



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of District Mining
Knox District Office

Acid Mine Drainage Treatment Facilities Field Trip

Knox District Mining Office

July 19, 2017

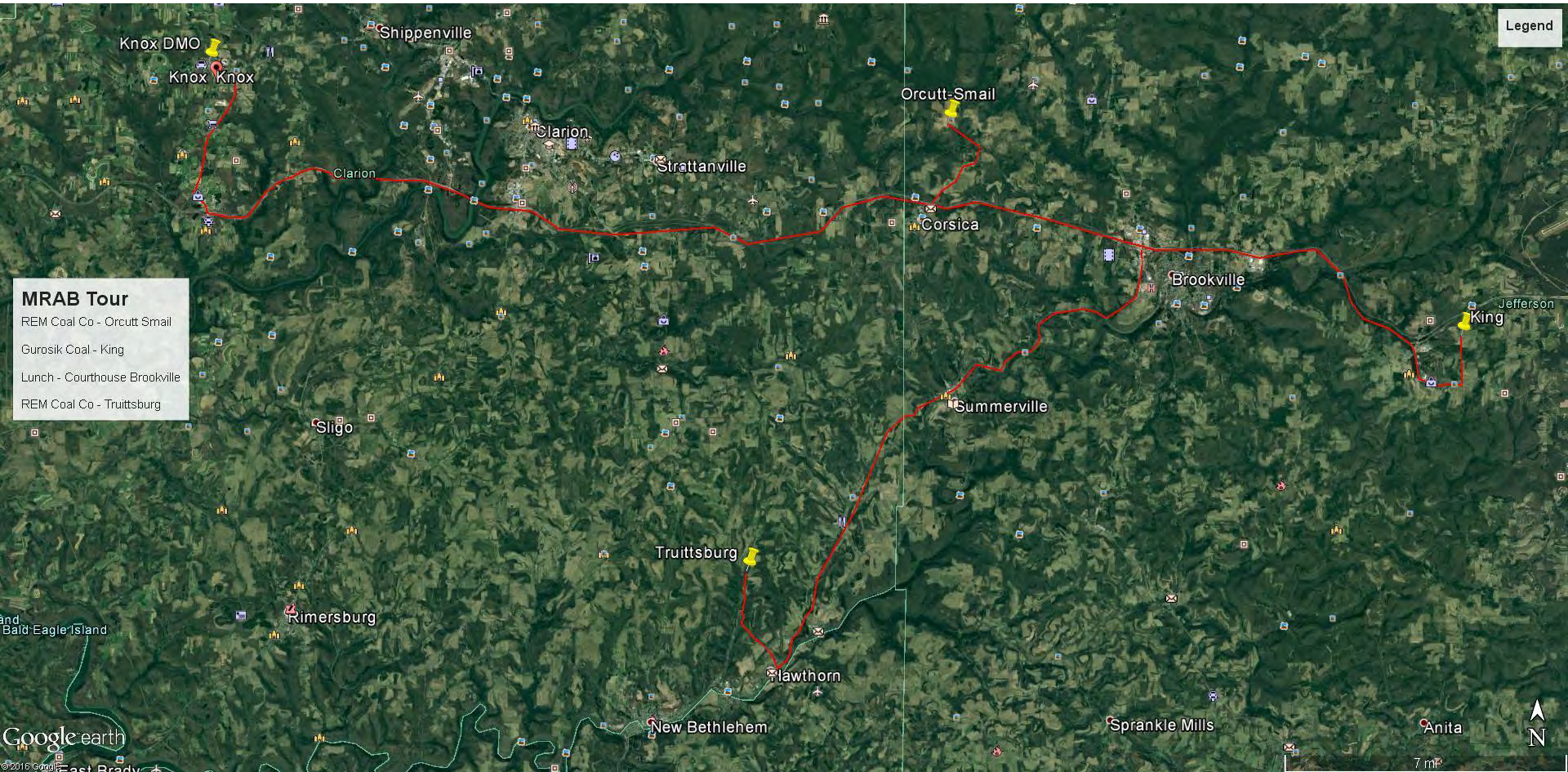
Tom Wolf, Governor

Acting Secretary Patrick McDonnell

MRAB Field Trip

- Meet at the Knox District Office at 9 AM.
Depart at 9:30 AM
- Visit three sites
- Lunch stop during the tour

MRAB Field Trip



REM COAL ORCUTT-SMAIL



REM Coal Co
Orcutt- Smail AMD Treatment System

Legend
REM passive treatment system

Google earth
© 2013 Google

REM COAL – Orcutt-Smail

- Attempts to treat discharges passively failed.
- Converted to active treatment in 2015
 - Lime slurry tank with 2 separate pump systems
 - Steel pre-aeration tanks to remove CO₂
 - 4 vertical flow ponds converted to settling ponds.
- Raw water chemistry. 2 discharges 19.3 gpm and 36 gpm average.

pH	Total Fe	Total Al	Total Mn	ALK	Hot Acidity	Sulfates
5.8 & 3.9	101 & 215	<0.5 & 3.3	39.5 & 71.5	40 & 3	250 & 540	850 & 1450

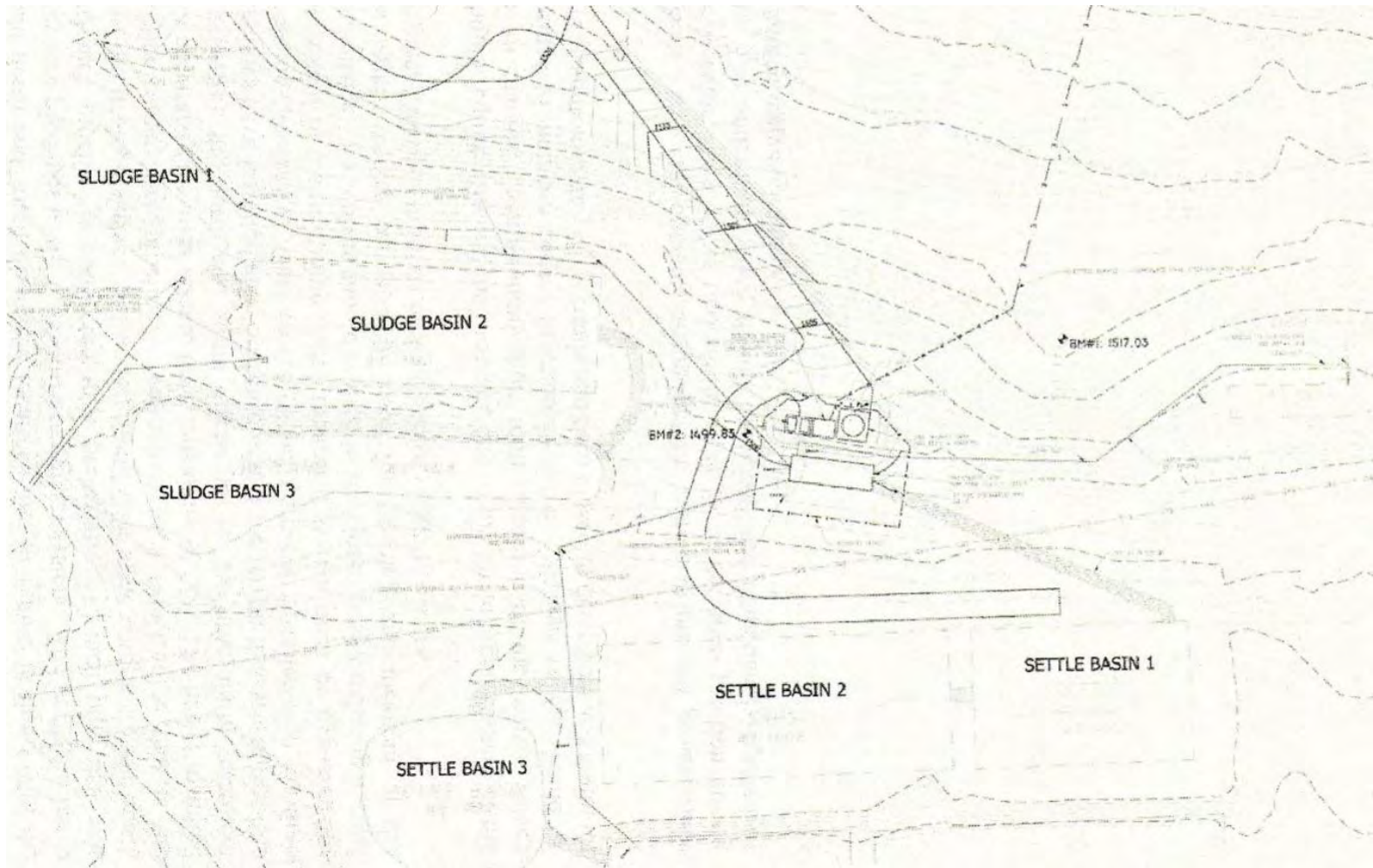
REM COAL ORCUTT-SMAIL

**ORCUTT-SMAIL
LIME SLURRY TREATMENT SYSTEM
R.E.M. Coal Company, Inc.
SMP #33803040 & #33743044
Union Township, Jefferson County**

O&M Documentation



REM COAL ORCUTT-SMAIL



REM COAL ORCUTT-SMAIL



REM COAL ORCUTT-SMAIL



REM COAL ORCUTT-SMAIL

- Effluent Limits – pH $6 < < 9$, Fe < 3.0 mg/l, Mn < 2.0 mg/l
- Final discharge water quality – Avg 55 gpm

pH	Total Fe	Total Al	Total Mn	Hot Acidity	Sulfates
7.1	1.48	<0.5	8.56	-37.07	1115

REM COAL ORCUTT-SMAIL

Project costs

Phase	Cost
Design	\$82,000
Construction	\$600,000
Operation and Maintenance	\$77,000

GUROSIK COAL - KING

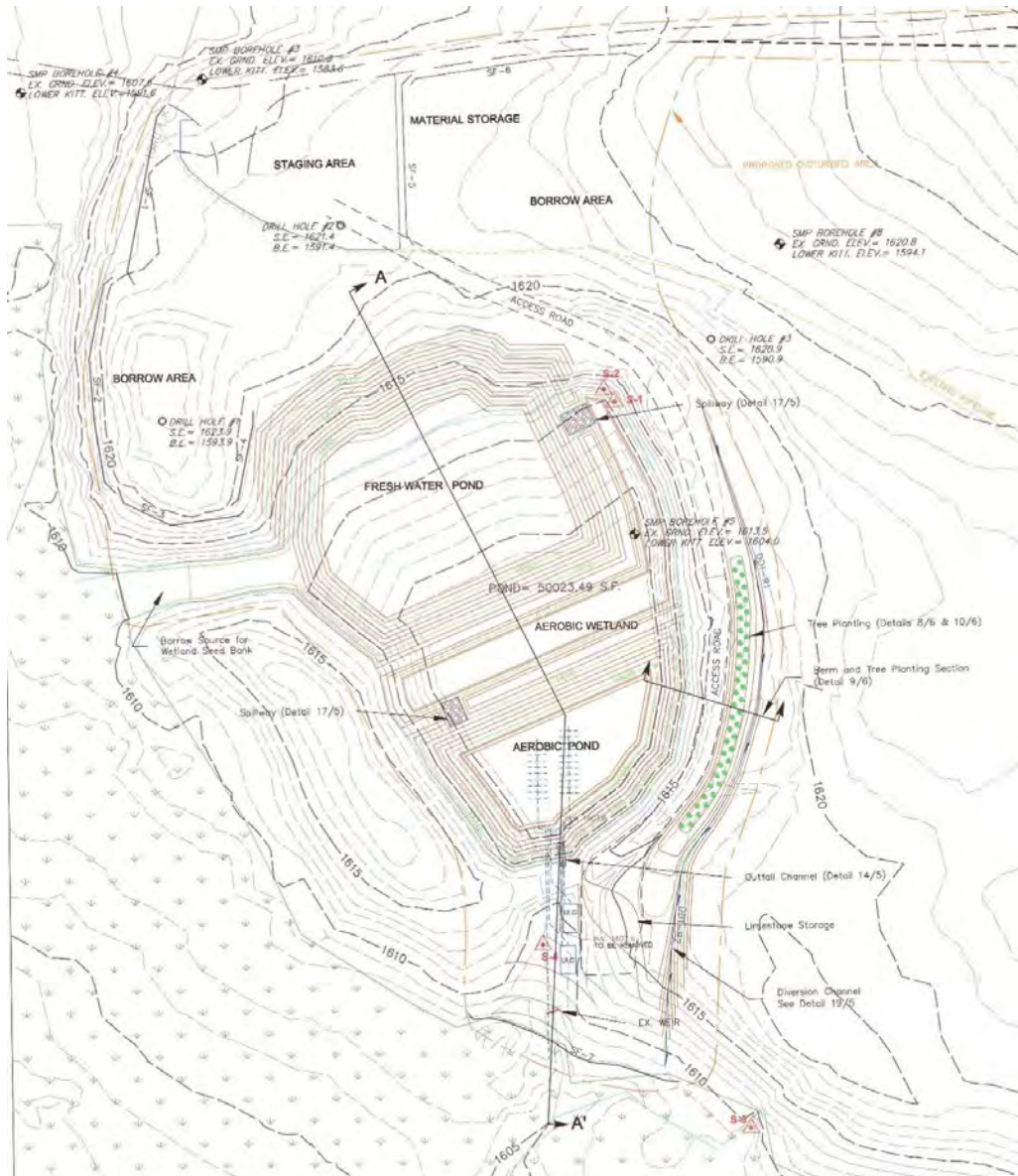


GUROSIK COAL - KING

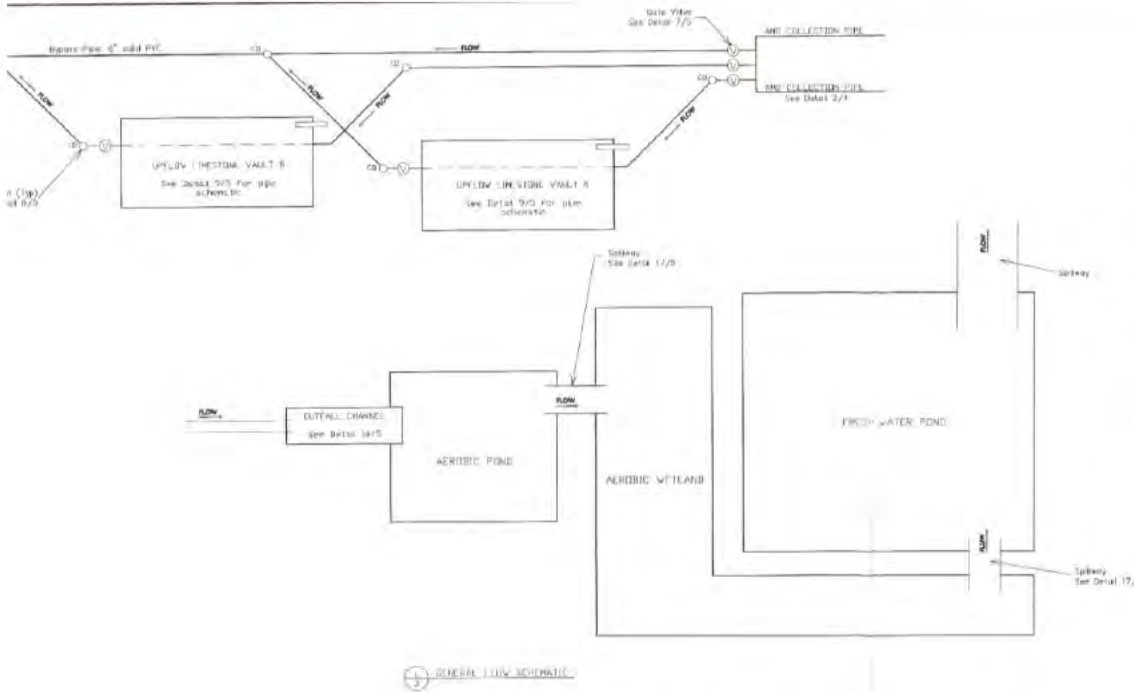
- Discharges emanated in and around an existing sediment pond below grade
- Collect & pump to limestone bed.
- Landowner didn't want to expand beyond footprint of the sediment pond.
- Raw water chemistry

pH	Total Fe	Total Al	Total Mn	ALK	Acidity	Sulfates
3.8 – 6.7	0 – 93.4	<0.5	0 – 13.8	0 – 68	0 – 93.4	140 - 278

GUROSIK COAL - KING



GUROSIK COAL - KING



Dimensions Summary Table

Class. Size 18 Cell #	General Dimensions			Treatment Media Dimensions			Emergency Spillway Dimensions		
	Top of EL (FT/MSL)	Subgrade EL (FT/MSL)	Top Width (FT)	Height (FT)	Water Depth (FT)	Water Elevation (FT)	Chow EL (FT/MSL)	Spillway Width (FT)	Spillway Depth (FT)
Aerobic Pond	1002.5	1014.0	8.0	0.5	8.0	1010.0	1010.0	12	2.0
Aerobic Wetland	1007.5	1017.0	8.0			1008.5	1008.5	15	2.5
Fresh Water Pond	1002.5	1014.0	8.0			1008.0	1008.0	18	

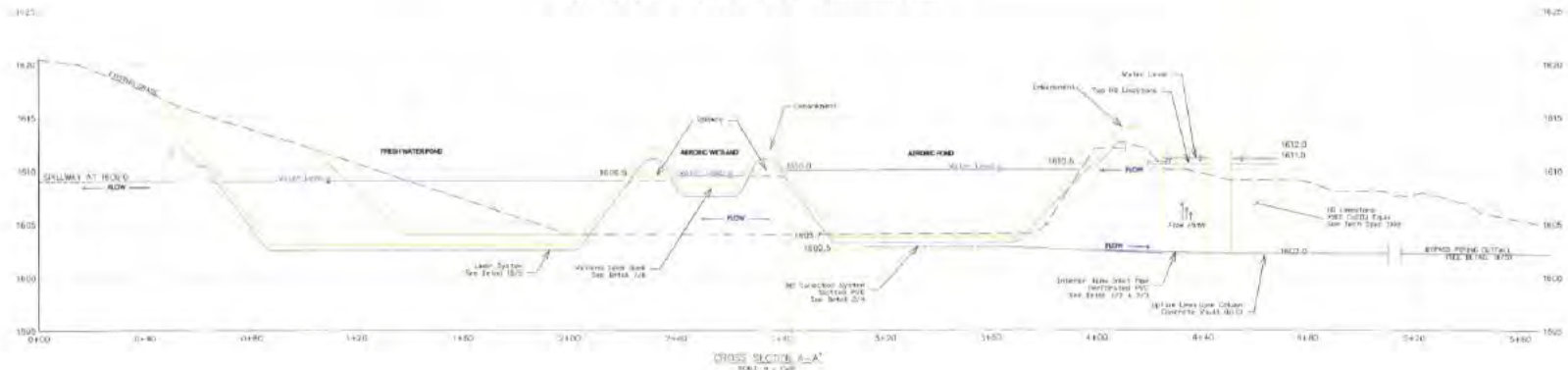
TABLE 2

Piping Summary Table

Site & Cell #	Invert Elevations		Total Offsets		Number of Ordnance	Design Flow Rate/Cycle (GPM)
	Pipe Diameter (IN)	(FT/MSL)	Number (FT/MSL)	Diameter (IN)		
Upflow Inflow Vault	6	1002.5	1002.5	1017.0	0.0	1 per cycle
Aerobic Pond	N/A	1002.7	1002.7	1027.7	6.0	2 pipes

TABLE 3

General Cross-Section Schematic of Treatment Cells



GUROSIK COAL - KING



GUROSIK COAL - KING



GUROSIK COAL - KING



GUROSIK COAL - KING

- Effluent Limits – pH $6 < < 9$, Fe < 3.0 mg/l
- Final discharge water quality – Average 16 gpm

pH	Total Fe	Total Al	Total Mn	Hot Acidity	Sulfates
7.7	0.27	<0.5	0.98	-79.1	234

GUROSIK COAL - KING

Project costs

Phase	Cost
Design	\$45,800
Construction	\$426,231
Operation and Maintenance	\$45,539

2015 replaced one pump and limestone. Average annual O & M \$6,470

REM COAL TRUITTSBURG

REM Coal Co
Truittsburg AMD Treatment System



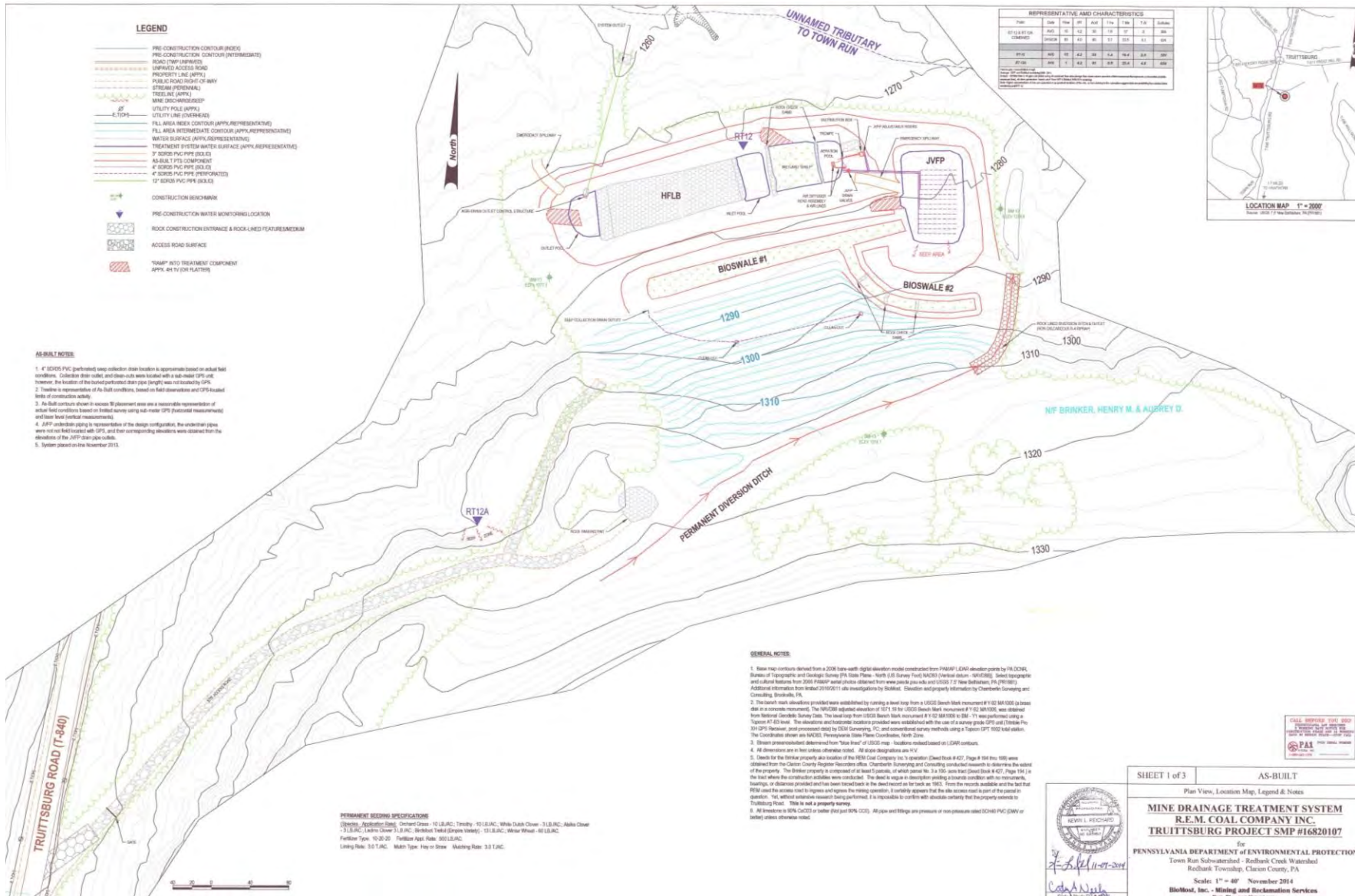
REM COAL – TRUITTSBURG

- Treatment system built to treat 2 acidic discharges
- Raw water chemistry. 2 discharges 12 gpm and 1 gpm average.

pH	Total Fe	Total Al	Total Mn	ALK	Hot Acidity
4.3	1	2	18	5	44

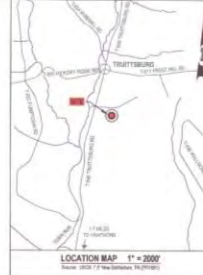
pH	Total Fe	Total Al	Total Mn	ALK	Hot Acidity
4.3	<0.5	5	26	4	86

REM COAL TRUITTSBURG



REPRESENTATIVE AND CHARACTERISTICS

Zone	Area (Ac)	Length (ft)	Width (ft)	Flow (cfs)	Velocity (ft/s)	Depth (ft)
RT12	100	10	10	10	1.0	1.0
RT12A	100	10	10	10	1.0	1.0
RT12B	100	10	10	10	1.0	1.0
RT12C	100	10	10	10	1.0	1.0
RT12D	100	10	10	10	1.0	1.0
RT12E	100	10	10	10	1.0	1.0
RT12F	100	10	10	10	1.0	1.0
RT12G	100	10	10	10	1.0	1.0
RT12H	100	10	10	10	1.0	1.0
RT12I	100	10	10	10	1.0	1.0
RT12J	100	10	10	10	1.0	1.0
RT12K	100	10	10	10	1.0	1.0
RT12L	100	10	10	10	1.0	1.0
RT12M	100	10	10	10	1.0	1.0
RT12N	100	10	10	10	1.0	1.0
RT12O	100	10	10	10	1.0	1.0
RT12P	100	10	10	10	1.0	1.0
RT12Q	100	10	10	10	1.0	1.0
RT12R	100	10	10	10	1.0	1.0
RT12S	100	10	10	10	1.0	1.0
RT12T	100	10	10	10	1.0	1.0
RT12U	100	10	10	10	1.0	1.0
RT12V	100	10	10	10	1.0	1.0
RT12W	100	10	10	10	1.0	1.0
RT12X	100	10	10	10	1.0	1.0
RT12Y	100	10	10	10	1.0	1.0
RT12Z	100	10	10	10	1.0	1.0



- LEGEND**
- PRE-CONSTRUCTION CONTOUR (INDEX)
 - PRE-CONSTRUCTION CONTOUR (INTERMEDIATE)
 - ROAD (TYP UNIMPROVED)
 - UNIMPROVED ACCESS ROAD
 - PROPERTY LINE (APPL)
 - PUBLIC ROAD RIGHT-OF-WAY
 - STREAM (PERMANENT)
 - TREELINE (APPL)
 - MINE DISCHARGE(S)
 - UTILITY POLE (APPL)
 - UTILITY LINE (OVERHEAD)
 - FILL AREA INDEX CONTOUR (APPL REPRESENTATIVE)
 - FILL AREA INTERMEDIATE CONTOUR (APPL REPRESENTATIVE)
 - WATER SURFACE (APPL REPRESENTATIVE)
 - TREATMENT SYSTEM WATER SURFACE (APPL REPRESENTATIVE)
 - 3\"/>
 - AS-BUILT PTS COMPONENT
 - AS-BUILT PVE (PERFORATED)
 - AS-BUILT PVE (PERFORATED)
 - AS-BUILT PVE (PERFORATED)
 - CONSTRUCTION BENCHMARK
 - PRE-CONSTRUCTION WATER MONITORING LOCATION
 - ROCK CONSTRUCTION ENTRANCE & ROCK-LINED FEATURE (MEDIUM)
 - ACCESS ROAD SURFACE
 - "RAMP" INTO TREATMENT COMPONENT (APPL 441V OR FLAT) (R)

AS-BUILT NOTE:

1. If 100% PVC perforated wrap collection drain location is approximate based on actual field conditions. Collector drain radius and clear cuts were located with sub-meter GPS; however, the location of the located perforated drain pipe (length) was not located by GPS.
2. Treatment is representative of field conditions, based on field observations and GPS actual levels of construction activity.
3. In-fill contour elevations are based on placement area and a reasonable representation of actual field conditions based on limited survey using sub-meter GPS (photogrammetry) and base level (vertical measurements).
4. JVPF underdrain piping is representative of the design configuration; the underdrain pipes were not field located with GPS, and their corresponding elevations were obtained from the elevations of the JVPF base pipe underdrain.
5. System placed on the November 2013.

GENERAL NOTES:

1. Base map contours derived from a 2008 base north digital elevation model constructed from PPMAP LEAD elevation points by P.R. DICKEL, Bureau of Topographic and Geologic Survey (PA State Plane - North U.S. Survey Tied NAD83) (vertical datum - NAVD83). Ground topographic and cultural features from 2008 PPMAP aerial photos obtained from www.ppm.gov and USGS 1:25000 Topographic Maps (PA Property). Additional information from 2010/2011 site investigations by Siskind. Elevation and property information by Chesapeake Consulting and Consulting, Inc., Harrisburg, PA.
2. The bench mark elevations provided were established by ranging a level loop from a USGS bench mark monument of 1022 MARIAGE to brass disk at a nearby monument. The USGS bench mark monument of 1021 at USGS bench mark monument # 1022 MARIAGE was obtained from National Geodetic Survey Data. The level loop from USGS bench mark monument # 1022 MARIAGE to BM-71 was performed using a Topcon AT-43 level. The elevations and horizontal locations provided were established with the use of a survey grade GPS and Trimble Pro 3X GPS Receiver, and processed (GCS) by SEM Surveying, P.C., and conventional survey methods using a Topcon SPT 1022 total station. The Coordinates shown are NAD83, Pennsylvania State Plane Coordinates, North Zone.
3. Slopes presented determined from "true" line of USGS map; locations indicated based on LIDAR contours.
4. All dimensions are in feet unless otherwise noted. All slope designations are 1%.
5. Details for the historic property also location of the REM Coal Company is to creation (David Rank # 427, Page # 104 thru 105) were obtained from the Clear County Register Recorder's Office. Chesapeake Surveying and Consulting conducted research to determine the status of the property. The Ranker property is composed of about 7 parcels, of which parcel 3 is 100' wide from David Rank # 427, Page 104 to the east where the construction activities were conducted. The deed is vague in describing parcel 3's boundary with no monuments, bearings, or distance provided and has been interpreted as the deed record for Rank # 105. From the records available and the fact that REM used the access road to ingress and egress the mining operation, it is hereby apparent that the site access road is part of the parcel in question. The actual entrance research being performed, it is responsible to confirm with absolute certainty that the property extends to Truittsburg Road. This is not a property survey.
6. All structures to 10% CLOSURE (better than 10% CLOSURE) All pipe and fittings are pressure or non-pressure steel SCH40 PVC (DWV or better) unless otherwise noted.

PERMANENT SEEDING SPECIFICATIONS

(Species, Application Date) Orchard Grass - 10 LB/AC, Timothy - 10 LB/AC, White Dutch Clover - 3 LB/AC, Alsike Clover - 3 LB/AC, Lemon Clover 3 LB/AC, Birdfoot Trefoil (Green Variety) - 10 LB/AC, Winter Wheat - 40 LB/AC.

Fertilizer Type - 10-20-20 Fertilizer Appl. Rate - 500 LB/AC.

Liming Rate - 3.0 T/AC. Muck Type - Fine or Steam. Mucking Rate - 3.0 T/AC.



SHEET 1 of 3 AS-BUILT

Plan View, Location Map, Legend & Notes

MINE DRAINAGE TREATMENT SYSTEM
R.E.M. COAL COMPANY INC.
TRUITTSBURG PROJECT SMP #16820107

for
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
 Town Run Subwatershed - Redbank Creek Watershed
 Redbank Township, Clearfield County, PA

Scale: 1" = 40' November 2014

BlotMod, Inc. - Mining and Reclamation Services

REM COAL TRUITTSBURG



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REM COAL TRUITTSBURG

- Effluent Limits – pH $6 < < 9$, Fe < 3.0 mg/l
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pH	Total Fe	Total Al	Total Mn	Hot Acidity	Sulfates
7.7	0.27	<0.5	0.98	-79.1	234

REM COAL TRUITTSBURG

Project costs

Phase	Cost
Design	\$29,945
Construction	\$224,911
Operation and Maintenance	\$1,292

Average annual O & M \$323



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION



Active and Abandoned Mine Operations

Chris Yeakle
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