STATE OF COLORADO

Musick - DNR, Jason <jason.musick@state.co.us>

Bowie No. 2, 3Q Gob & Pond Inspection Report

1 message

Tamme Bishop <tamme.jestover@bresnan.net> Wed, Oct 19, 2016 at 11:27 AM
To: "Musick - DNR, Jason" <jason.musick@state.co.us>
Cc: Bill Bear <BBear@bowieresources.com>

Hi Jason, please see attached and let me know if you have any questions. Thanks. <<...>>

Tamme Bishop, P.E.

JE Stover & Associates, Inc.

2352 N. 7th Street, Unit B

Grand Junction, CO 81501

970-245-4101

3Q Gob and Pond Report.pdf
8283K

J. E. STOVER & ASSOCIATES, INC.

2352 NORTH 7TH STREET, UNIT B
GRAND JUNCTION, COLORADO 81501
PHONE: (970) 245-4101, FAX: (970) 242-7908

MINE ENGINEERING
MINE RECLAMATION
CIVIL ENGINEERING
CONST. MANAGEMENT

Via Electronic Transmittal

October 19, 2016

Jason Musick
Division of Reclamation, Mining & Safety
1313 Sherman St., Room 215
Denver, CO 80203

Re: Bowie Resources, LLC, Bowie No. 2 Mine
Coal Mine Waste Banks & Instrumentation Monitoring
Pond Quarterly Inspections
Permit C-1996-083

Dear Mr. Musick:

Enclosed please find the referenced reports for the 3rd quarter of 2016.

Please call if you have any questions.

Sincerely,

Tamme Bishop

Tamme Bishop, P.E.
Project Engineer

cc: Alysha Hernandez (DRMS)
Wm. A. Bear, Jr.

BOWIE RESOURCES, LLC

Bowie No. 2 Mine

Coal Mine Waste Bank Nos. 1, 2, & 3 Inspections - 3rd Quarter 2016

On September 21, 2016 a visual inspection of the Bowie No. 2 Mine coal mine waste banks was performed by the undersigned in accordance with Rule 4.10.2. This inspection includes Gob Pile Nos. 1, 2, and 3. Pile No. 1 is considered inactive. Pile no. 2 is located north of Bowie Road. Pile no. 3 is located south of Bowie Road.

I, Tamme Bishop, P.E., have a wide variety of experience in the design and construction of earth fill embankments. Nothing was observed during the inspection that would indicate the piles have a potential for failure. A small area of seepage was seen at the toe of gob pile #2, west of the haul road on bench #2. There were no windrows of stacked gob. All organic material and topsoil has been removed ahead of the waste bank founding. The diversion ditches at gob pile #2 were inspected, both lower and upper, and found to be in good condition. The upper and lower diversion ditches at gob pile #3 were inspected, and were in good condition. The underdrain was flowing, and the water was clear. A new seep has been discovered at gob pile #3, north of the east drying area. At this time, the seep will not impact the long term stability of the gob pile. However, before final placement and compaction of gob in the footprint of the east drying area, an underdrain will be installed. Approval of the underdrain design was incorporated into the permit under Technical Revision No. 105.

At gob pile #2, the first bench east of the haul road is covered with soil. The second bench east of the haul road is mostly covered with a subsoil pile. Most of the third and forth benches east of the road are covered with soil. Soil has been placed on most of the second and third benches west of the haul road.

Most of the coal mine waste was generated from the preparation plant. Approximately 29,915 tons of gob were hauled during the quarter with an estimated 50% distribution between the two gob piles. Coal mine waste is to be placed in the piles in approximately horizontal lifts no more than 24-inches thick. The coal mine waste is dried and then spread and compacted by self propelled sheepsfoot compactors. Thirty-two compaction tests were taken at gob pile #2 during the quarter. No compaction tests were performed at gob pile #3 during the quarter.

The top of gob pile #2 serves as a drying area for end dumped gob. Gob is to be stacked to a maximum height of 20 feet, with a slope angle up to 1.5h:1v. A 25 foot buffer zone on the face of the gob pile will be maintained at all times. Gob will be spread and compacted to the currently approved slope configuration as soon as gob and weather conditions allow.

The westernmost and easternmost sections of gob pile #3 serve as drying areas for end dumped material. The purpose of the gob drying area is to provide an area for temporary storage of gob for drying purposes. End-dumped gob in the gob drying

areas is worked with dozers and track hoes to assist in the drying process.

At gob pile #3 it is necessary to stockpile gob material during the winter months then place and compact the stockpiled gob when weather allows. Stockpiling of gob can commence November 15 and end April 15. Winter stockpiled material will be re-handled and compacted by September 30. Beginning on October 1, the Operator should be compacting all material concurrently, until conditions again require stockpiling. The stockpiling dates listed above should be considered flexible and may change slightly from year to year based on weather conditions. The gob material will be stockpiled in rows generally running from northwest to southeast. The rows of gob will be placed in a controlled manner and overlap will be minimized so there is space between rows to allow for drainage to the southeast. There were no rows of stockpiled gob at gob pile #3 during the inspection.

The available volume of coverfill material is sufficient to meet the requirements of Rule 4.10.4(5). No coverfill was used for blending or other uses during the quarter.

A failure of the gob pile no. 1 would probably not be a hazard to human life. The pile is located above a large flat bench. The bench is approximately 80 to 150-feet wide directly below the pile. Additionally, the gob pile sediment pond is located below the pile. If the coal mine waste bank failed, the material would very likely be contained on the bench below the pile and or within the gob pile sediment pond.

A failure of gob pile no. 2 would probably not be a hazard to human life. A residential dwelling is located over 300-feet below pile no. 2. The piles are located above Bowie Road. A failure of the piles might damage Bowie Road and the Fire Mountain Canal but would not likely impact the residential dwelling.

A failure of gob pile no. 3 would not be a hazard to human life. A failure of the pile might damage the rail track below the pile.

I certify that to the best of my knowledge and belief, that the fill and other aspects of the coal mine waste banks have been constructed as permitted in the design approved by the DRMS.

COLORADO LICENSED
TAMMERIN KAE STOVER-BISHOP
43402
PROFESSIONAL ENGINEER

10-19-16

Tammie Bishop — Date
Colorado Professional Engineer
Registration No. 43402

QUARTERLY POND INSPECTION REPORT

Operator:	Bowie Resources LLC	Quarter:	Third 2016
Mine:	Bowie No. 2 Mine - C-1996-083	Inspection Date:	21-Sep-16

Pond Identification	B	C	D - Gob Pile	F - New Gob	J UTL East	K UTL West
Type of Pond	Sediment	Sediment	Sediment	Sediment	Sediment	Sediment
Status During Inspection:						
Approximate Water Level	5944	5991	5971	5946	5847	Dry
Sediment (% remaining)	75%	100%	90%	80%	60%	80%
Outflow (cfs)	0	0	0	0	0	0

Features	Problem Yes/No	Problem Yes/No	Problem Yes/No	Problem Yes/No	Problem Yes/No	Problem Yes/No
Erosional						
Rills & Gulleys	No	No	No	No	No	No
Inadequate Vegetation	No	No	No	No	No	No
Outlet Channel Erosion	No	No	No	No	No	No
Burrows	No	No	No	No	No	No
Other	No	No	No	No	No	No
Structural						
Differential Settling	No	No	No	No	No	No
Cracks or Slides	No	No	No	No	No	No
Seepage	No	No	No	No	No	No
Other	No	No	No	No	No	No
Appurtenant Structures						
Defective Spillways	No	No	No	No	No	No
Dewatering Devices Clogged	No	No	No	No	No	No
Faulty Gates, Etc.	No	No	No	No	No	No
Other	No	No	No	No	No	No

Additional Comments

Design depth measured from pond bottom to invert of emergency spillway:
Pond B=10, C=10, D=10, J=10, K=3, F=10' TD
Pond Bottom Elevations B=5942, C=5990, D=5970, J=5846, F=5944, K=5819
Pond B held about 3 feet of water
Pond C had a water pool at the bottom of the pond.
Pond D contained a pool of water below the primary spillway.
Pond J held about 3 feet of water & sediment and was being cleaned out
Pond K was dry.
Pond F held about 2 feet of water and sediment
There were no mud pits open at the end of the quarter.

Maintenance Required: At Ponds J and F, cleaning was underway and nearly complete. Pond B should be cleaned out next year.

Name of Inspector: Tamme Bishop

Tamme Bishop
Colorado P. E. 43402 Date

Huddleston-Berry
Engineering & Testing, LLC

640 White Avenue, Unit B
Grand Junction, Colorado 81501
Phone: 970-255-8005
Fax: 970-255-6818
HuddlestonBerry@Bresnan.net

October 13, 2016
Project#01349-0001

Bowie Resources, LLC
43659 Bowie Road
Paonia, Colorado 81428

Attention: Mr. Bill Bear

Subject: Construction Materials Testing
3rd Quarter 2016
Bowie Mine No. 2
Paonia, Colorado

Dear Mr. Bear,

At your request, a representative of Huddleston-Berry Engineering and Testing, LLC (HBET) conducted field moisture and compaction testing, and laboratory moisture testing of coal mine waste materials placed at Bowie Mine No. 2 near Paonia, Colorado. Field testing was conducted on July 20th, 2016. Soil compaction test reports, test location data, and laboratory optimum moisture and density (Proctor) data are attached.

We are pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

Michael A. Berry, P.E.
Vice President of Engineering

Huddleston-Berry
Engineering & Testing, LLC

SOIL COMPACTION TEST REPORT

Task: Gob Pile Densities

Field vs. Lab Densities

Project No.: 01349 - 0001
Project Name: Bowie Mine
Client Name: Bowie Resources
Placement Contractor: Bowie Resources
Contractor Representative: Ron

Tested By: Dm **Date:** 7/20/16
Work Order No: 41923
Authorized By: Client **Date:** 7/20/16
Reviewed By: MAB **Date:** 10/13/16

No.	Point No.	Elevation	Max. Dry Density (pcf)	Optimum Moisture (%)	Wet Density (pcf)	Speedy Moisture (%)	Field Dry Density (pcf)	Relative Field Comp.(%)	Tare Weight (g)	Wet Weight (g)	Dry Weight (g)	Lab Dry Density (pcf)	Lab Moisture (%)	Relative Lab Comp.(%)	
1	5477	6199.6	102.0	11.0	106.2	14.2	93	91	191.2	1266.2	1142.2	93.9	13.0%	92%	
2	5478	6201.3	102.0	11.0	101.3	11.5	92	90	237.8	996.4	932.8	92.8	9.2%	91%	
3	5479	6205.1	102.0	11.0	99.6	-	-	-	191.5	1294.2	1203.5	91.4	9.0%	90%	
4	5480	6204.9	102.0	11.0	104.7	10.6	95	93	195.1	1171.3	1085.5	95.5	9.6%	94%	
5	5481	6205.3	92.0	13.5	100.1	-	-	-	188.9	1466.4	1326.1	89.1	12.3%	97%	
6	5482	6206.4	102.0	11.0	100.5	10.4	93	91	188.6	1069.8	995.5	92.0	9.2%	90%	
7	5483	6204.7	102.0	11.0	101.3	-	-	-	193.0	1011.9	942.1	92.7	9.3%	91%	
8	5484	6204.6	102.0	11.0	101.7	-	-	-	314.1	1607.0	1492.7	92.7	9.7%	91%	
9	5485	6202.1	102.0	11.0	100.4	10.8	90	88	202.2	1128.3	1050.2	91.9	9.2%	90%	
10	5486	6203.2	102.0	11.0	103.7	-	-	-	298.6	1306.1	1213.5	94.2	10.1%	92%	
11	5487	6204.1	102.0	11.0	102.5	-	-	-	196.5	978.7	912.7	93.9	9.2%	92%	
12	5488	6203.3	102.0	11.0	99.6	-	-	-	316.8	1251.6	1174.6	91.4	9.0%	90%	
13	5489	6203.9	102.0	11.0	100.7	11.1	93	91	193.9	963.8	899.5	92.3	9.1%	90%	
14	5490	6206	102.0	11.0	105.8	-	-	-	189.0	1145.1	1051.1	95.4	10.9%	94%	
15	5491	6208.1	102.0	11.0	100.7	11.6	90	88	238.2	1123.2	1049.4	92.3	9.1%	90%	

Remarks:

Gauge Number: 12122 Density Counts: 2014 Moisture Counts: 621 **Record No.** **20 S**

Huddleston-Berry
Engineering & Testing, LLC

SOIL COMPACTION TEST REPORT

Task: Gob Pile Densities

Field vs. Lab Densities

Project No.: 01349 - 0001
Project Name: Bowie Mine
Client Name: Bowie Resources
Placement Contractor: Bowie Resources
Contractor Representative: Ron

Tested By: Dm **Date:** 7/20/16
Work Order No: 41923
Authorized By: Client **Date:** 7/20/16
Reviewed By: MAB **Date:** 10/13/16

No.	Point No.	Elevation	Max. Dry Density (pcf)	Optimum Moisture (%)	Wet Density (pcf)	Speedy Moisture (%)	Field Dry Density (pcf)	Relative Field Comp.(%)	Tare Weight (g)	Wet Weight (g)	Dry Weight (g)	Lab Dry Density (pcf)	Lab Moisture (%)	Relative Lab Comp.(%)	
16	5492	6211.5	102.0	11.0	101.7	-	-	-	156.4	957.7	883.2	92.2	10.3%	90%	
17	5493	6212.8	92.0	13.5	94.3	-	-	-	191.7	1290.1	1175.2	84.4	11.7%	92%	
18	5494	6208.5	102.0	11.0	100.6	-	-	-	194.0	975.7	906.4	91.7	9.7%	90%	
19	5495	6229.7	102.0	11.0	100.7	10.0	92	90	316.5	1115.0	1047.6	92.2	9.2%	90%	
20	5496	6228.7	92.0	13.5	97.1	-	-	-	313.3	1332.4	1227.0	87.1	11.5%	95%	
21	5497	6225.4	102.0	11.0	102.8	9.4	97	95	188.2	1000.3	932.2	94.2	9.2%	92%	
22	5498	6222.9	102.0	11.0	100.9	-	-	-	192.6	1064.4	985.4	91.8	10.0%	90%	
23	5499	6220.7	102.0	11.0	103.6	-	-	-	238.1	936.5	858.3	92.0	12.6%	90%	
24	5500	6216.6	92.0	13.5	95.1	10.9	95	100+	237.6	991.4	910.4	84.9	12.0%	92%	
25	5501	6212.9	92.0	13.5	93.2	-	-	-	238.6	1083.5	995.6	83.5	11.6%	91%	
26	5502	6210.1	92.0	13.5	94.6	-	-	-	186.0	1019.3	930.8	84.6	11.9%	92%	
27	5503	6203.8	92.0	13.5	94.1	-	-	-	254.4	1209.0	1107.0	84.0	12.0%	91%	
28	5504	6200.3	102.0	11.0	104.7	-	-	-	273.9	1723.3	1557.5	92.7	12.9%	91%	
29	5505	6195.4	92.0	13.5	93.7	-	-	-	191.5	952.3	872.6	83.9	11.7%	91%	
30	5506	6191.2	102.0	11.0	102.9	-	-	-	311.1	982.6	910.1	91.8	12.1%	90%	

Remarks:

12122 Density Counts: 2014 Moisture Counts: 621 **Record No.** 21 S

Huddleston-Berry
Engineering & Testing, LLC

SOIL COMPACTION TEST REPORT

Task: Gob Pile Densities

Field vs. Lab Densities

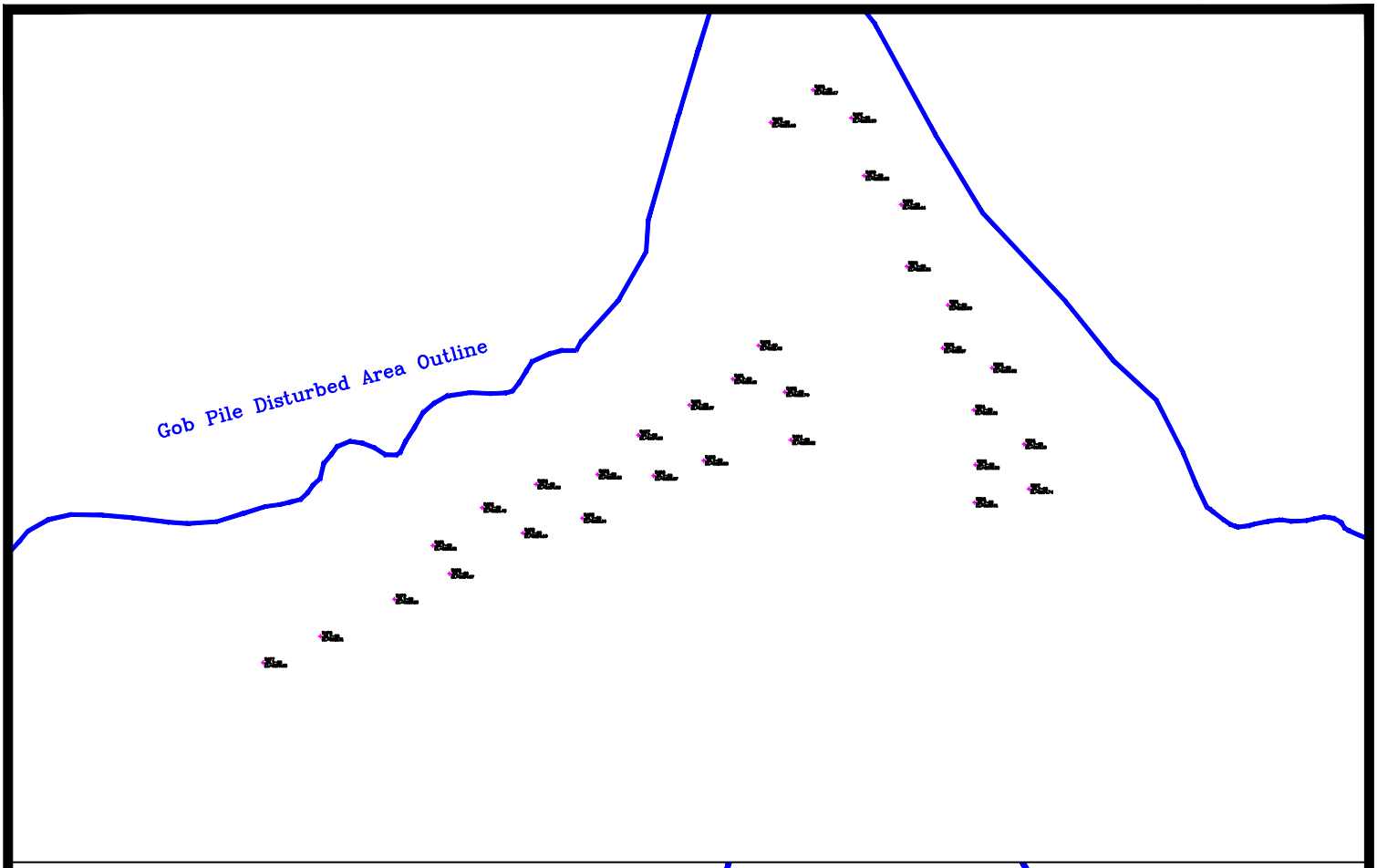
Project No.: 01349 - 0001
Project Name: Bowie Mine
Client Name: Bowie Resources
Placement Contractor: Bowie Resources
Contractor Representative: Ron

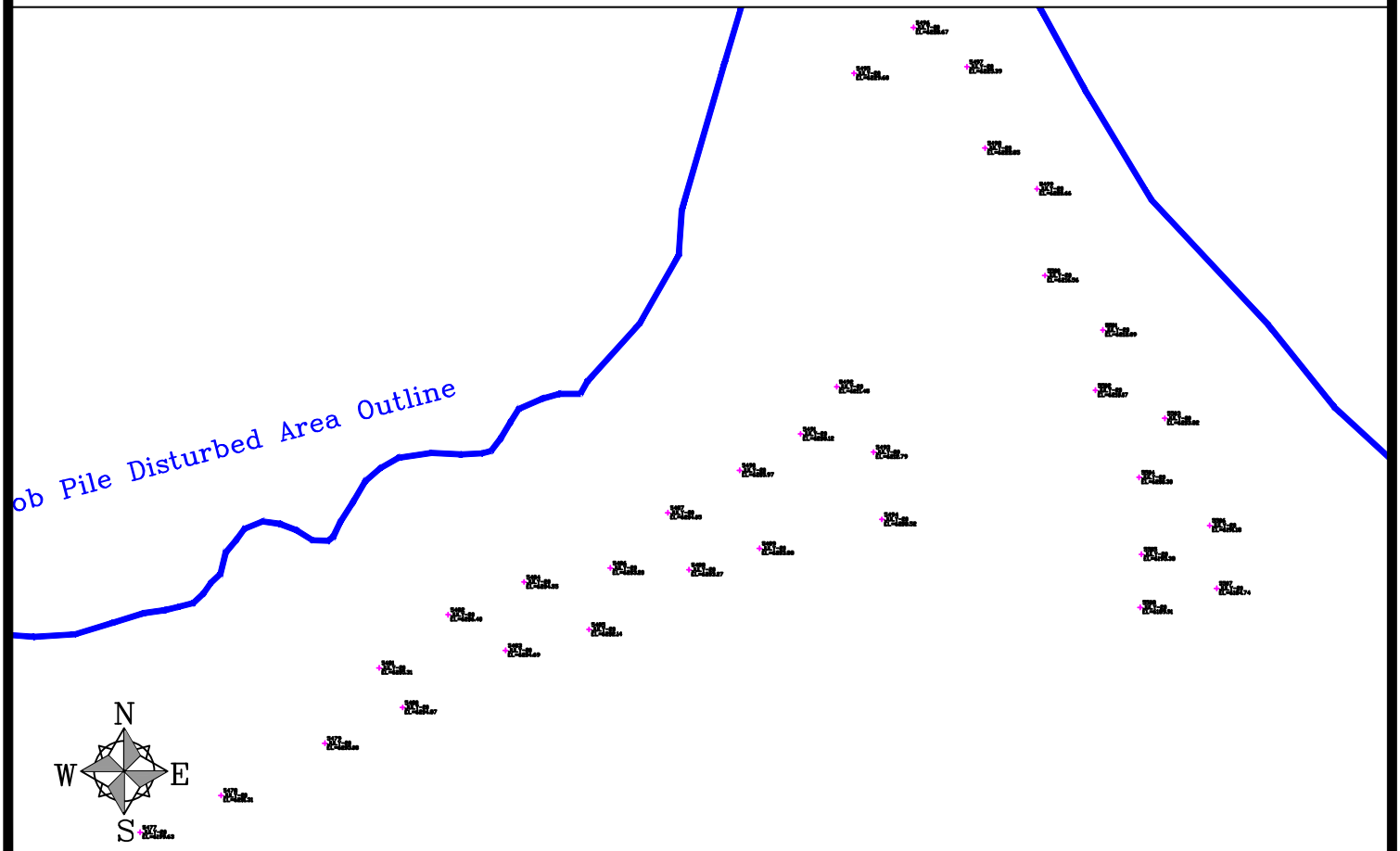
Tested By: Dm **Date:** 7/20/16
Work Order No: 41923
Authorized By: Client **Date:** 7/20/16
Reviewed By: MAB **Date:** 10/13/16

No.	Point No.	Elevation	Max. Dry Density (pcf)	Optimum Moisture (%)	Wet Density (pcf)	Speedy Moisture (%)	Field Dry Density (pcf)	Relative Field Comp.(%)	Tare Weight (g)	Wet Weight (g)	Dry Weight (g)	Lab Dry Density (pcf)	Lab Moisture (%)	Relative Lab Comp.(%)	
31	5507	6184.7	92.0	13.5	92.4	10.6	88	96	201.8	991.2	908.9	82.8	11.6%	90%	
32	5508	6189.9	92.0	13.5	98.6	11.4	90	98	309.7	1137.4	1050.3	88.2	11.8%	96%	

Remarks:

Gauge Number: 12122 Density Counts: 2014 Moisture Counts: 621 **Record No.** 22 S





GOB PILE #2
COMPACTION TEST LOCATIONS

PREPARED FOR:

BOWIE RESOURCES, LLC

BOWIE NO. 2 MINE
P.O. BOX 483
PAONIA, COLORADO 81428

J. E. STOVER & ASSOCIATES, INC.
2356 N 7th St. Unit B
Grand Jct., CO 81501

GOB PILE #2
07/20/16

DESIGN BY:		DATE:	1/9/14
DRAWN BY:	J.E.S.	CHK'D BY:	
SCALE:	NONE		
DIRECTORY:	D:\BOWIE	DWG. NAME:	

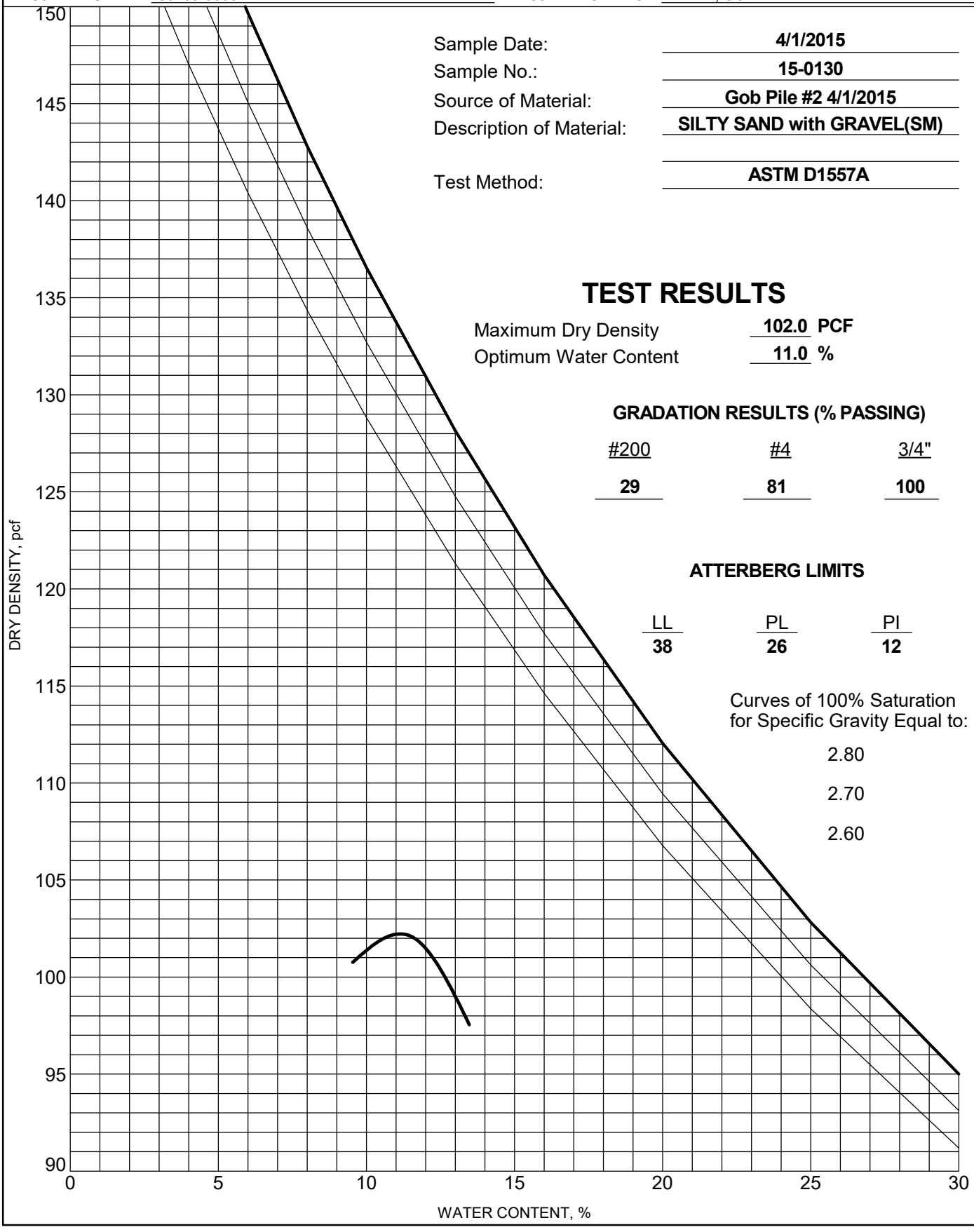
Bowie Resources Gob Disposal Location of Compaction Tests				
Gob Pile #2				
	North	East	Elevation	Date
Point #				
5477	19475.89	36572.13	6199.63	7/20/2016
5478	19517.91	36664.23	6201.31	7/20/2016
5479	19577.42	36782.63	6205.08	7/20/2016
5480	19618.26	36871.29	6204.87	7/20/2016
5481	19663.38	36844.61	6205.31	7/20/2016
5482	19724.06	36923.34	6206.40	7/20/2016
5483	19683.33	36988.73	6204.69	7/20/2016
5484	19761.41	37009.83	6204.55	7/20/2016
5485	19707.25	37083.95	6202.14	7/20/2016
5486	19777.35	37108.28	6203.20	7/20/2016
5487	19840.34	37173.85	6204.05	7/20/2016
5488	19775.33	37197.97	6203.27	7/20/2016
5489	19799.69	37278.44	6203.88	7/20/2016
5490	19888.75	37255.74	6205.97	7/20/2016
5491	19930.24	37325.32	6208.12	7/20/2016
5492	19984.12	37366.62	6211.45	7/20/2016
5493	19909.50	37408.63	6212.79	7/20/2016
5494	19832.75	37418.11	6208.52	7/20/2016
5495	20341.53	37386.20	6229.68	7/20/2016
5496	20393.83	37454.03	6228.67	7/20/2016
5497	20349.08	37515.04	6225.39	7/20/2016
5498	20256.31	37535.65	6222.86	7/20/2016
5499	20209.80	37594.94	6220.66	7/20/2016
5500	20110.90	37603.99	6216.56	7/20/2016
5501	20048.74	37670.04	6212.89	7/20/2016
5502	19980.02	37661.56	6210.07	7/20/2016
5503	19948.08	37740.65	6203.82	7/20/2016
5504	19880.75	37711.39	6200.30	7/20/2016
5505	19792.99	37714.02	6195.38	7/20/2016
5506	19825.83	37792.01	6191.18	7/20/2016
5507	19754.11	37799.90	6184.74	7/20/2016
5508	19732.41	37712.64	6189.91	7/20/2016

Total 33 Tests

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

MOISTURE-DENSITY RELATIONSHIP

CLIENT Bowie Resources, LLC
PROJECT NAME Bowie Mine #2
PROJECT NUMBER 00489-0003
PROJECT LOCATION Paonia, CO



Sample Date:	**4/1/2015**
Sample No.:	**15-0130**
Source of Material:	**Gob Pile #2 4/1/2015**
Description of Material:	**SILTY SAND with GRAVEL(SM)**
Test Method:	**ASTM D1557A**

TEST RESULTS

Maximum Dry Density	**102.0 PCF**
Optimum Water Content	**11.0 %**

GRADATION RESULTS (% PASSING)

#200	#4	3/4"
29	**81**	**100**

ATTERBERG LIMITS

LL	PL	PI
38	**26**	**12**

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

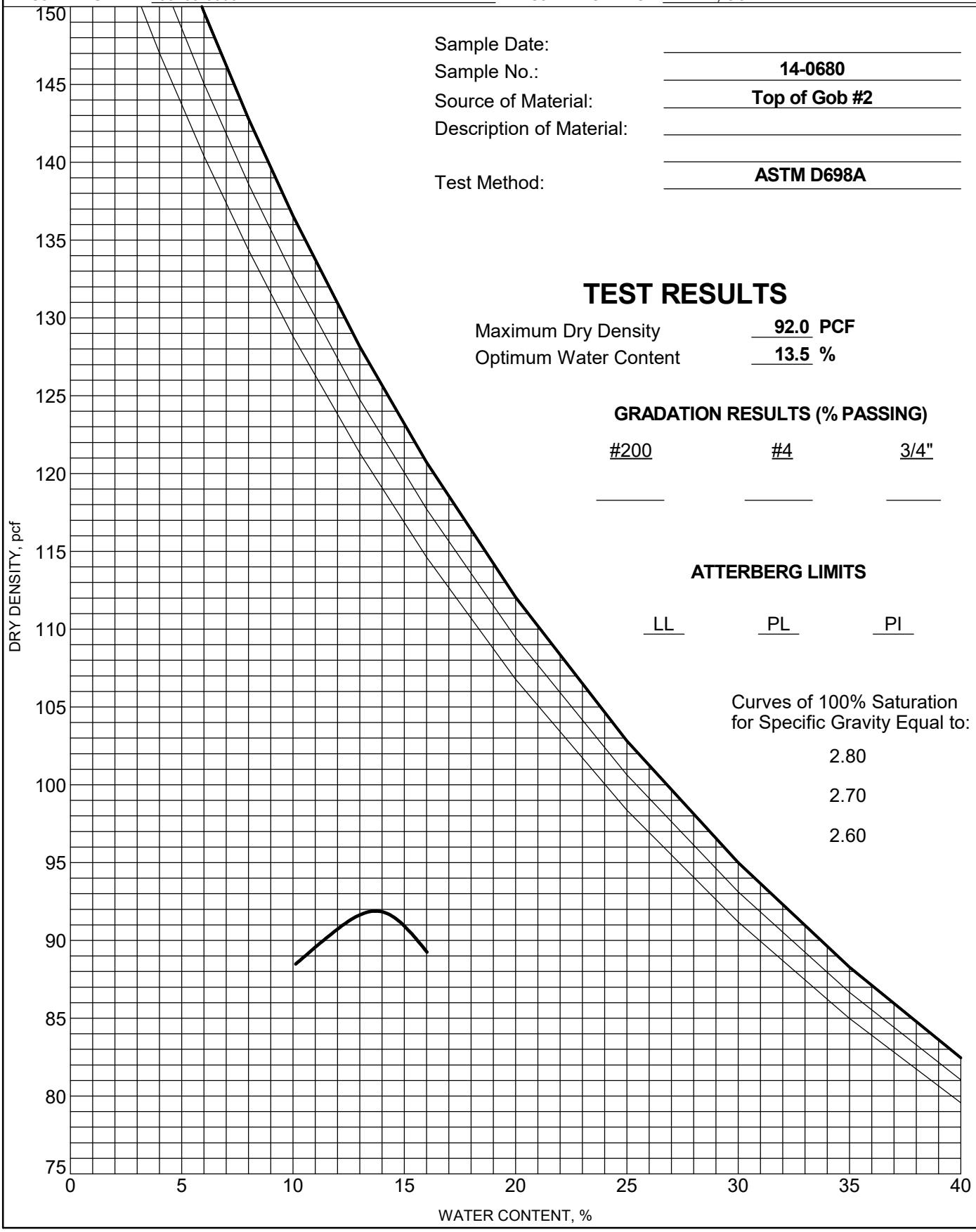
2.60

COMPACTION BOWIE MINE.GPJ GINT US LAB.GDT 10/13/16

Huddleston-Berry Engineering & Testing, LLC
640 White Avenue, Unit B
Grand Junction, CO 81501
970-255-8005
970-255-6818

MOISTURE-DENSITY RELATIONSHIP

CLIENT Bowie Resources, LLC
PROJECT NAME Bowie Mine #2
PROJECT NUMBER 00489-0003
PROJECT LOCATION Paonia, CO



Sample Date:
Sample No.: **14-0680**
Source of Material: **Top of Gob #2**
Description of Material:
Test Method: **ASTM D698A**

TEST RESULTS

Maximum Dry Density **92.0** **PCF**
Optimum Water Content **13.5** **%**

GRADATION RESULTS (% PASSING)

#200	#4	3/4"

ATTERBERG LIMITS

LL	PL	PI

Curves of 100% Saturation for Specific Gravity Equal to:

2.80

2.70

2.60

COMPACTION BOWIE MINE.GPJ GINT US LAB.GDT 7/12/16

Huddleston-Berry
Engineering & Testing, LLC

640 White Avenue, Unit B
Grand Junction, Colorado 81501
Phone: 970-255-8005
Fax: 970-255-6818
Info@huddlestonberry.com

October 13, 2016
Project#01349-0001

Bowie Resources, LLC
43659 Bowie Road
Paonia, Colorado 81428

Attention: Mr. Bill Bear

Subject: Summary of Instrumentation Monitoring
3rd Quarter 2016
Bowie Coal Waste Disposal Area No. 2
Paonia, Colorado

Reference: *Summary of Instrumentation Monitoring, 2nd Quarter 2016, Bowie Coal Waste Disposal Area No. 2, Paonia, Colorado* by Huddleston-Berry Engineering & Testing, LLC for Bowie Resources, LLC, July 12, 2016.

Stability Evaluation, Technical Revision #85, Gob Pile #2 Drying Area, Bowie No. 2 Mine by Huddleston-Berry Engineering & Testing, LLC for Bowie Resources, LLC, June 3, 2014.

Dear Mr. Bear,

At the request of the Colorado Division of Reclamation, Mining and Safety (DRMS), Huddleston-Berry Engineering & Testing, LLC (HBET) prepared this letter regarding quarterly monitoring of vibrating wire piezometers and inclinometers at Coal Waste Disposal Area No. 2 (CWDA No. 2) at the Bowie mine near Paonia, Colorado. The intent of the monitoring was to detect significant changes in the pore water pressures or significant displacements within the coal waste which may impact the stability of the waste pile.

Inclinometers

In 2005, three inclinometers, designated BG05-04, BG05-05, and BG05-07, were installed at CWDA No. 2 through the coal refuse and into the native foundation soils. The inclinometers have been monitored quarterly since August 2005. The 3rd Quarter 2016 monitoring was completed by DOWL on September 27th, 2016. The monitoring report prepared by DOWL includes a site plan showing the locations of the inclinometers and cumulative displacement curves relative to the baseline readings in 2005. Axis "A" reflects deformation with depth in the direction of anticipated movement perpendicular to the face of the gob. Axis "B" reflects deformation with depth parallel to the face of the gob.

Discussion of Inclinometer Monitoring

The latest inclinometer readings indicate no major movements since the last quarterly reading. As indicated in the DOWL report, the movements noted in BGO5-05 and BGO5-07 during the previous two quarters have reversed and/or stabilized. It is possible that the previously reported movements were due to an instrument error or other error which did not reflect actual movement of the gob. In general, the 3rd Quarter 2016 monitoring data does not provide any indication of instability in CWDA No. 2.

Vibrating Wire Piezometers

Between 2005 and 2012, a total of ten vibrating wire piezometers were installed in CWDA No. 2. However, several of the piezometers have been damaged or have otherwise ceased to function. Currently, five of the piezometers are functional.

Monitoring of the functioning piezometers was completed by DOWL on September 26th, 2016. The attached monitoring report prepared by DOWL includes the piezometer monitoring data and the data is summarized in the following table.

VWP ID	Initial Pore Pressure (psi)	6/25/16 Pore Pressure (psi)	9/26/16 Pore Pressure (psi)	Difference Since Installation (psi)	Difference Since Last Reading (psi)
VWP-05	6.8	1.8	2.3	-4.5	+0.5
VWP-06	11.3	14.3	14.0	+2.7	-0.3
VWP-08	8.2	10.0	9.9	+1.7	-0.1
VWP-09	2.8	2.9	3.0	+0.2	+0.1
VWP-10	-1.9	-1.8	-1.7	+0.2	+0.1

Discussion of Vibrating Wire Piezometers

VWP-05

VWP-05 was installed on August 3, 2005 near the toe of CWDA No. 2 adjacent to the access road/bench. The pore pressures recorded at VWP-05 have shown some seasonal fluctuations; however, the range of pore pressure changes is fairly small. In general, HBET does not believe that the pore pressures in VWP-05 are cause for concern regarding stability of the gob pile.

VWP-06

VWP-06 was installed on June 5, 2009 near the existing top of CWDA No. 2. The pore pressures recorded at VWP-06 have fluctuated since installation. In general, the fluctuations have been seasonal and reflect the level of coal mine waste placement activity on top of CWDA No. 2. Although an increase was recorded in the 1st Quarter 2016, the pore pressures recorded in VWP-06 decreased during the 2nd and 3rd Quarters. In general, HBET does not believe that the measured pore pressures are an indication of any instability in CWDA No. 2.

VWP-08

VWP-08 was installed on June 5, 2009 at a slightly lower elevation than VWP-06. The pore pressures recorded at VWP-08 have fluctuated since installation. However, the fluctuations have generally been within a narrow range of values. The measured pore pressures are generally consistent with the level of coal mine waste placement activity at CWDA No. 2.

As indicated in the referenced *Stability Evaluation* report, the stability of CWDA No. 2 is sensitive to increases in pore pressures in VWP-08. An increase in the pore pressure of 7 psi in VWP-08 would result in a reduction of the Factor of Safety to below 1.5.

The current pore pressure reflects a piezometric surface elevation of approximately 6098 feet which is much less than the critical elevation of 6113 feet. As a result, HBET does not believe that the measured pore pressures in VWP-08 are any indication of instability in CWDA No. 2.

VWP-09

VWP-09 was installed on May 18, 2012 near the toe of CWDA No. 2. The pore pressures recorded at VWP-09 have been fairly steady since installation. This suggests that dewatering of the gob in this area is likely nearly complete. It is anticipated that the pore pressures at VWP-09 will remain fairly steady over time.

VWP-10

VWP-10 was installed on May 18, 2014 near the toe of CWDA No. 2. The pore pressures recorded at VWP-10 have been fairly steady since installation. This suggests that dewatering of the gob in this area is likely nearly complete. It is anticipated that the pore pressures at VWP-10 will remain fairly steady over time.

Site Visit Observations

HBET visited the site on October 5th, 2016. At the time of our visit, no coal mine waste was being actively placed. However, gob was being compacted at the top of CWDA No. 2 with a loaded haul truck. Some wet material was observed at the north end of the pile; however, this material had not been spread for compaction. HBET also observed cover soil placement on the west-central portion of CWDA No. 2. In general, CWDA No. 2 appeared to be in good condition and no evidence of instability or other adverse conditions were observed.

General

In general, based upon the results of the recent VWP and inclinometer monitoring data, and upon our observations at the site, HBET does not believe that there is any reduction in the stability of CWDA No. 2. Continued quarterly monitoring of piezometers and inclinometers is recommended.

We are pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

Michael A. Berry, P.E.
Vice President of Engineering

ATTACHMENTS

970-249-6828 ■ 800-865-9847 (fax) ■ 222 South Park ■ Montrose, CO 81401 ■ www.dowl.com
Alaska ■ Arizona ■ Colorado ■ Montana ■ North Dakota ■ Oregon ■ Washington ■ Wyoming

October 7, 2016

Huddleston-Berry Engineering and Testing, LLC
640 White Avenue
Grand Junction, CO 81501
Attention: Mike Berry, PE

SUBJECT: Summary Report, Third Quarter 2016, Inclinometer and Active Vibrating Wire Piezometer Data through September 2016, Bowie Mine No. 2, Coal Waste Disposal Area No. 2

Dear Mr. Berry,

DOWL conducted quarterly monitoring of inclinometers and vibrating wire piezometers at Coal Waste Disposal Area No. 2 (CWDA No. 2), Bowie Resources, LLC. This report is intended to cover the time period of June through September 2016. VWP and inclinometer data was obtained on 9-26-16. Per DRMS and your instructions, vibrating wire piezometer readings for all active piezometers are taken quarterly along with inclinometers.

Vibrating Wire Piezometers

Table 1. Summary of VWP Pore Pressure Readings

VWP ID #	Initial Pore Pressure (psi)	6/25/16 Pore Pressure (psi)	9/26/16 Pore Pressure (psi)	Difference Since Installation (psi)	Difference Since Last Reading (psi)
VWP-05	6.8	1.8	2.3	-4.5	+0.5
VWP-06	11.3	14.3	14.0	+2.7	-0.3
VWP-08	8.2	10.0	9.9	+1.7	-0.1
VWP-09	2.8	2.9	3.0	+0.2	+0.1
VWP-10	-1.9	-1.8	-1.7	+0.2	+0.1

The physical locations of the piezometers are shown on the attached Instrumentation Site Plan, Drawing 1. The graph of historical data through 5-21-14 is presented for reference as Figure 1. A graph of active piezometers only is presented as Figure 2.

Inclinometers

Three inclinometers, designated BG05-04, BG05-05, and BG05-07, were installed at CWDA No. 2 in August 2005. The inclinometers were installed through the coal refuse and approximately 20 feet into the native foundation soils. The physical locations of the inclinometers are shown on the attached Instrumentation Site Plan, Drawing 1. Baseline readings were taken on 8/10/05 and subsequent readings have generally been taken quarterly since that time. Displacement curves for the prior three readings are presented as attachments to this letter for each inclinometer. Axis “A” reflects deformation with depth in the direction of anticipated movement (downslope), while Axis “B” is orthogonal to Axis A. Based on our most recent site visit, the slight movements within inclinometer BGO5-05 and BGO5-07 previously noted have

reversed or stabilized, which would seem to indicate that the movements are within the accuracy tolerance of the equipment. As described in previous reports, we are of the opinion that historic displacements indicated on the plots for the approximate upper ten feet of the inclinometers are likely due to placement of cover soil on the face of the waste bank during normal operations.

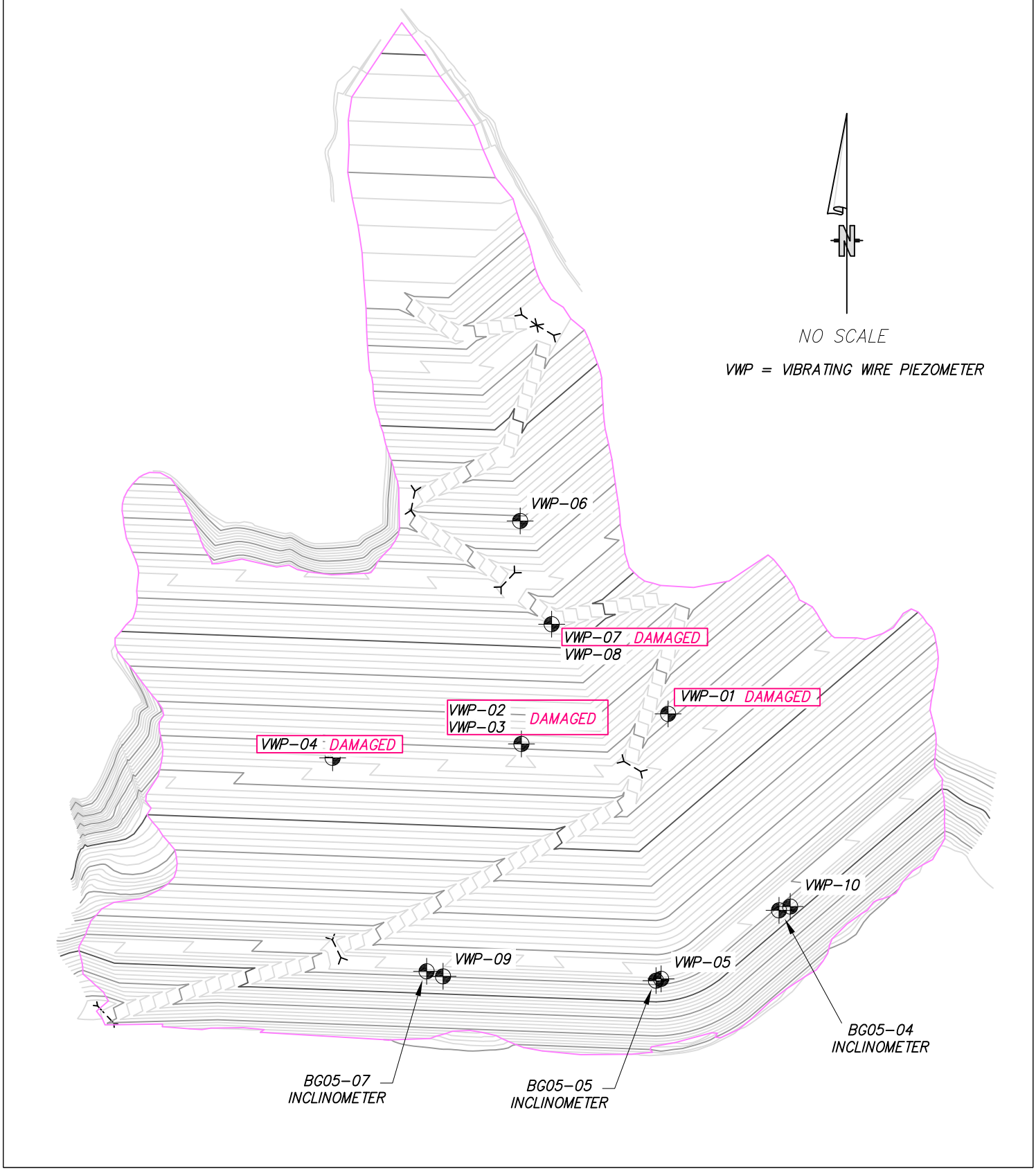
If you have any questions regarding this letter or the instrumentation monitoring at CWDA No. 2, please don't hesitate to contact me at (970) 497-8827 or *wpandorf@dowl.com*.

Respectfully Submitted,
DOWL

Wayne Pandorf, P.E.
Sr. Geotechnical Engineer

Enclosures: Instrumentation Location Plan, Drawing 1
Figure 1 – Active and Damaged Piezometer Data Graph through 5-21-14
Figure 2 – Active Vibrating Wire Piezometer Data Graph
Inclinometer Graphs BG05-04, BG05-05, and BG05-07

INSTRUMENTATION SITE PLAN



DRAWING NUMBER 1 OF 1	DATE 2014	Huddleston-Berry BOWIE #2 GOB PILE DELTA COUNTY, COLORADO	BUCKHORN GEOTECH
	JOB NO. 13-231-001		Civil, Structural, and Geotechnical Engineers, Inc. 222 South Park Avenue Montrose, Colorado 81401 Phone (970) 249-6828 Fax (970) 249-0945

Bowie Mine No. 2 - CWDA No. 2
Active and Damaged Vibrating Wire Piezometer Data

Inception through 5-21-14

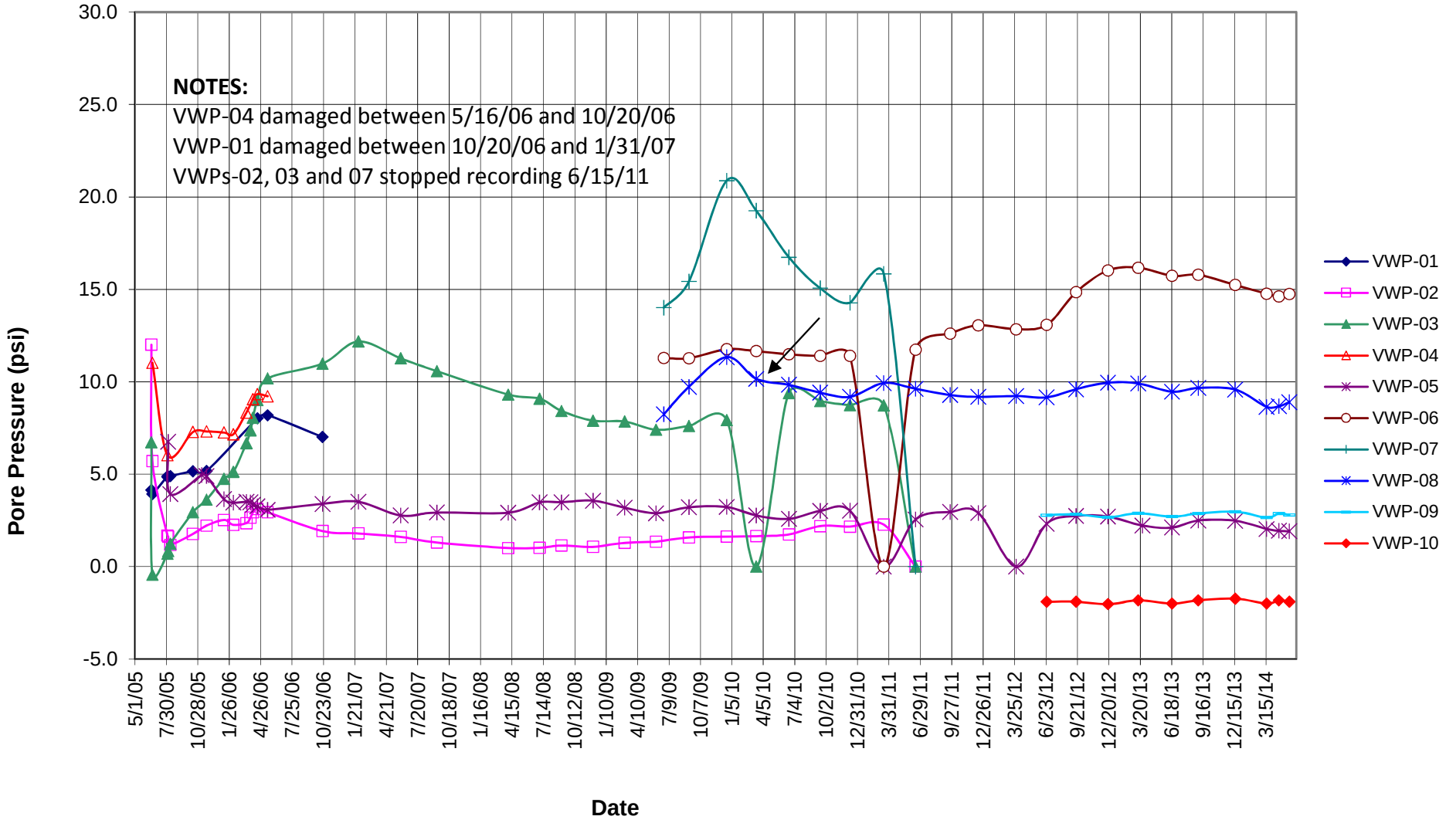
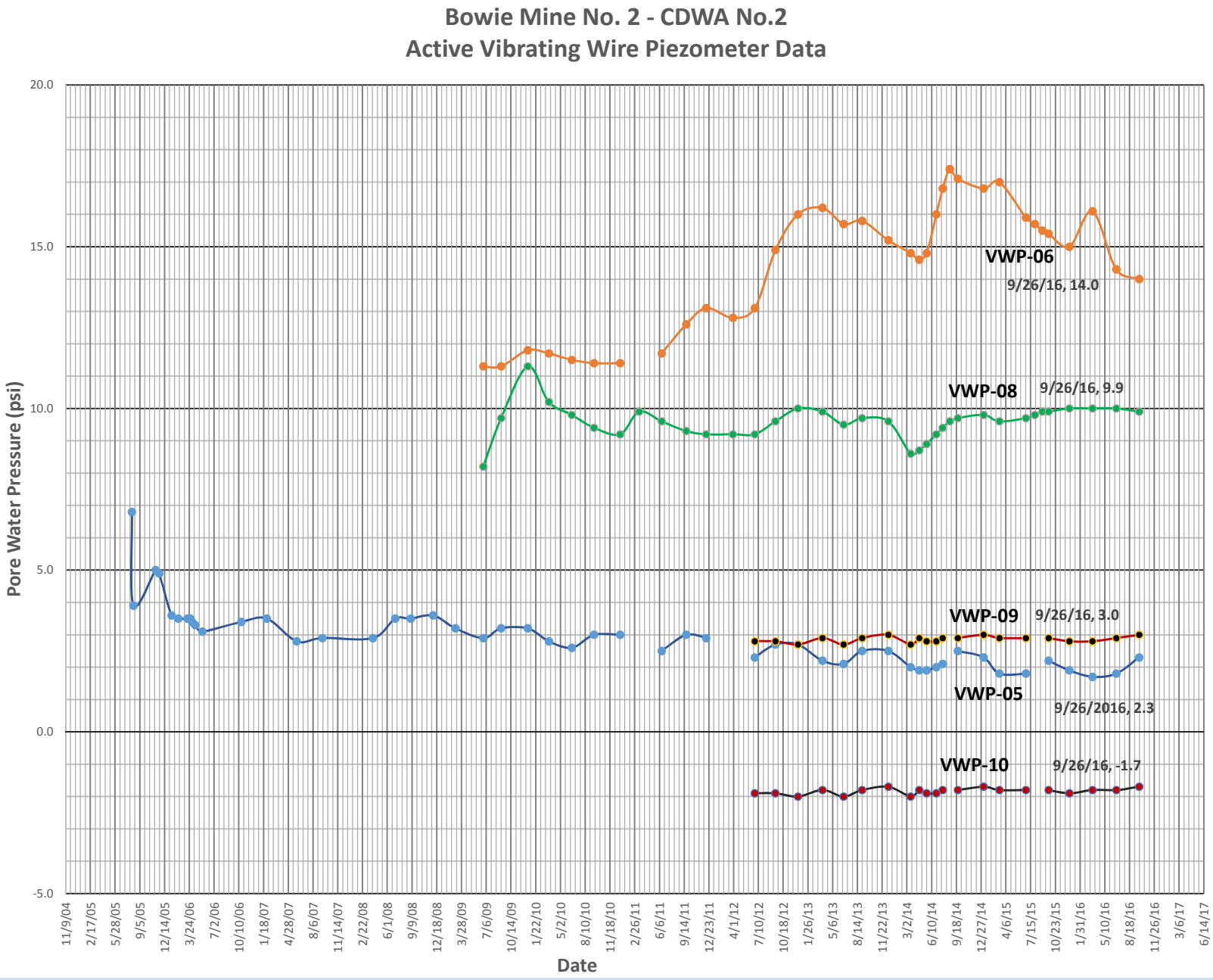


FIGURE 1


Bowie Mine No. 2 - CDWA No.2
Active Vibrating Wire Piezometer Data
Pore Water Pressure (psi)
20.0
15.0
10.0
5.0
0.0
-5.0
VWP-06
9/26/16, 14.0
VWP-08
9/26/16, 9.9
VWP-09
9/26/16, 3.0
VWP-05
9/26/2016, 2.3
VWP-10
9/26/16, -1.7
11/9/04
2/17/05
5/28/05
9/5/05
12/14/05
3/24/06
7/2/06
10/10/06
1/18/07
4/28/07
8/6/07
11/14/07
2/22/08
6/1/08
9/9/08
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5/2/10
8/10/10
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5/6/13
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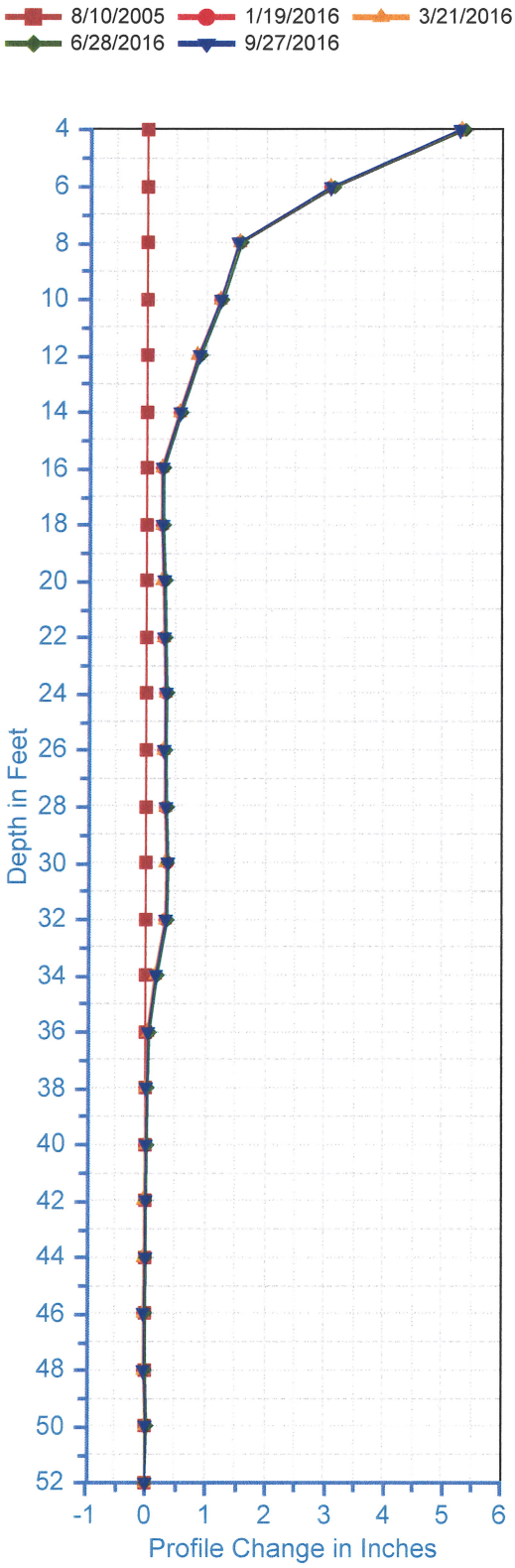
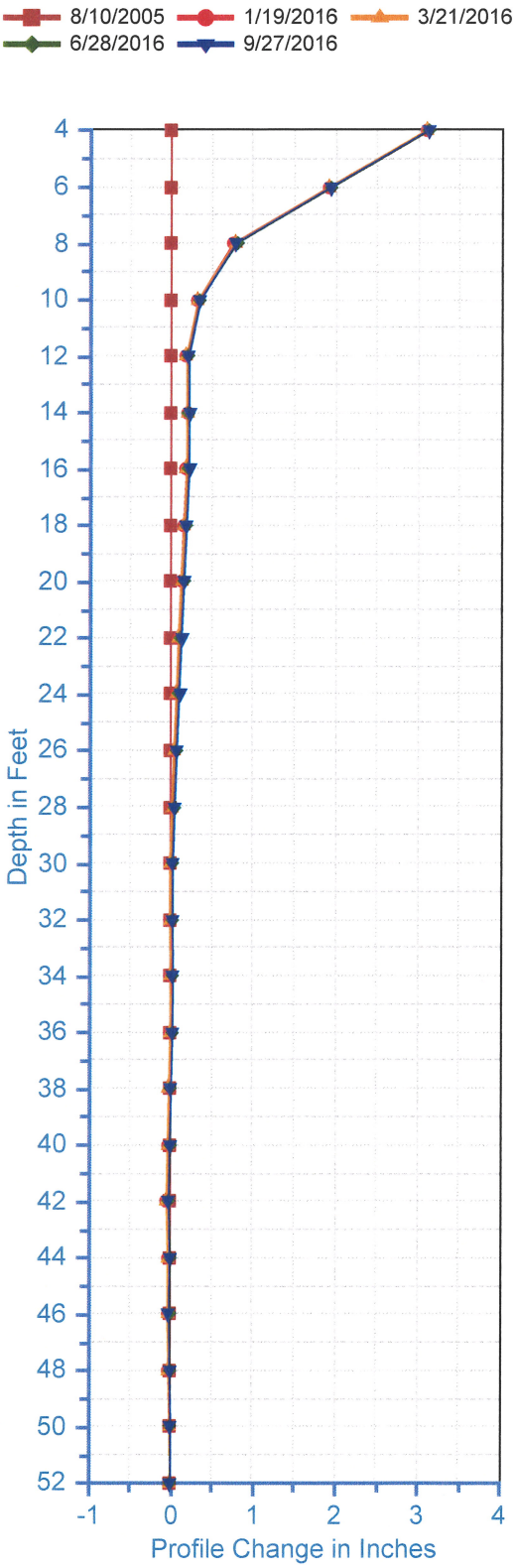
11/22/13
3/2/14
6/10/14
9/18/14
12/27/14
4/6/15
7/15/15
10/23/15
1/31/16
5/10/16
8/18/16
11/26/16
3/6/17
6/14/17
Date

FIGURE 2

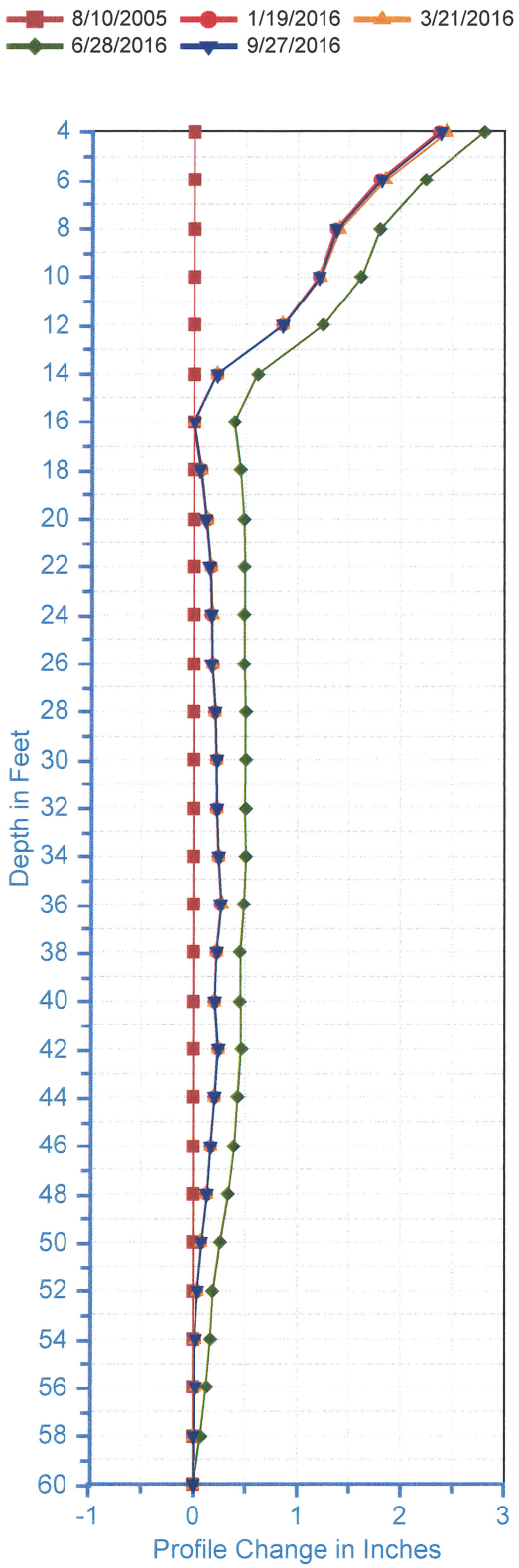
BOWIE BG05_4 A



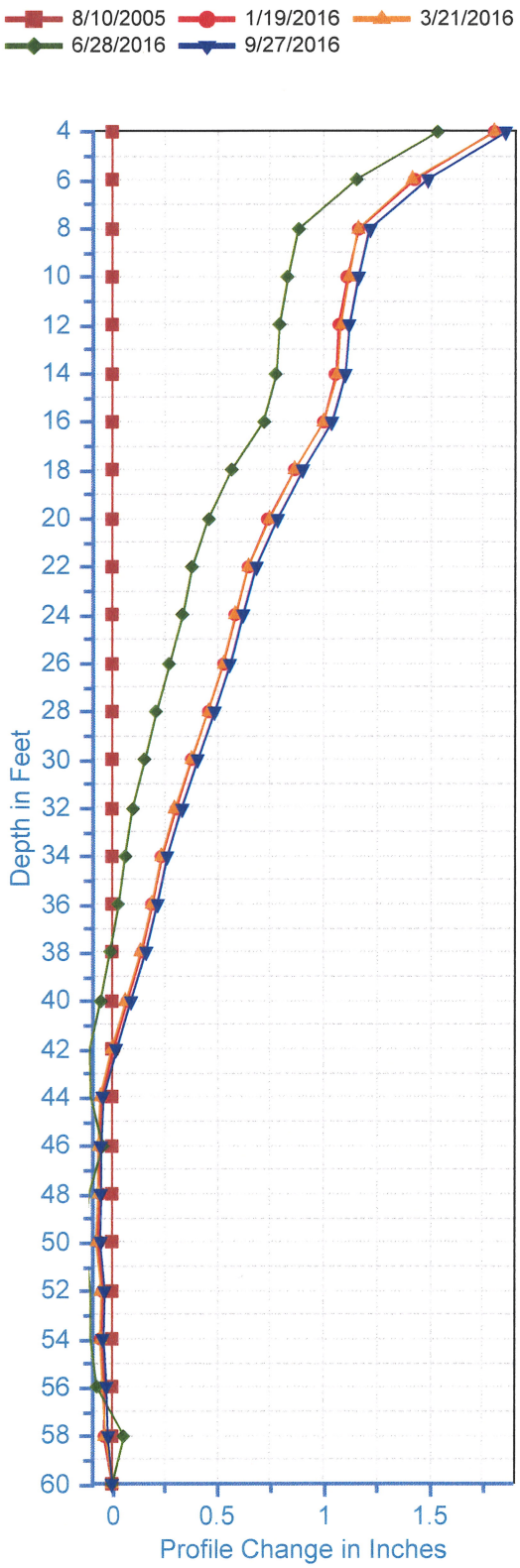
BOWIE BG05_4 B



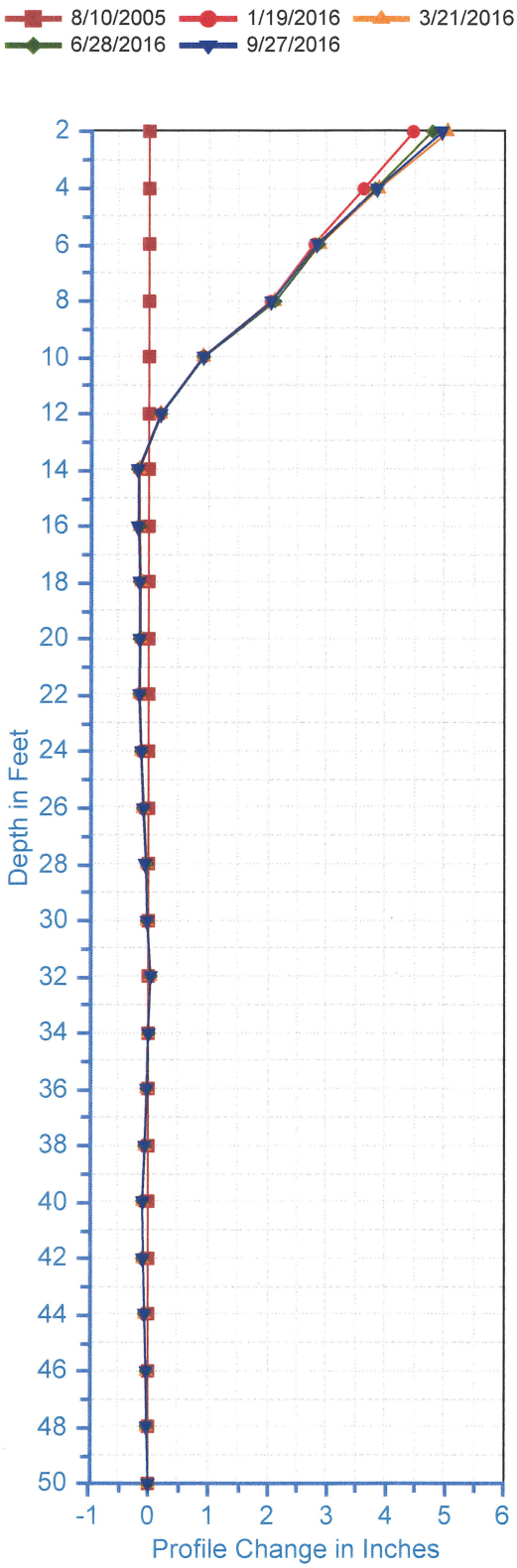
BOWIE BG05_5 A



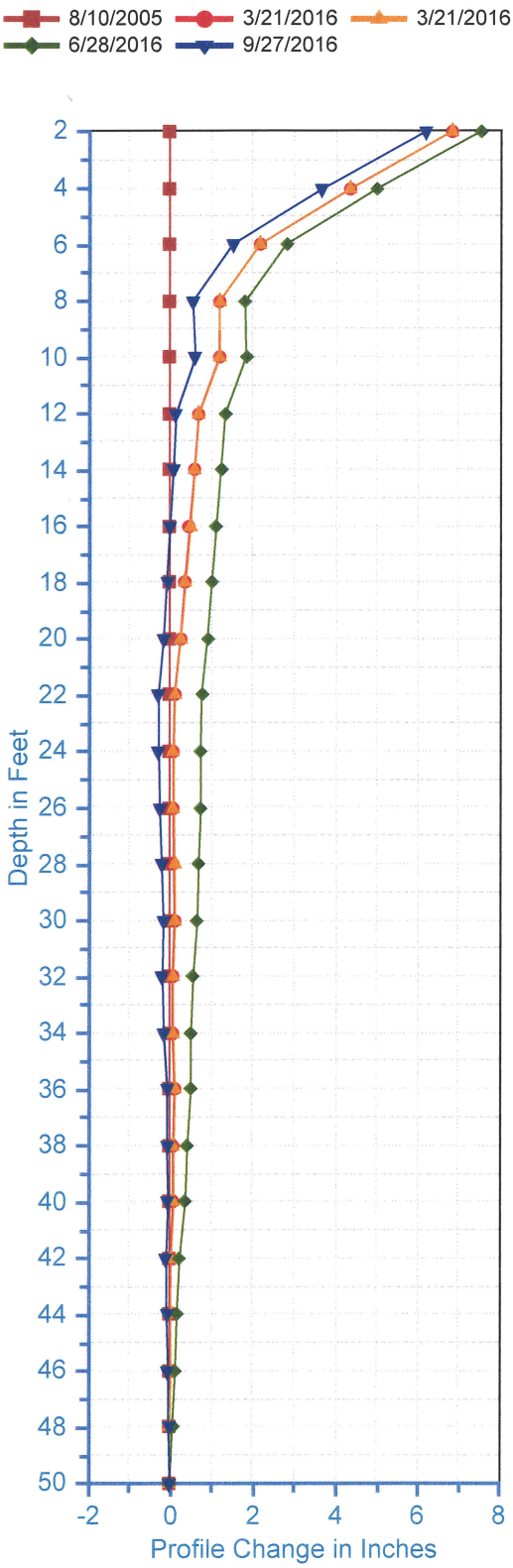
BOWIE BG05_5 B



BOWIE BG05_7 A



BOWIE BG05_7 B



Huddleston-Berry
Engineering & Testing, LLC

640 White Avenue, Unit B
Grand Junction, Colorado 81501
Phone: 970-255-8005
Fax: 970-255-6818
Info@huddlestonberry.com

October 13, 2016
Project#01349-0001

Bowie Resources, LLC
43659 Bowie Road
Paonia, Colorado 81428

Attention: Mr. Bill Bear

Subject: Summary of Instrumentation Monitoring
3rd Quarter 2016
Bowie Coal Waste Disposal Area No. 3
Paonia, Colorado

Reference: *Summary of Instrumentation Monitoring, 2nd Quarter 2016, Bowie Coal Waste Disposal Area No. 3, Paonia, Colorado* by Huddleston-Berry Engineering & Testing, LLC for Bowie Resources, LLC, July 12, 2016.

Stability Evaluation, Gob Pile #3, Bowie No. 2 Mine by Huddleston-Berry Engineering & Testing, LLC for Bowie Resources, LLC, July 15, 2014.

Dear Mr. Bear,

At the request of the Colorado Division of Reclamation, Mining and Safety (DRMS), Huddleston-Berry Engineering & Testing, LLC (HBET) prepared this letter regarding quarterly monitoring of vibrating wire piezometers at Coal Waste Disposal Area No. 3 (CWDA No. 3) at the Bowie mine near Paonia, Colorado. The intent of the monitoring was to detect significant changes in the pore water pressures within the coal waste which may impact the stability of the waste pile.

Vibrating Wire Piezometers

Five vibrating wire piezometers were installed in CWDA No. 3 in October 2014. The piezometers were installed at three locations within the footprint of the gob pile. Monitoring of the functioning piezometers was completed by DOWL on September 26th, 2016. The attached monitoring report prepared by DOWL includes the piezometer monitoring data and the data is summarized in the following table.

VWP ID	Initial Pore Pressure 10/31/14 (psi)	06/25/16 Pore Pressure (psi)	09/26/16 Pore Pressure (psi)	Difference Since Installation (psi)	Difference Since Last Reading (psi)
VWP-A Deep	10.4	4.8	4.2	-5.8	-0.6
VWP-A Shallow	4.7	4.4	4.1	-0.6	-0.3
VWP-B Deep	0.2	1.6	0.4	+0.2	-1.2
VWP-B Shallow	13.9	13.0	12.3	-1.6	-0.7
VWP-D	7.1	6.1	5.9	-1.2	-0.2

Discussion of Vibrating Wire Piezometers

VWP-A Deep

VWP-A Deep was installed on October 6, 2014 near the northern edge of CWDA No. 3. VWP-A Deep was installed in the foundation soil approximately eight feet below the bottom of the gob. The pore pressures recorded at VWP-A Deep generally decreased since installation until September 2015. Between September and December 2015, the pore pressures increased slightly. However, the pore pressures dropped significantly between December 2015 and March 2016. A slight increase was recorded since March; however, the pore pressures again dropped between June and September 2016. In general, HBET does not believe that the pore pressure changes in VWP-A Deep are cause for concern regarding stability of the gob pile.

VWP-A Shallow

VWP-A Shallow was installed on October 6, 2014 near the northern edge of CWDA No. 3. VWP-A Shallow was installed approximately ten feet above the base of the gob. After installation, the pore pressures dropped until November 2014. Between November 2014 and September 2015, increases in the pore pressures were recorded at VWP-A Shallow. However, between September 2015 and September 2016, the pore pressures decreased. In general, HBET does not believe that the pore pressure changes in VWP-A Shallow are an indication of instability in CWDA No. 3.

VWP-B Deep

VWP-B Deep was installed on October 6, 2014 in the west-central portion of CWDA No. 3. VWP-B Deep was installed in the foundation soil approximately ten feet below the bottom of the gob. Since installation, the pore pressures recorded at VWP-B Deep were fairly constant through March 2016. A slight increase was recorded between March and June 2016; however, the pore pressures dropped between June and September 2016. In general, HBET does not believe that the pore pressure changes in VWP-B Deep are an indication of instability in CWDA No. 3.

VWP-B Shallow

VWP-B Shallow was installed on October 6, 2014 in the west-central portion of CWDA No. 3. VWP-B Shallow was installed approximately ten feet above the base of the gob. Since installation, the pore pressures recorded at VWP-B Shallow have fluctuated with periods of slight increase and slight decrease. Between March and September 2015, the pore pressures at VWP-B Shallow increased. However, since September 2015, the pore pressures have decreased. In general, HBET does not believe that the pore pressure changes in VWP-B Shallow are an indication of instability in CWDA No. 3.

VWP-D

VWP-D was installed on October 7, 2014 in the east-central portion of CWDA No. 3. VWP-D was installed approximately ten feet above the base of the gob. Since installation, the pore pressures recorded at VWP-D have fluctuated. There was a slight increase in pore pressures between June and September 2015 with a decrease since. In general, HBET does not believe that the pore pressure changes in VWP-D are an indication of instability in CWDA No. 3.

Site Visit Observations

HBET visited the site on October 5th, 2016. At the time of our visit, coal mine waste was not being placed at CWDA No. 3. However, several windrows of wet gob were present on top of the pile. In addition, HBET observed that the western portion of CWDA No. 3 had been bisected with several deep trenches. HBET believes that this is likely part of efforts to dry the gob in this area. It did not appear that any recent work had been completed at the east end of CWDA No. 3 in the drying area.

At the time of our site visit, a very small quantity of water was emanating from the underdrain at CWDA No. 3. Seepage from the south edge of the pile was very minimal. In general, no evidence of instability of other adverse conditions were observed at CWDA No. 3

General

Based upon the results of the most recent VWP monitoring data and upon our observations at the site, HBET does not believe that there is any reduction in the stability of CWDA No. 3. Continued quarterly monitoring of piezometers and inclinometers is recommended.

We are pleased to be of service to your project. Please contact us if you have any questions or comments regarding the contents of this report.

Respectfully Submitted:
Huddleston-Berry Engineering and Testing, LLC

Michael A. Berry, P.E.
Vice President of Engineering

ATTACHMENTS

DOWL
970-249-6828 ■ 800-865-9847 (fax) ■ 222 South Park ■ Montrose, CO 81401 ■ www.dowl.com
Alaska ■ Arizona ■ Colorado ■ Montana ■ North Dakota ■ Oregon ■ Washington ■ Wyoming

October 7, 2016

Huddleston-Berry Engineering and Testing, LLC
640 White Avenue
Grand Junction, CO 81501
Attention: Mike Berry, PE

SUBJECT: Summary Report, Third Quarter 2016, Vibrating Wire Piezometers through September 2016, Bowie Mine No. 2, Coal Waste Disposal Area No. 3

Dear Mr. Berry,

DOWL conducted quarterly monitoring of installed vibrating wire piezometers at Coal Waste Disposal Area No. 3 (CWDA No. 3), Bowie Resources, LLC. This report is intended to cover the time period of July through September 2016. VWP data was obtained on 9-26-16. A graphic plot of measured pore pressures over time is presented on the attached Figure 1, and numerically in Table 1 below. Table 1 summarizes the initial, prior and current readings and the difference in individual pore pressures since installation and prior readings.

Table 1. Summary of Pore Pressure Readings

VWP ID #	Initial Pore Pressure 10/31/14 (psi)	6/25/16 Pore Pressure (psi)	9/26/16 Pore Pressure (psi)	Difference Since Installation (psi)	Difference Since Last Reading (psi)
VWP-A Deep	10.4	4.8	4.2	-5.8	-0.6
VWP-A Shallow	4.7	4.4	4.1	-0.6	-0.3
VWP-B Deep	0.2	1.6	0.4	+0.2	-1.2
VWP-B Shallow	13.9	13.0	12.3	-1.6	-0.7
VWP-D	7.1	6.1	5.9	-1.2	-0.2

If you have any questions regarding this letter or the instrumentation monitoring at CWDA No. 3, please don't hesitate to contact me at (970) 497-8827 or *wpandorf@dowl.com*.

Respectfully Submitted,
DOWL

Wayne Pandorf, P.E.
Sr. Geotechnical Engineer
Enclosure: Figure 1 – Vibrating Wire Piezometer Data Graph

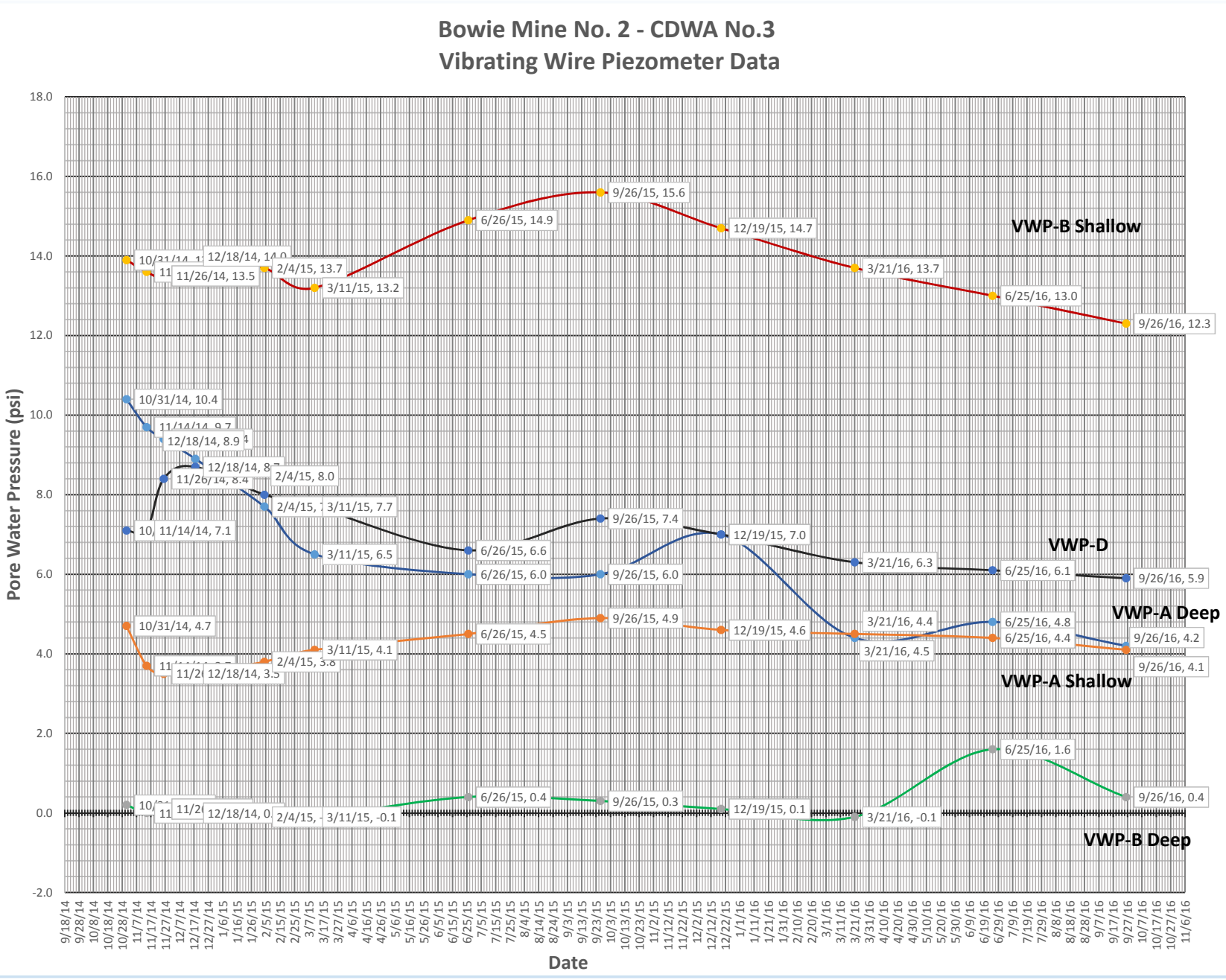

Bowie Mine No. 2 - CDWA No.3
Vibrating Wire Piezometer Data
Pore Water Pressure (psi)
Date
VWP-B Shallow
VWP-D
VWP-A Deep
VWP-A Shallow
VWP-B Deep
10/31/14, 10.4
12/18/14, 8.9
2/4/15, 8.0
3/11/15, 7.7
3/11/15, 6.5
6/26/15, 6.6
6/26/15, 6.0
9/26/15, 6.0
12/19/15, 7.0
3/21/16, 6.3
6/25/16, 6.1
9/26/16, 5.9
10/31/14, 4.7
3/11/15, 4.1
6/26/15, 4.5
9/26/15, 4.9
12/19/15, 4.6
3/21/16, 4.4
3/21/16, 4.5
6/25/16, 4.8
6/25/16, 4.4
9/26/16, 4.2
9/26/16, 4.1
11/26/14, 13.5
2/4/15, 13.7
3/11/15, 13.2
6/26/15, 14.9
9/26/15, 15.6
12/19/15, 14.7
3/21/16, 13.7
6/25/16, 13.0
9/26/16, 12.3
12/18/14, 0
3/11/15, -0.1
6/26/15, 0.4
9/26/15, 0.3
12/19/15, 0.1
3/21/16, -0.1
6/25/16, 1.6
9/26/16, 0.4

FIGURE 1