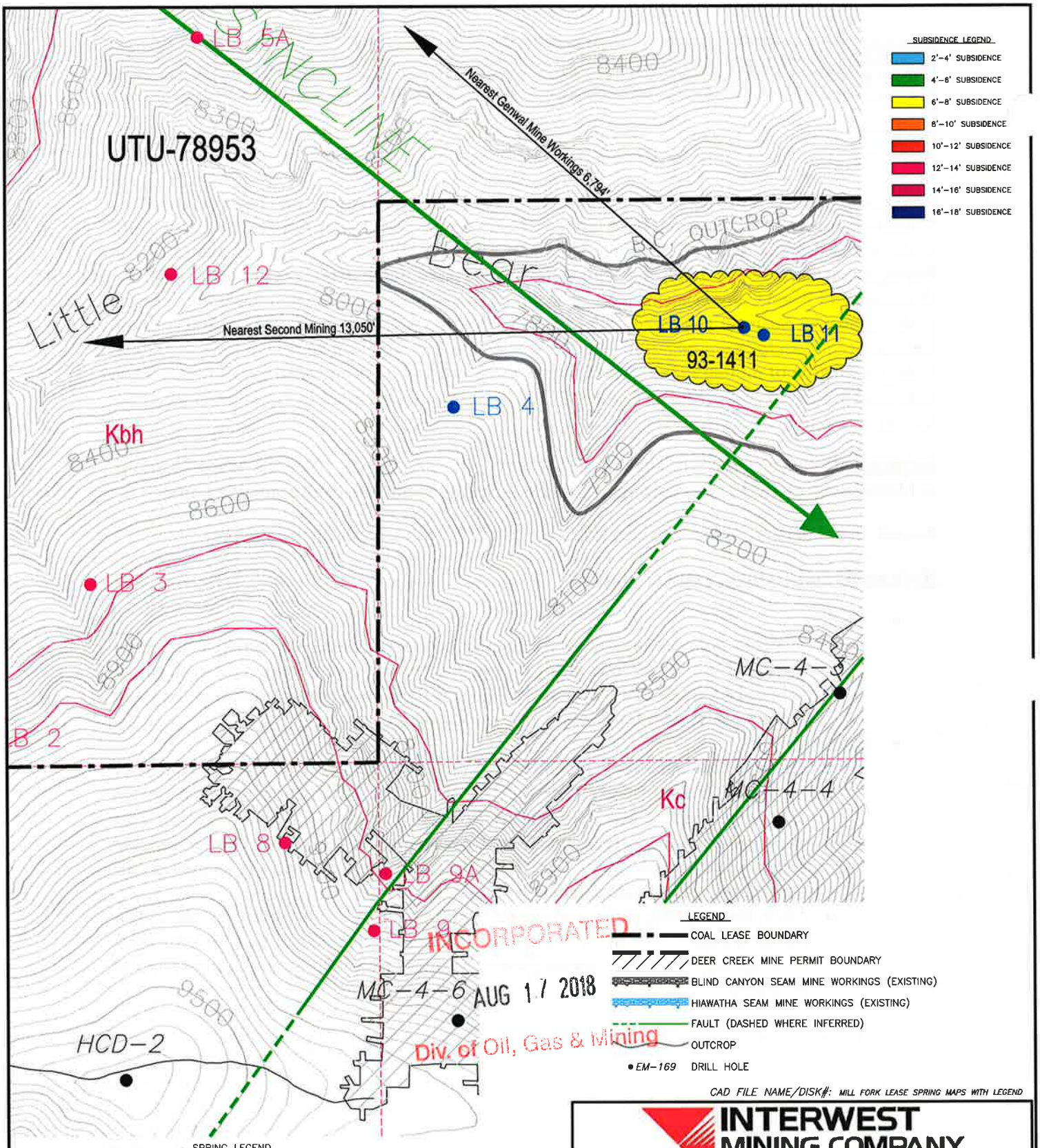
Subsidence: No subsidence has been detected near Little Bear Spring. **Nearest second mining is 13,050' west of Little Bear Spring. Little Bear Spring is outside of the subsided area.**

For additional data related to subsidence refer to the 2017 Annual Subsidence Report.

Hydrologic Data (Quality and Quantity):

- Quality
  - Historic pre/post mining water quality data is included for spring Little Bear Spring. Date of database query for pre/post mining determination for each spring is based on the date of the nearest mining. Data show no abnormalities in the water quality parameters for this area of East Mountain.
- Quantity
  - Historic flow data has been collected from 1982 and has continued through 2017 by Castle Valley Special Service District. This information is found on the following page where July spring flow is plotted against precipitation data collected from the East Mountain weather station, as well as the Palmer Drought Index for regions 4, and 5. The East Mountain weather station is located on the southern tip of East Mountain.
  - Little Bear Spring is located on the south slope of Little Bear Canyon. Main culinary supply to CVSSD (Cities of Huntington, Cleveland and Elmo). Flow from spring Little Bear Spring generally ranges from 225 gpm to a maximum of 475 gpm.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

CAD FILE NAME/DISK#: MILL FORK LEASE SPRING MAPS WITH LEGEND

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-88554
MILL FORK SPRINGS DETAILED SUBSIDENCE DATA

DRAWN BY:	K. LARSEN	MAP 10	
SCALE:	1" =600'	DRAWING #:	
DATE:	MAY 7, 2018	SHEET 10 OF 10	REV. ___

Geologic Mode of Occurrence for spring Little Bear Spring:

- Multiple potential recharge sources have been identified; south: fracturing related to the Mill Fork Graben, west: fractures - Little Bear Canyon, north: fractures - Huntington Creek Drainage.
- Geologic Formation: Blackhawk Formation (refer to Geologic Occurrence sheet).
- Stratigraphic Position: At base.

Justification for removal from monitoring: Little Bear Spring has been monitored by Castle Valley Special Service District since 1982 and by PacifiCorp since 2000. There have been no reported occurrences in which mining has impacted this site. Historic quality and quantity data have not indicated such impacts to the site.

All mining activities in Lease UTU-88554 and adjacent Federal Lease UTU-84285 ceased as of January 7, 2015. Deer Creek Mine portals were sealed April 17, 2015 as a facet of the Deer Creek mine closure process. All mining equipment including the mine dewatering system was removed from the mine prior to sealing. Withdrawal of all mining equipment inby the parallel plug locations commenced upon completion of mining PacifiCorp coordinated removal of the mining equipment, including conducting environmental inspections, with the subsurface management agency and State of Utah regulators. A double redundant French drain system (two separate well screen intake setups installed in two separate portals) was installed in the two lowest elevation portals at the Deer Creek Mine site to allow for a permanent post mine gravity discharge of groundwater from the southern portion of the mine. The remaining Rilda Canyon portion was left open while implementing mitigation measures to handle anticipated intercepted groundwater. Final sealing of the Rilda Canyon 1st Right portals consisted of first constructing a water drainage system including an in-mine collection gallery together with the construction and permanent placement of a water pipeline from Rilda Canyon 1st Right to the Huntington Power Plant raw water pond. The pipeline project was completed in November 2017. The final Rilda Canyon 1st Right portal sealing consisted of two 25-foot thick concrete portal plugs with water drains, one each in the 1st Right facility fan and roadway portals, that were constructed on November 8 and 10, 2017, and high strength panel seals, one each in the Left Fork facility fan and roadway portals completed on December 18 and December 20, 2017. The portal seals were constructed to meet or exceed regulatory requirements of 30CFR 75.1711. With the completion of the Rilda Canyon Left Fork Portals seals, final abandonment and closure of the Deer Creek Mine has been concluded. PacifiCorp will commence with final reclamation activities of the entire Deer Creek Mine complex per the approved reclamation plan.

With the completion of three years of hydrologic monitoring after the last date of mining, PacifiCorp formally requests that site Little Bear Spring be removed from the monitoring program.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

EAST MOUNTAIN

MILL FORK SPRING & SEEP SURVEY

GEOLOGIC OCCURRENCE

Spring Name/Number: **Little Bear Spring**

Location		From Section Corner	Section	Township	Range	Elevation (above mean sea level)
Feet	Feet					
2028' N.	1726' E	SW	9	16S	6E	7540

Geologic Formation	*Development*	*Water Right*	*Stratigraphic Position*
Star Point Sandstone Panther Member	Developed With Collection Boxes & Pipeline	93-1411	near base

Location Comments: Spring located on the south slope of Little Bear Canyon. Main culinary supply to CVSSD (Cities of Huntington, Cleveland and Elmo).

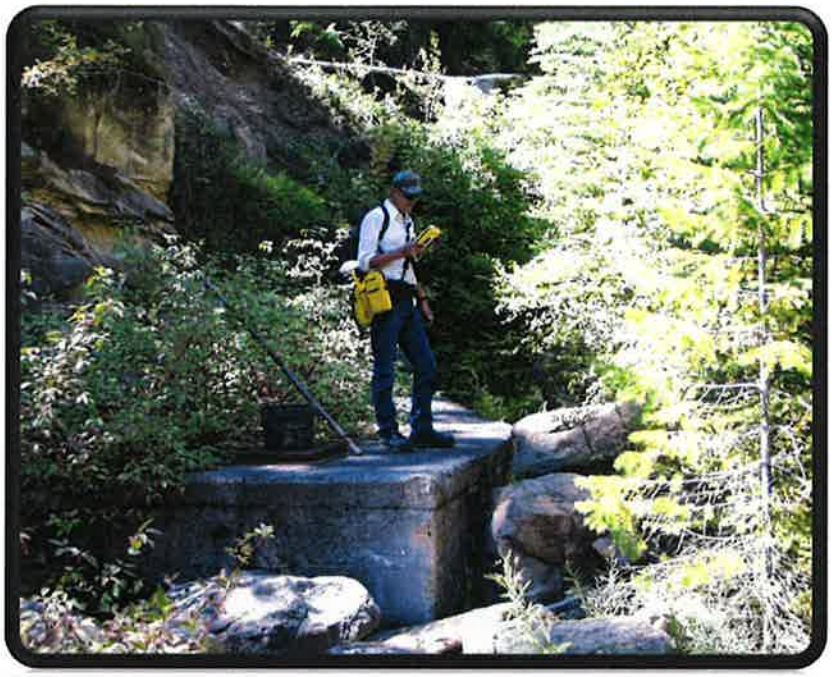
RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

Probable Recharge Area: Multiple potential recharge sources have been identified; south: fracturing related to the Mill Fork Graben, west: fractures - Little Bear Canyon, north: fractures - Huntington Creek Drainage

Relationship to Adjacent Springs: This spring is not related to other springs within the immediate area.

Geologic Occurrence of Spring:

Water flowing through fractures in the lower section of the Star Point Sandstone (Panther Member) intersects the surface.



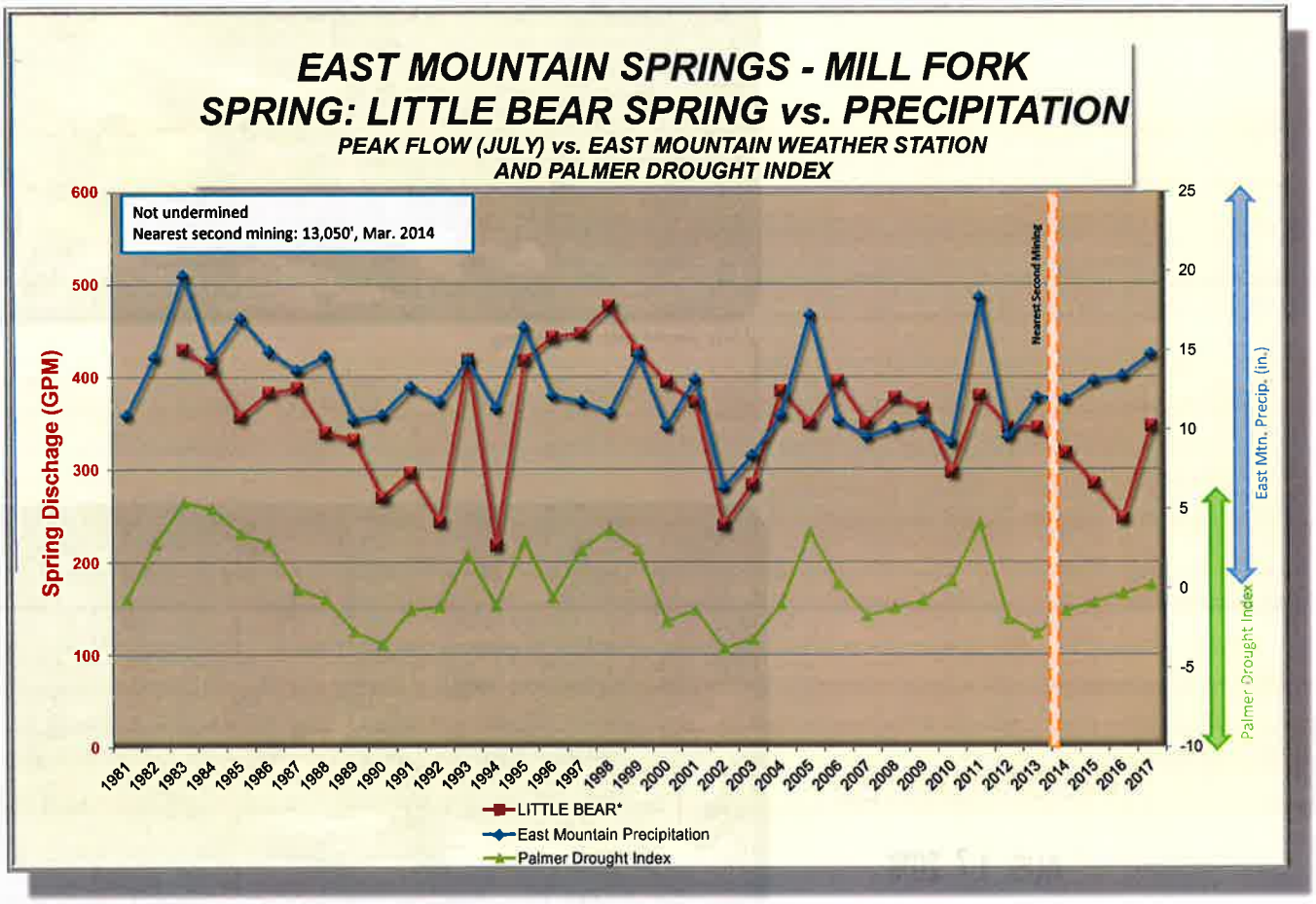
Little Bear Collection System

Little Bear Collection System

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

East Mountain Spring:	**Little Bear**
Water Quality Data:	**Operational**
Mine Association:	**Deer Creek Mine - Mill Fork**
Date of Development:	**Not undermined**
Date of Second Mining:	**Not undermined**
Location of Nearest Mining:	**13,050'**
Date of Nearest Mining:	**Mar. 2014**

	Pre-Mining Data: 20000101 THROUGH 20140228				Post-Mining Data: 20140301 THROUGH 20171231				
PARAMETER	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	MAXIMUM	MINIMUM	AVERAGE	# ANALYSIS	
BICARBONATE	354	265	284.523	21	290	265	277.25	8	BICARBONATE
CALCIUM	68.85	63.45	66.4838	21	67.46	60.63	63.78	8	CALCIUM
CARBONATE	0	0	0	10	0	0	0	8	CARBONATE
CHLORIDE	6	3	3.95238	21	9	3	4.25	8	CHLORIDE
CONDUCTIVITY	650	559	592.142	21	596	526	576.625	8	CONDUCTIVITY
DISSOLVED OXYGEN	0				0				DISSOLVED OXYGEN
FLOW	387	270	338.1	14	347	247	294.625	8	FLOW
HARDNESS	330	294	315.571	21	321	293	306.5	8	HARDNESS
TOTAL IRON	0.21	0	2.66153	13	0.27	0	0.04625	8	TOTAL IRON
DISSOLVED IRON	0.006	0	5.45454	11	0	0	0	8	DISSOLVED IRON
MAGNESIUM	38.5	32.91	36.2995	21	38.17	33.28	35.75	8	MAGNESIUM
DISSOLVED MANGANESE	0.003	0	0.0003	10	0.008	0	0.00225	8	DISSOLVED MANGANESE
MANGANESE	0.007	0	6.36363	11	0	0	0	8	MANGANESE
OIL AND GREASE	0				0				OIL AND GREASE
PH	7.68	7.04	7.4138	21	7.67	7.39	7.50375	8	PH
POTASSIUM	3.4	1.36	1.65619	21	2.1	1.37	1.58125	8	POTASSIUM
SET SOLIDS	0				0				SET SOLIDS
SODIUM	11.2	6.41	7.29238	21	9.91	7.57	8.83875	8	SODIUM
SULFATE	41	31	36.9047	21	44	38	41.625	8	SULFATE
SUSPENDED SOLIDS	0				0				SUSPENDED SOLIDS
TEMPERATURE	10.6	5.4	9.07	20	10.1	8.3	9.2125	8	TEMPERATURE
TOTAL DISSOLVED SOLIDS	356	298	324.523	21	383	311	335.625	8	TOTAL DISSOLVED SOLIDS

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

Deer Creek Mine
Federal Coal Lease UTU-84285 Full Lease Relinquishment
Appendix D

Evaluation of Impacts to Vegetation

Vegetation of Lease UTU-84285 is diverse, ranging from sagebrush, pinyon – juniper to brush, with groves of aspen trees and spruce - fir. A breakdown of vegetation type in the relinquishment area is shown below (mid-level vegetation provided by the Manti-LaSal National Forest Price Office):

Vegetation Types – UTU-84285:	
Aspen	AS
Aspen/Conifer	AS/C
Riparian Woody	RW
Spruce/Fir	SF

Previous relinquishment documents submitted by PacifiCorp have included comparative sets of periodic infrared aerial photographs to detect changes in vegetation that might be related to mining. Until 2011, PacifiCorp had submitted aerial photographs on 1-year intervals and color infrared photographs on 5-year intervals. PacifiCorp attempted to detect changes in vegetation that might be caused by mining using both the color and color infrared images without success. The inability to detect changes in vegetation that might be caused by mining is due to several factors – spreading insect infestations in forests, forest fires, variation in precipitation from year to year, variations in the time of year when each set of photographs is taken, and the quality of the photographs themselves. These factors make it difficult or impossible to detect any changes that might be caused by mining activities. PacifiCorp amended the Deer Creek Mine permit to exclude this requirement in 2011; UDOGM approved the amendment on July 28, 2011 (see following correspondence and permit changes).

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

P.O. Box 310
15 North Main Street
Huntington, Utah 84528

July 7, 2011

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

Subj: **Amendment to Remove the Commitment to Conduct Periodic Vegetation Surveys using Color and Color Infrared Aerial Photographs, Pacificorp, Deer Creek Mine, C/015/0018, Emery County, Utah**

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company ("Energy West") as mine operator, hereby submits an amendment to remove the commitment to conduct periodic vegetation surveys using color and color infrared photographs from the Deer Creek Mine Permit. Submission of this amendment is in response to the 2010 Annual Report Review Completion, Task ID #3793, requesting submission of aerial photography for vegetation monitoring purposes.

Energy West has had aerial photographs taken of the active mining areas in black and white every year, and color and color infrared every 5 years. Energy West has attempted to detect changes in vegetation that might be caused by mining by interpreting these sets of photographs without success. The inability to detect changes in vegetation that might be caused by mining using color and color infrared images is due to several factors - spreading insect infestations in forest stands, variations in precipitation from year to year, variations in the time of year when the photographs are taken, and the quality of the photographs themselves. These factors make it difficult or impossible to detect any changes that might be caused by mining activities. Aerial photography, whether color or color infrared, will no longer be used for this purpose.

This amendment includes changes in Volume 1 as outlined below. Please refer to redline/strikeout text herein:

- Volume 1, Part 2 Environmental Resources, page 2-174

A redline/strike copy of the amended page has been included with this submittal. The required C1/C2 forms are also included. If you have any question or concern with this submittal please feel free to call myself at (435) 687-4712 or Dennis Oakley at (435) 687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Manager of Geology and Environmental Affairs

Enclosures: C1/C2 Forms
Volume 1, Part 2 Environmental Resources, page 2-174

cc: file

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

VEGETATION MONITORING PLAN - DEER CREEK MINE R645-301-321

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive or regressive impacts ~~and final effects of the underground mining activities~~ on vegetation at the Deer Creek mine ~~on vegetation~~. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas ~~that will be impacted by underground mining~~. The monitoring shall be an extension of the baseline data as outlined in the Deer Creek PAP Volume 1.

Aerial photography taken annually up to present (2009) ~~will~~ be has been used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation. There has been no detected stress or any other impacts to vegetation using aerial photography.

Because stress to vegetation within the permit area is so much more subject to the natural forces in nature, (fire, insect infestation, drought, etc.) aerial photography will no longer be used.

~~Infrared photography was taken of impacted surface areas during September, 1987. This will be repeated in 1992 and continued on a five year schedule.~~ Reference area qualitative and quantitative monitoring at the Deer Creek Mine has been conducted at least on five year intervals in the past. Qualitative and quantitative monitoring was last conducted in 2007 and will continue on five year intervals through mine through reclamation and bond release.

~~Each vegetation type mapped and monitored will be based on a~~

INCORPORATED
2-174
AUG 17 2018
Div. of Oil, Gas & Mining

~~dominant overstory and a dominant understory species to be consistent with Unita Southwestern Coal Region Data Adequacy Standards. The details of monitoring and analyses will be developed in cooperation with the US Forest Service.~~

The vegetation monitoring information for reference areas and reclamation sites ~~and an~~ will be evaluat~~ion~~ed ~~of the impacts of mining on vegetation will be~~ and submitted in an annual report following the year in which monitoring is conducted.

SOILS INFORMATION R645-301-200

Portal and support facility areas for the Deer Creek Mine are cut into steep, nearly perpendicular rock cliffs. The areas are dominated by rock outcrop, rubble land, and shallow soils.

Nowhere in the vicinity of the mine is there a source of material which would usually be referred to as 'topsoil'. Soil tests on the disturbed and undisturbed areas and coal waste show that the materials in the portal area should support selected vegetative materials. These test results, therefore, preclude the recommendation for procurement of topsoil for reclamation since the exposed materials are suitable growth media if properly managed. The one exception is that if during mining operations toxic substances are concentrated, it will be necessary to sample these areas periodically and take the necessary reclamation measures to dispose of or cover the areas in order to assure success of revegetation attempts. Results of soil analyses are summarized in Part 4, Reclamation Plan.

The applicant commits to fulfilling the requirements of

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

GARY R. HERBERT
Governor
GREGORY S. BELL
Lieutenant Governor

State of Utah
DEPARTMENT OF NATURAL RESOURCES
MICHAEL R. STYLER
Executive Director
Division of Oil, Gas and Mining
JOHN R. BAZA
Division Director

July 28, 2011

Kenneth S. Fleck, Geology and Environmental Affairs Manager
Energy West Mining Company
P.O. Box 310
Huntington, Utah 84528

Subject: Final Approval, Deer Creek Mine, C/015/0018, Remove Vegetation Survey Commitment, Task ID #3869

Dear Mr. Fleck:

The above-referenced amendment was conditionally approved on July 21, 2011 upon receipt of 8 clean copies. We received the requested clean copies on July 28, 2011. Enclosed is a stamped incorporated copy for insertion into your copy of the Mining and Reclamation Plan.

Thank you for your help during this process. If you have any questions, please feel free to call me at (801) 538-5325.

Sincerely,

Daron R. Haddock
Coal Program Manager

DRH/sgs
Enclosure
cc: Kenneth Walker, OSM
Jeff McKenzie, BLM
Pam Brown, USFS
Larry Crist, USFWS w/o
Marc Stilson, Water Rights w/o
Dave Ariotti, DEQ w/o
Chris Wood, DWR w/o
Kevin Carter, TLA w/o
Price Field Office
O:\015018.DER\WG3869\FinApp.doc

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

1594 West North Temple, Suite 1210, PO Box 145801, Salt Lake City, UT 84114-5801
telephone (801) 538-5340 • facsimile (801) 359-3940 • TTY (801) 538-7458 • www.ogm.utah.gov

UTAH DNR OIL, GAS & MINING

ENERGY WEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

P.O. Box 310
15 North Main Street
Huntington, Utah 84528

July 27, 2011

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

Subj: Clean Copy Submittal for Task ID #3869, PacifiCorp, Deer Creek Mine, C/015/0018, Emery County, Utah

PacifiCorp, by and through its wholly-owned subsidiary, Energy West Mining Company "Energy West" as mine operator, hereby submits the clean copies to the above approved amendment to update the Deer Creek Mine Mining and Reclamation Plan.

Actions to finalize this amendment include removing and/or replacing the noted pages. As noted above, all clean copy pages are included with this submittal. After stamping "Approved" on the clean copy pages, the Division needs to complete the following:

- **Volume 1:** **Replace Page 2-174**

Eight (8) complete clean copies of this amendment are submitted for Division certification. A C2 form is included for organization of removal or replacement of items into the Deer Creek MRP. If you have any questions concerning this amendment, please contact myself at 435-687-4712 or Dennis Oakley at 435-687-4825.

Sincerely,

Kenneth S. Fleck

Kenneth Fleck
Geology and Environmental Affairs Manager

Cc: file

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

VEGETATION MONITORING PLAN - DEER CREEK MINE R645-301-321

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive or regressive impacts on vegetation at the Deer Creek mine. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas. The monitoring shall be an extension of the baseline data as outlined in the Deer Creek PAP Volume 1.

Aerial photography taken annually up to present (2009) has been used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation. There has been no detected stress or any other impacts to vegetation using aerial photography.

Because stress to vegetation within the permit area is so much more subject to the natural forces in nature, (fire, insect infestation, drought, etc.) aerial photography will no longer be used.

Reference area qualitative and quantitative monitoring at the Deer Creek Mine has been conducted at least on five year intervals in the past. Qualitative and quantitative monitoring was last conducted in 2007 and will continue on five year intervals through mine through reclamation and bond release.

The vegetation monitoring information for reference areas and reclamation sites will be evaluated and submitted in an annual report following the year in which monitoring is conducted.

SOILS INFORMATION R645-301-200

Portal and support facility areas for the Deer Creek Mine are cut into steep, nearly perpendicular rock cliffs. The areas are

INCORPORATED
JUL 28 2011
Div. of Oil, Gas & Mining

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Replaced

VEGETATION MONITORING PLAN - DEER CREEK MINE R645-301-321

The purpose of this monitoring plan is to define and establish a system to locate, measure, and quantify the progressive and final effects of the underground mining activities at the Deer Creek mine on vegetation. The monitoring system will utilize techniques which will provide a continuing record of change over time and an analytical method for location and measurement of a sufficient number of points located on surface areas that will be impacted by underground mining. The monitoring shall be an extension of the baseline data as outlined in the Deer Creek PAP Volume 1.

Aerial photography taken annually will be used for delineation of vegetative types, documentation of changes in vegetation and detection and monitoring of stressed vegetation.

Infrared photography was taken of impacted surface areas during September, 1987. This will be repeated in 1992 and continued on a five year schedule.

Each vegetation type mapped and monitored will be based on a dominant overstory and a dominant understory species to be consistent with Unita-Southwestern Coal Region Data Adequacy Standards. The details of monitoring and analyses will be developed in cooperation with the US Forest Service.

The vegetation monitoring information and an evaluation of the impacts of mining on vegetation will be submitted in an annual report following the year in which monitoring is conducted.

SOILS INFORMATION R645-301-200

Portal and support facility areas for the Deer Creek Mine are cut into steep, nearly perpendicular rock cliffs. The areas are

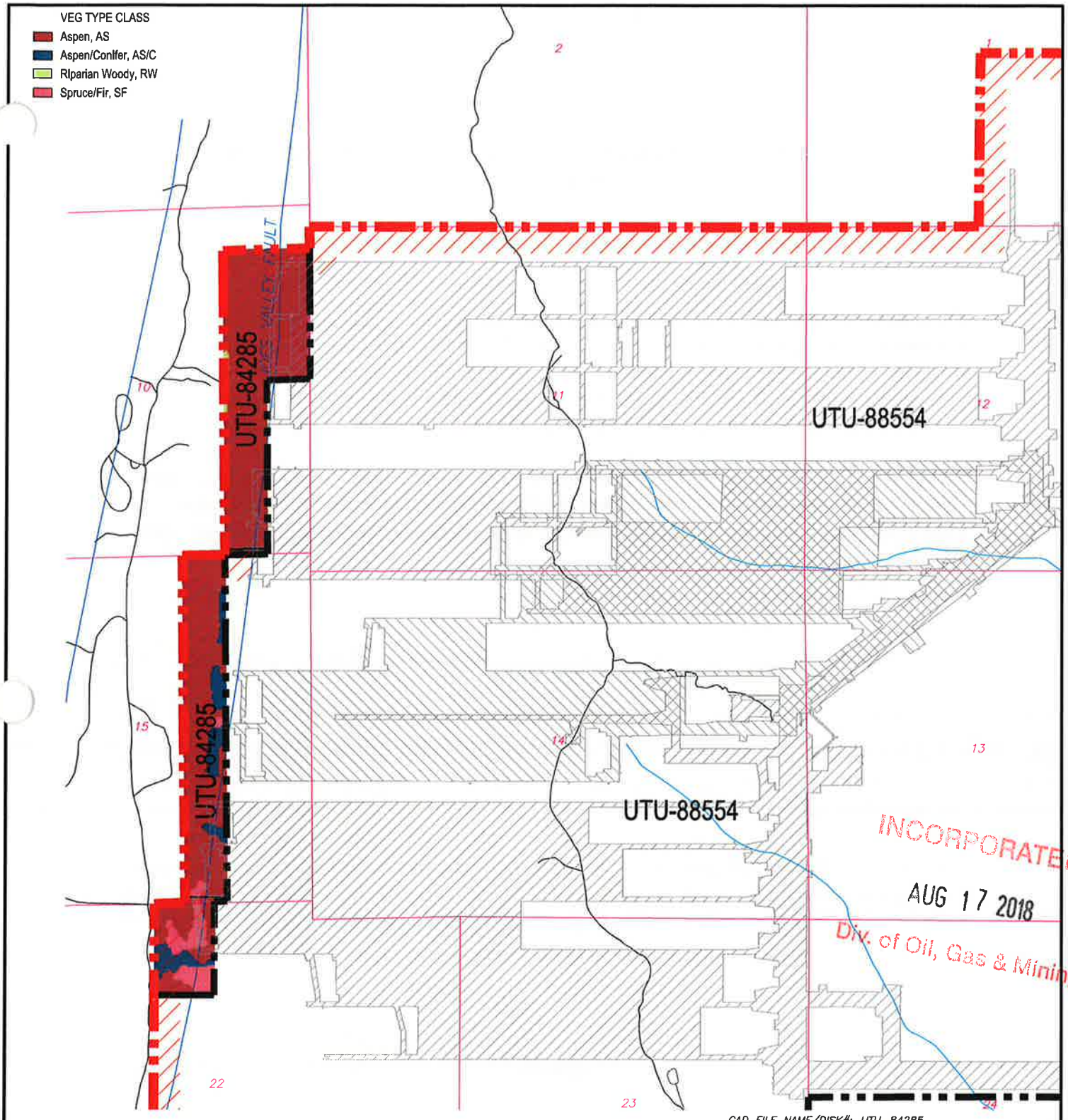
INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Based on PacifiCorp's observations, no mining-related impacts to vegetation have been witnessed observed or reported in the UTU-84285 area. There were no surface facilities or installations on this lease.

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

CAD FILE NAME/DISK#: UTU-84285

LEGEND

- LMU BOUNDARY UTU-73336
- COAL OUTCROP
- HIAWATHA SEAM MINE WORKINGS
- BLIND CANYON SEAM MINE WORKINGS
- FAULTS
- UTU-84285 FEDERAL LEASE NUMBER
- FEDERAL LEASE LINE
- ROADS
- DRAINAGE

N

INTERWEST MINING COMPANY
A SUBSIDIARY OF PACIFICORP

EAST MOUNTAIN PROPERTY – DEER CREEK MINE
FEDERAL COAL LEASE RELINQUISHMENT UTU-84285
VEGETATION BASE MAP

DRAWN BY:	K. LARSEN	APPENDIX D	
SCALE:	1" =2000'	DRAWING #:	
DATE:	APRIL 23, 2018	SHEET 1 OF 1	REV. ___

Deer Creek Mine
Federal Coal Lease UTU-84285 Full Lease Relinquishment
Appendix E

Evaluation of Impacts to Private Improvements

There is one private surface improvement in Lease UTU-84285. This is the 345 KV power transmission line that crosses the southwest corner of the lease. It is owned by PacifiCorp / Rocky Mountain Power. Two separate studies of the potential subsidence beneath this line were conducted in 1997 and 2004. The power line crosses the southwest corner of the lease. The 345 KV power line was not undermined within Lease UTU-84285 (see map in Appendix B).

To the best of the knowledge of the lessee through due inquiry including reconnaissance flights, subsidence surveys and periodic surface topography inspections, there are no mining-related impacts associated with the Deer Creek Mine to any private surface improvements on the lease area being relinquished.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Appendix "F"

ENVIRONMENTAL AND CERCLA CERTIFICATION

CERCLA certification documents for sealing various districts of panels within the UTU-84285 lease have been submitted when those districts were sealed. Previous CERCLA inspections within UTU-84285 have taken place in March 2008, January 2012, and October 2014. These inspections covered all areas of mining that took place within the UTU-84285 lease and the areas were approved for sealing.

On November 29, 2017, a hazardous/toxic waste inspection was conducted underground at Deer Creek Mine to clear the remaining open areas of the mine for permanent sealing. Full documentation of this inspection is included.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

ENVIRONMENTAL AND CERCLA CERTIFICATION

Submittal Date: 5-29-2018

Lease(s) # UTU-84285 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) 2nd Left, 14th – 17th West, 22nd -27th West, and Remainder of Mine Workings

Coal Bed: Blind Canyon and Hiawatha Coal Seams

The Environmental Protection Agency promulgated final regulations to implement requirements established in Section 120(h) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by Superfund Amendments Reauthorization Act (SARA). Under section 120(h), whenever a Federal agency enters into any contract/agreement for the sale or transfer of public land/real property, and on which any hazardous substance was stored for one year or more, or known to have been released or disposed of, the contract (conveyance document) must include notice of the type and quantity of such hazardous substance, and the time at which such storage, release or disposal was originated. This final rule making became effective October 17, 1990.

Federal coal leases, if developed, result in the operator conducting mining operations on all or parts of the Federal lands. The lessee/operator, under appropriate circumstances, may utilize hazardous substances on the surface or underground on Federal lands. At the time of lease relinquishment, or at the time of any sealing or potentially sealing operation conducted by a Federal lessee, it is necessary for the lessee to inform the BLM and any other surface managing agency of any activities of a lessee that might be subject to CERCLA notification. This information will be utilized to satisfy the requirements under Section 120(h) of CERCLA as amended by SARA.

BLM requires the following information to the extent it is applicable to the Federal coal lease relinquishment area, area or any time that a mining operation seals or places structures possibly sealing an area. BLM will make the company proprietary information public only upon transfer or exchange of the affected lands.

Explanation:
Items 1-5 deal with hazardous substances and environmental issues. Item 6 is a CERCLA certification by an officer of the lessee. Suggested formats follow.

Required Information:

1. A list of any hazardous substances as defined in SARA Title III Consolidated List (40 CER 302.4) used on the lease (by date) or products that contain such substances. This shall include all hazardous substances and materials along with their Chemical Abstract Services Registry Numbers (CASRN), and petroleum based oil and other petroleum products that were used, stored or delivered to the lease. Quantities at this time are not necessary. This is for disclosure purposes only.

2. A copy of all reports of spills occurring on the lease or sealed area.

RECEIVED
AUG 17 2018
Div. of Oil, Gas & Mining

3. A copy of all reports submitted to the State of Utah listing any spill of petroleum based oil or other petroleum products on the lease exceeding 25 gallons or that cause a threat to human health or the environment.

4. A mine map covering the lease showing the location, type and model of any equipment or machinery that is known to be remaining underground. (this does not include materials and supplies, and hand tools). For every piece of equipment that will be left underground upon lease cessation of operations, please list the quantities of oil, batteries, or other fluids that are remaining, or could be remaining in the equipment.

5. A summary analysis of water quality reports showing whether or not the water quality has been affected by mining. The data that has been collected throughout the years should be the basis for this summary report. The UPDES/NPDES discharge permit requirements for the mine and copies of certifications or samples to show that these requirements have not been exceeded should be part of this analysis. The analysis should compare the water quality at the time of cessation of operations with the water quality that existed prior to mining in the base line analysis. This shall be for all waters that are affected by mining. The company should list any mitigation that was done to alleviate any water quality concerns.

6. An officer of the lessee shall sign and submit a certificate in the form attached for each lease or portion thereof where operations have ceased.

a. Based upon a complete search of all known records of the lessee(s), sublessee(s) and operator(s) (i) for the specified lease or portion thereof relinquished, operations ceased or sealed and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed; and upon our knowledge of past operations, there have been no reportable quantities of hazardous substances (per 40 CFR 302.4) and Part 373 or used oil (per Utah State Management Rule R-3 15-15), deposited or released within the lease, either on the surface or underground that will harm human health and the environment with respect to any such substances remaining on the property.

b. Based upon a complete search of all known records for the lessee(s), sublessee(s) and operator(s) for the specified lease or portion thereof relinquished, operations ceased or sealed and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed; and upon our knowledge of past operations, there has been a release or disposal of a reportable quantity of **hazardous substance** (per 40 CFR 302.4) and Part 373 or **used oil** (per Utah State Management Rule R-315-15) on the surface of the lease or underground, and all remedial action necessary has been taken to protect human health ~ and the environment with respect to any such substances remaining on the property. This shall be documented with sample analytical data from the remediation or removal process.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

(Officer of the Lessee) 5/29/18 (Date)

HAZARDOUS SUBSTANCE REPORT

Submittal Date: 5-29-2018

Lease(s) # UTU-84285 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) 2nd Left, 14th – 17th West, 22nd -27th West, and Remainder of Mine Workings

Coal Bed Blind Canyon and Hiawatha Coal Seams

Hazardous Substance / Product	Date Utilized	CASRN (if applicable)	Location Used (Cross-cut if known)
None Spilled -			
See Attached CASRN List			

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Hazardous Substance Report CERCLA Page One of Two
Lease(s) UTU-84285
Deer Creek Mine - MSHA # 42-00121
Sealed Mine Sections: 2nd Left, 14th - 17th West, 22nd - 27th West, and remainder of mine workings

Coal Bed Hiawatha Seam

Note: While these substances were likely transported into, used, or stored in the referenced leases during the time interval shown, (03/06 - 04/15) there are no reports or evidence that any of these substances were spilled or left within the sealed area.
No complete list exists that shows all hazardous materials transported into, used, or stored within the referenced area.

Product Name	Date Utilized	Hazardous Ingredient Name	Component Percentage	CASRN	Location Used
D Cell Nickel Cadmium Battery, 4.8 VDC	3/06 - 4/15	Nickel and Nickel Hydroxide	20 - 32%	Unknown	All Sections
	3/06 - 4/15	Cadmium and Cadmium Hydroxide	13 - 22%	Unknown	All Sections
	3/06 - 4/15	Sodium Hydroxide	0 - 4%	Unknown	All Sections
	3/06 - 4/15	Potassium Hydroxide	0 - 4%	Unknown	All Sections
	3/06 - 4/15	Cobalt Hydroxide	0.5 - 2%	Unknown	All Sections
Chevron Superla White Oil	3/06 - 4/15	White Mineral Oil	100%	8042-47-5	All Sections
Blaster PB Penetrating Catalyst	3/06 - 4/15	Naptha	40 - 50%	64742-94-5	All Sections
	3/06 - 4/15	Petroleum Distillates, hydrotreated	30 - 40%	64742-47-8	All Sections
	3/06 - 4/15	Petroleum Distillates, solvent-dewaxed	20 - 30%	64742-65-0	All Sections
	3/06 - 4/15	Alcohols, C11-15 secondary ethoxylated	0 - 3%	68131408	All Sections
	3/06 - 4/15	Carbon Dioxide Propellant	0 - 3%	124389	All Sections
Krylon Spray Paints	3/06 - 4/15	Propane	14%	74-98-6	All Sections
	3/06 - 4/15	Butane	13%	106-97-8	All Sections
	3/06 - 4/15	Toluene	17%	108-88-3	All Sections
	3/06 - 4/15	Medium Aromatic Hydrocarbons	3%	64742-94-5	All Sections
	3/06 - 4/15	Napthalene	0.40%	91-20-3	All Sections
	3/06 - 4/15	Acetone	41%	67-64-1	All Sections
	3/06 - 4/15	Ethyl 3-Ethoxypropionate	4%	763-69-9	All Sections
Hand Cleaner, Brody Chemical	3/06 - 4/15	Aliphatic Petroleum Distillate	25 - 35%	64742-96-7	All Sections
RD-90 Spray Lubricant	3/06 - 4/15	Petroleum Lube Oil	10 - 20%	64742-65-0	All Sections
	3/06 - 4/15	Deodorized Kerosene	30 - 40%	64742-47-8	All Sections
	3/06 - 4/15	Mineral Oil	20 - 25%	8042-47-5	All Sections
	3/06 - 4/15	Mineral Spirits	5 - 10%	64741-65-7	All Sections
	3/06 - 4/15	Liquified Petroleum Gas	10 - 20%	68476-85-7	All Sections
Extreme Blue Windshield Washer Fluid	3/06 - 4/15	Methanol	<20%	67-56-1	All Sections
	3/06 - 4/15	Denatonium Benzoate	<2%	3734-33-6	All Sections
Carquest Starting Fluid	3/06 - 4/15	Heptane	69 - 79%	142-82-5	All Sections
	3/06 - 4/15	Ethyl Ether	11 - 21%	60-29-7	All Sections
	3/06 - 4/15	Carbon Dioxide	1 - 11%	124-38-9	All Sections
	3/06 - 4/15	Hexane	2.80%	110-54-3	All Sections
Blend #0019A Premium Starting Fluid	3/06 - 4/15	Heptane	60 - 70%	142-82-5	All Sections
	3/06 - 4/15	Ethyl Ether ACS Reagent Grade	23 - 33%	60-29-7	All Sections
	3/06 - 4/15	Carbon Dioxide	1 - 11%	124-38-9	All Sections
Diesel Engine Oil	3/06 - 4/15	Zinc Dithiophosphate	<2.5%	68649-42-3	All Sections
Cat Hydraulic Oil SAE 10W	3/06 - 4/15	None			All Sections
Cat Transmission and Drive Train Oil	3/06 - 4/15	None			All Sections
Solcenic 3B-BLK (Emulsion Oil)	3/06 - 4/15	Monoethanolamine	<10%	141-41-3	All Sections
	3/06 - 4/15	Triethanolamine	<5%	102-71-6	All Sections
Chevron Delo 400	3/06 - 4/15	Mineral Oil	70 - 95%	Mixture	All Sections
	3/06 - 4/15	Zinc alkyl dithiophosphate	1 - 5%	68649-42-3	All Sections
Conoco HD Fleet Engine Oil	3/06 - 4/15	Lubricant base oil	87 - 91%	Various	All Sections
	3/06 - 4/15	Zinc Compounds	1.0 - 1.5%	Proprietary	All Sections
	3/06 - 4/15	Additives	9 - 13%	Proprietary	All Sections
Conoco Transformer Oil	3/06 - 4/15	Hydrotreated dist., Lt. Napthenic	>99%	64742-53-6	All Sections
	3/06 - 4/15	Additives	<1%	Proprietary	All Sections
Contact Cleaner 2000	3/06 - 4/15	Decafluoropentane (HFC-43-10mee)	5 - 15%	138495-42-8	All Sections
	3/06 - 4/15	Cozol 401	80 - 95%	Proprietary Blend	All Sections
	3/06 - 4/15	Carbon Dioxide	3 - 8%	124-38-9	All Sections
Heavy Duty Degreaser	3/06 - 4/15	Trichloroethylene	95 - 99%	79-01-6	All Sections
	3/06 - 4/15	1,2 Butylene Oxide	0.50%	106-88-7	All Sections
	3/06 - 4/15	Carbon Dioxide	1 - 5%	124-38-9	All Sections
Shellzone All-Season Antifreeze/Coolant	3/06 - 4/15	Ethylene Glycol	90 - 98%	107-21-1	All Sections
	3/06 - 4/15	Deionized Water	1 - 3%	7732-18-5	All Sections
	3/06 - 4/15	Phosphoric Acid	1 - 3%	7664-38-2	All Sections

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

Lease(s) UTU-84285
Deer Creek Mine - MSHA # 42-00121
Sealed Mine Sections: 2nd Left, 14th - 17th West, 22nd - 27th West, and remainder of mine workings

Coal Bed Hiawatha Seam

Note: While these substances were likely transported into, used, or stored in the referenced leases during the time interval shown, (11/05 - 01/15) there are no reports or evidence that any of these substances were spilled or left within the sealed area. No complete list exists that shows all hazardous materials transported into, used, or stored within the referenced area.

Product Name	Date Utilized	Hazardous Ingredient Name	Component Percentage	CASRN	Location Used
Holcim Portland Cement	3/06 - 4/15	Tri-calcium silicate	20 - 70%	12168-85-3	All Sections
	3/06 - 4/15	Di-calcium silicate	10 - 60%	10034-77-2	All Sections
	3/06 - 4/15	Tetra-calcium-alumino-ferrite	5 - 15%	12068-35-8	All Sections
	3/06 - 4/15	Calcium sulfate	2 - 10%		All Sections
	3/06 - 4/15	Tri-calcium aluminate	1 - 15%	12042-78-3	All Sections
	3/06 - 4/15	Magnesium oxide	0 - 4%	1309-48-4	All Sections
	3/06 - 4/15	Crystalline silica (quartz)	0 - 1%	14808-60-7	All Sections
	3/06 - 4/15	Hexivalent chromium		18540-29-9	All Sections
Shot-Set 250 Liquid Accelerator	3/06 - 4/15	Silicic Acid, Sodium Salt	1%	1344-09-S	All Sections
Johnson Controls Lead-Acid Battery	3/06 - 4/15	Lead	34%	7439-92-1	All Sections
	3/06 - 4/15	Lead Dioxide	31%	1309-60-0	All Sections
	3/06 - 4/15	Lead Sulfate	<1%	7446-14-2	All Sections
	3/06 - 4/15	Sulfuric Acid (35%)	34%	7664-93-9	All Sections
Johnsens Heavy Duty DOT 3 Brake Fluid	3/06 - 4/15	Diethylene Glycol Monobutyl Ether	5 - 20%	112-34-5	All Sections
	3/06 - 4/15	Triethylene Glycol	6 - 25%	112-35-6	All Sections
	3/06 - 4/15	Triethelyne Glycol Monoethyl Ether	6 - 25%	112-50-5	All Sections
	3/06 - 4/15	Triethylene Glycol Monobutyl Ether	20 - 39%	143-22-6	All Sections
	3/06 - 4/15	Tetraethylene Glycol Monobutyl Ether	5 - 20%	1559-34-8	All Sections
	3/06 - 4/15	Polyalkylene Glycol Monomethyl Ether	5 - 20%	23783-42-8	All Sections
	3/06 - 4/15	Polyethylene Glycol	5 - 20%	25322-68-3	All Sections
	3/06 - 4/15	Polyethylene glycol monobutyl ether	5 - 20%	9004-77-7	All Sections
	3/06 - 4/15	Polyalkylene Glycols	5 - 20%	9038-95-3	All Sections
	3/06 - 4/15	Diethylene Glycol	5 - 15%	111-46-6	All Sections
	3/06 - 4/15	Diethylene Glycol Monomethyl Ether	<5%	111-90-0	All Sections
Koehler Bright Star Lamp Battery Fluid	3/06 - 4/15	Sulfuric Acid (38%)	100%	7664-93-9	All Sections
Q-Bond Surface Bonding Cement	3/06 - 4/15	Portland Cement		65997-15-1	All Sections
	3/06 - 4/15	Crystalline Silicon Dioxide		13397-24-5	All Sections
	3/06 - 4/15	Calcium Hydroxide		001-305-620	All Sections
	3/06 - 4/15	Calcium Stearate		1592-23-0	All Sections
Roklok 70A	3/06 - 4/15	Polymethylene polyphenyl isocyanate	100%	009016-87-9	15 W
Roklok 70B	3/06 - 4/15	Polyglycols	60 - 100%	Mixture (2)	15 W
	3/06 - 4/15	Dimethylene Glycol	10 - 30%	111-46-6	15 W
Minova Lokset Resin Cartridge	3/06 - 4/15	Calcium Carbonate	60 - 100%	1317-65-3	All Sections
	3/06 - 4/15	Polyester Resin	5 - 15%	Not Reported	All Sections
	3/06 - 4/15	Styrene Monomer	3 - 7%	100-42-5	All Sections
	3/06 - 4/15	Diethylene Glycol	0.5 - 1.5%	57-55-6	All Sections
	3/06 - 4/15	Benzoyl Peroxide	0.5 - 1.5%	94-36-0	All Sections
Foamy Engine Bright Engine Cleaner	3/06 - 4/15	2-Butoxyethanol	2 - 10%	111-76-2	All Sections
	3/06 - 4/15	Aromatic Petroleum Naphtha	2 - 10%	64742-95-6	All Sections
	3/06 - 4/15	Isobutane	2 - 10%	75-28-5	All Sections
	3/06 - 4/15	Petroleum Base Oil	2 - 10%	8008-20-6	All Sections
	3/06 - 4/15	Propane	2 - 10%	74-98-6	All Sections
WD-40 Aerosol	3/06 - 4/15	Aliphatic Hydrocarbon	45 - 50%	64742-47-8	All Sections
	3/06 - 4/15			64742-48-9	All Sections
	3/06 - 4/15			64742-88-7	All Sections
	3/06 - 4/15	Petroleum Base Oil	15 - 25%	64742-65-0	All Sections
	3/06 - 4/15	LVP Aliphatic Hydrocarbon	12 - 18%	64742-47-8	All Sections
	3/06 - 4/15	Carbon Dioxide	2 - 3%	124-38-9	All Sections
Conoco Super Hydraulic Oil (all grades)	3/06 - 4/15	Lubricant base oil	>99	Various	All Sections
	3/06 - 4/15	Additives	<1	Proprietary	All Sections
Conoco Power Tran Fluid	3/06 - 4/15	Lubricant base oil	87 - 91%	Various	All Sections
	3/06 - 4/15	Zinc Compounds	1.0 - 1.5%	Proprietary	All Sections
	3/06 - 4/15	Additives	9 - 13%	Proprietary	All Sections
Powergear EP 5 - 35LB MPL	3/06 - 4/15	Mineral Oil	>95%	Proprietary	All Sections

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

CERCLA CERTIFICATION

Lease(s) # UTU-84285 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) 2nd Left, 14th – 17th West, 22nd -27th West, and Remainder of Mine Workings

Coal Bed: Blind Canyon and Hiawatha Coal Seams

a. Based upon a complete search of all known records of the lessee(s), sublessee(s) and operator(s) (i) for the specified lease or portion thereof relinquished, sealed or potentially sealed, and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed or potentially sealed; and upon our knowledge of past operations, there have been **no** reportable quantities of **hazardous substances** (per 40 CFR 302.4) and Part 373 or **used oil** (per Utah State Management Rule R-315-15), deposited or released within the lease, either on the surface or underground that will harm human health and the environment with respect to any such substances remaining on the property.

b. Based upon a complete search of all known records for the lessee(s), sublessee(s) and operator(s) for the specified lease or portion thereof relinquished, operations ceased or sealed and (ii) for the operations conducted on the specified lease or portion thereof relinquished, operations ceased or sealed; and upon our knowledge of past operations, there has been a release or disposal of a reportable quantity of **hazardous substance** (per 40 CFR 302.4) and Part 373 or **used oil** (per Utah State Management Rule R-315-15) on the surface of the lease or underground, and all remedial action necessary has been taken to protect human health ~ and the environment with respect to any such substances remaining on the property. This shall be documented with sample analytical data from the remediation or removal process.

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

(Officer of the Lessee) (Date) 5/21/18

PETROLEUM PRODUCT REPORT

Submittal Date 5-29-2018

Lease(s) #UTU-84285 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) 2nd Left, 14th – 17th West, 22nd -27th West, and Remainder of Mine Workings

Coal Bed Blind Canyon and Hiawatha Coal Seams

Oil or Petroleum product spilled	Date spilled	Amount Spilled (If > 25 gallons)	Location Spilled (Cross-cut if known)
None			

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

EQUIPMENT REMAINING UNDERGROUND REPORT

Submittal Date: 5-29-2018

Lease(s) # UTU-84285 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) 2nd Left, 14th – 17th West, 22nd -27th West, and Remainder of Mine Workings

Coal Bed Blind Canyon and Hiawatha Coal Seams

Equipment name & model number	Date Inspected	Fluid types/batteries and amount	Final location (Cross-cut if known)
None			

INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

SUMMARY WATER ANALYSIS REPORT

Lease(s) # UTU-84285 Full Relinquishment

Mine Name and MSHA Mine # Deer Creek Mine #42-00121

Mine Section (if applicable) 2nd Left, 14th – 17th West, 22nd -27th West, and Remainder of Mine Workings

Coal Bed Blind Canyon and Hiawatha Coal Seams

Dates: 1/1980 – 05/18 (No Mine Discharge after 01/15)

Submittal Date: 5-29-2018

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

SUMMARY WATER ANALYSIS REPORT

DEER CREEK MINE

Federal Lease UTU-88554 and UTU-84258
Lease Relinquishment

Mine ID
Utah Pollution Discharge Elimination System (UPDES) Permit Data
- **Quantity - Historical Data**
- **Quality - Historical Data (UPDES Parameters)**
  - **Total Suspended Solids**
  - **Iron (Total & Dissolved)**
  - **Oil & Grease**
  - **Total Dissolved Solids**
  - **Ph**

UPDES Permit Data:

Deer Creek Mine UPDES Permit: UT0023604
Mine Discharge - Site 002
Permit Renewed on February 1, 2015
Permit Expires on January 31, 2020

Permit Limitations (water discharged to Deer Creek Drainage):

Deer Creek Mine Water Discharge Site 002

	Effluent Limitations				Monitoring Requirements	
Effluent Characteristics	Average 30 - Day	Average 7 - Day	Daily Minimum	Daily Maximum	Measurement Frequency	Sample Type
Flow, MGD	5.0 MGD	NA	NA	NA	Monthly	Measured
Total Suspend Solids, mg/l	15	25	NA	NA	Monthly	Grab
Total Iron, mg/l	NA	NA	NA	1.0	Monthly	Grab
Oil & Grease, mg/l	NA	NA	NA	10	Monthly	Grab
TDS, mg/l	NA	NA	NA	1200	Monthly	Grab
pH, Units	NA	NA	6.5	9.0	Monthly	Grab
Sanitary Waste	NA	NA	NA	None	Monthly	Visual
Oil and Grease, floating, visible foam	NA	NA	NA	None	Monthly	Visual

INCORPORATED
AUG 17 2018
Div. of Oil, Gas & Mining

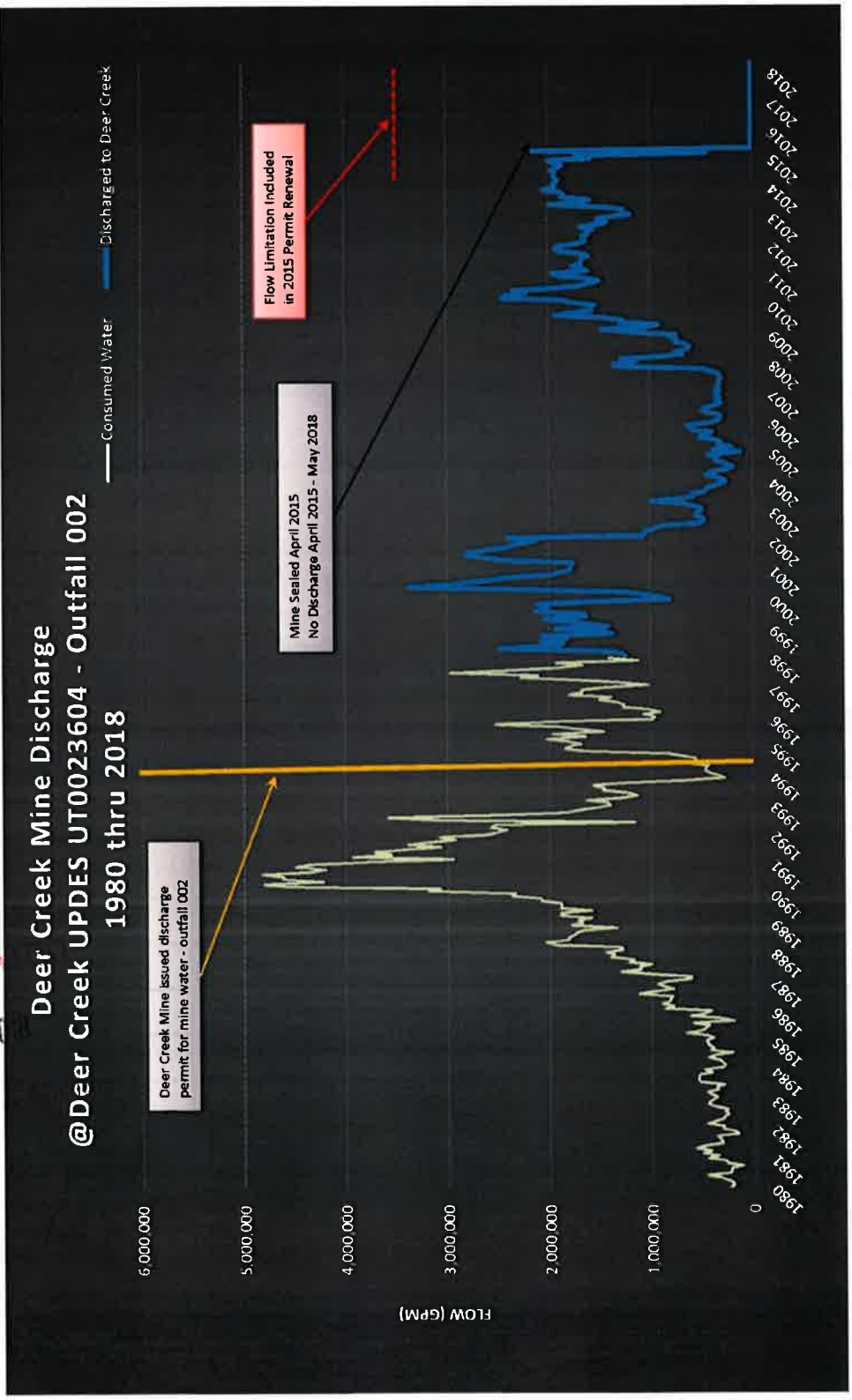
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Mine Water Discharge Site 002: 1980 – 2017

Mine Discharge Quantity



INCORPORA
AUG 17 20
Div. of Oil, Gas

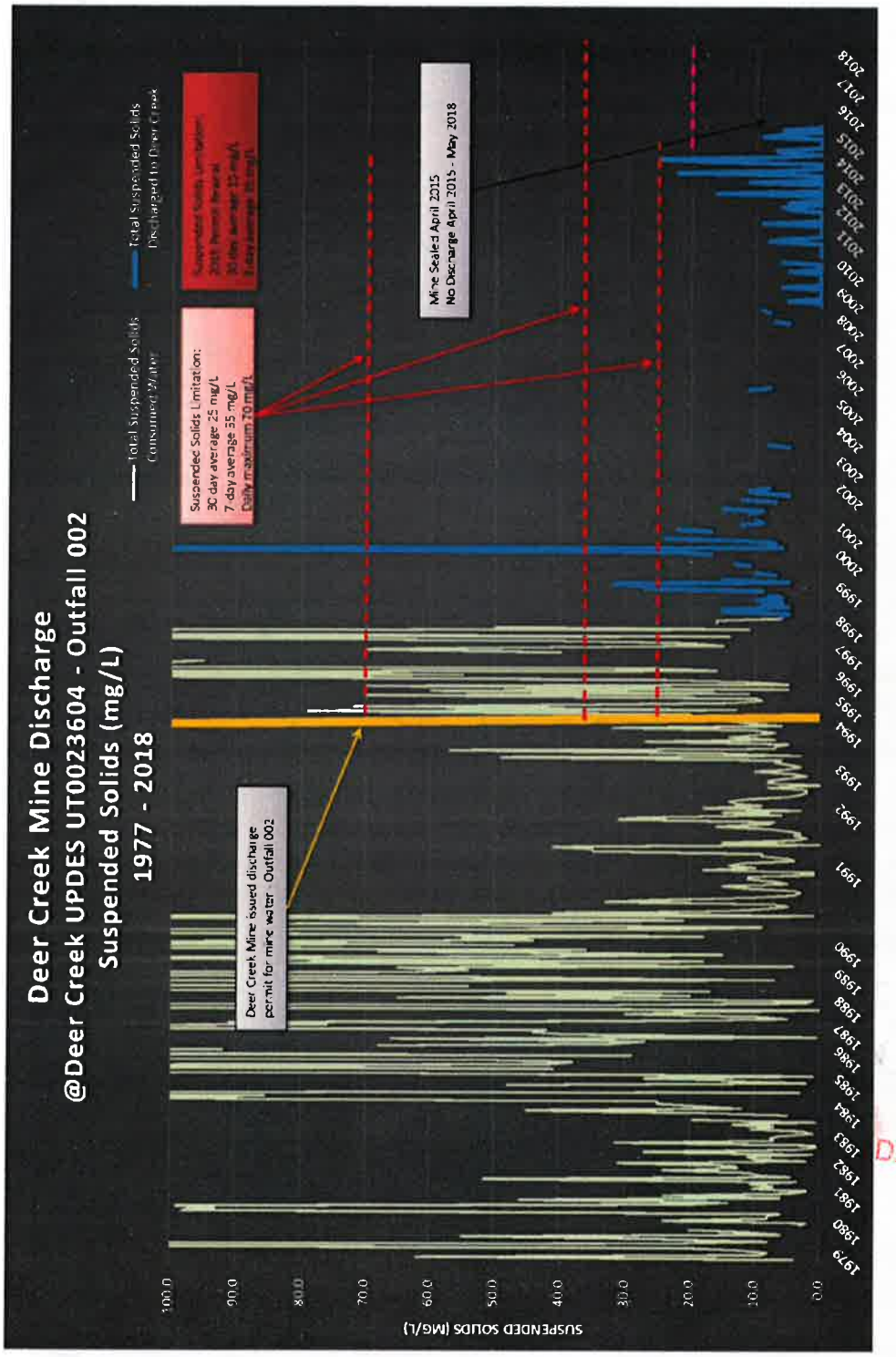
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Water Discharge Water Quality

Parameter: Total Suspended Solids



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Mining

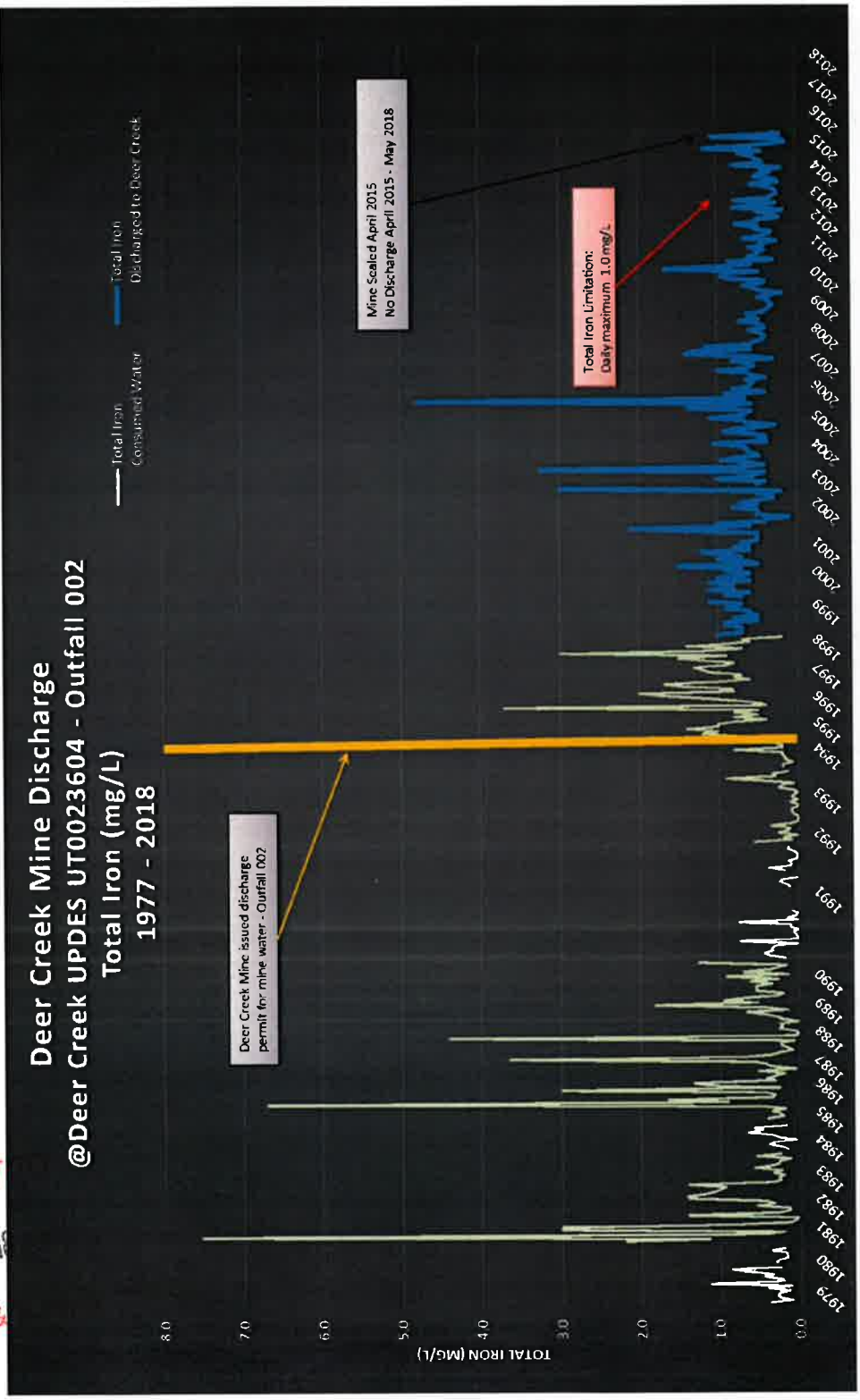
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Mine Water Discharge Water Quality

Parameter: Total Iron



INCORPORAT
AUG 17 201
Div. of Oil, Gas &

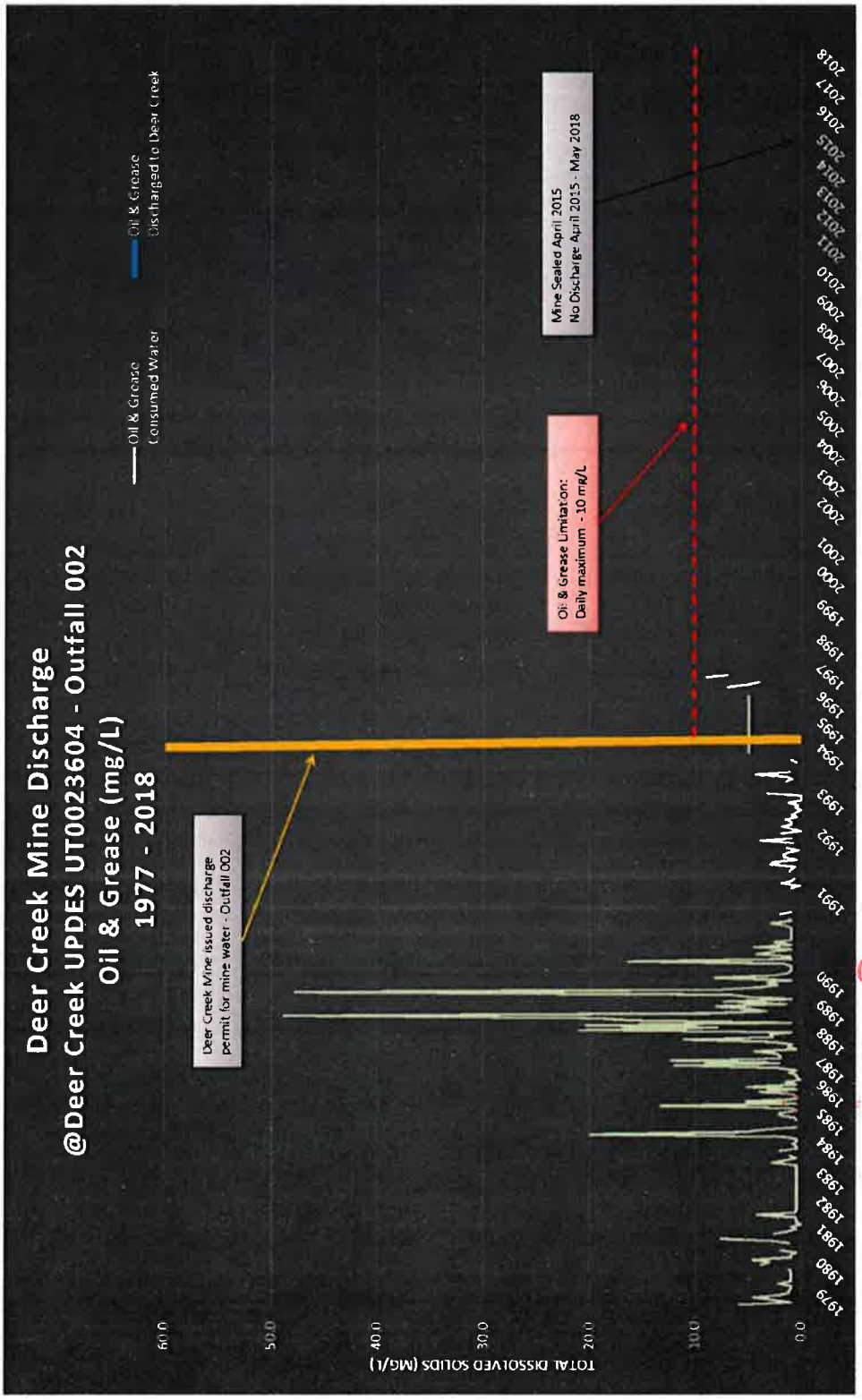
MINE ID

DEER CREEK MINE

UPDES - 0023604

Deer Creek Mine Water Discharge Water Quality

Parameter: Oil & Grease



CORPORATED
AUG 17 2018
Oil, Gas & Mining

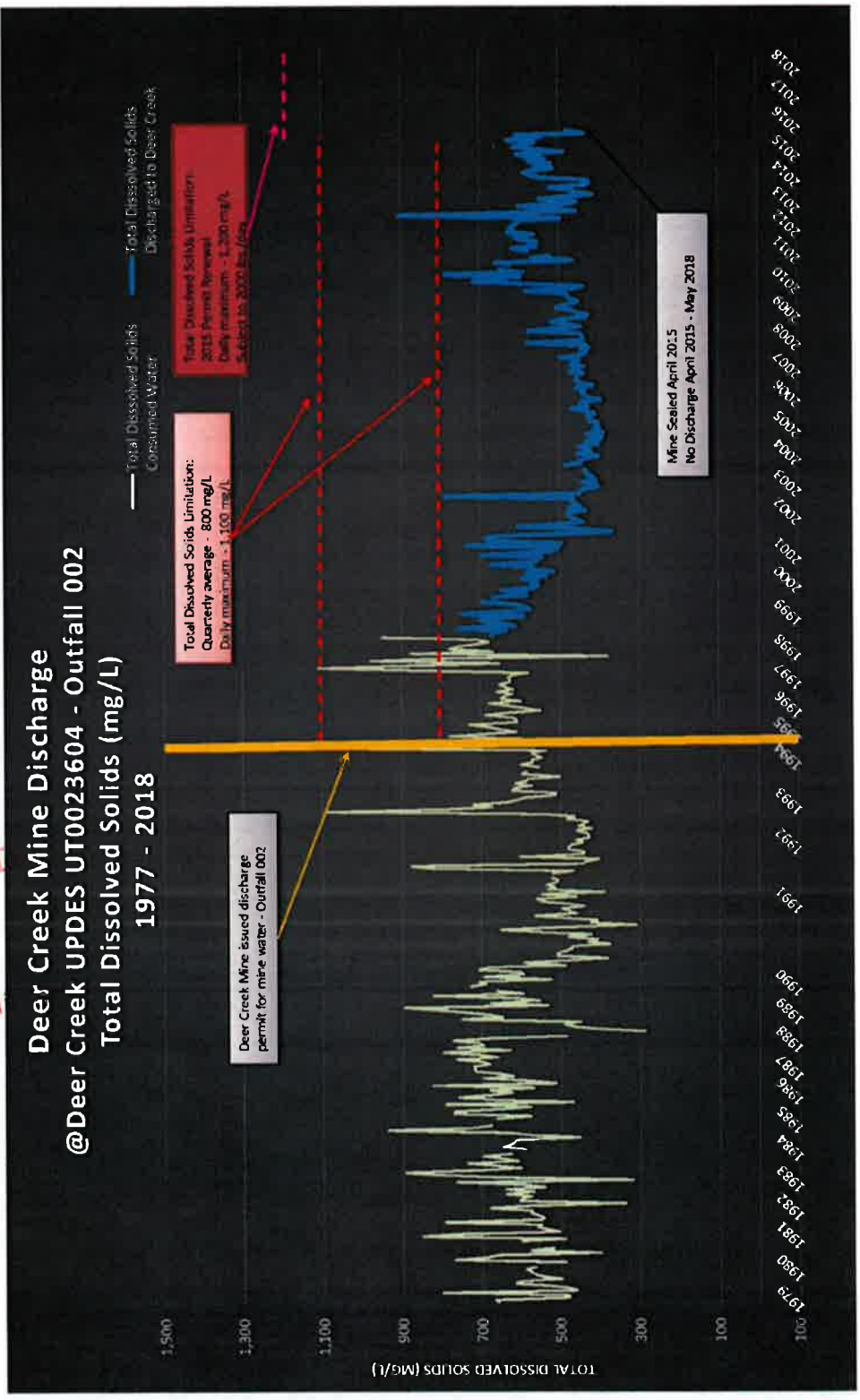
MINE ID

DEER CREEK MINE

UPDES - 23604

Deer Creek Mine Water Discharge Water Quality

Parameter: Total Dissolved Solids



INCORPORATED
AUG 17 2018
Div. of Oil, Gas & M

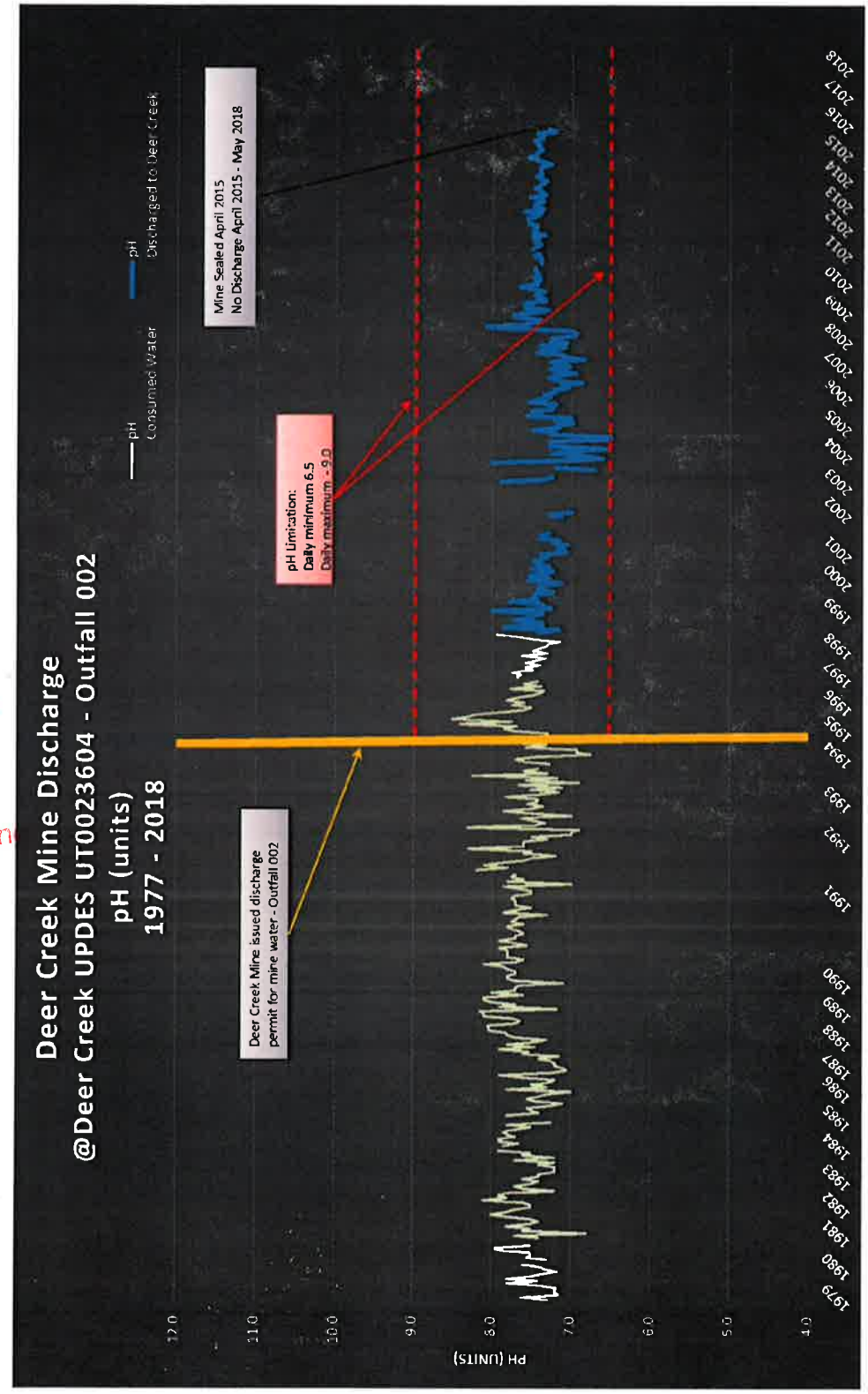
MINE ID

DEER CREEK MINE

UPDES - 23604

Deer Creek Mine Water Discharge Water Quality

Parameter: pH



INCORPORATED

AUG 17 2018

Div. of Oil, Gas & Minin