west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Jim Justice , Governor
Austin Caperton , Cabinet Secretary
www.dep.wv.gov

Friday, March 24, 2017
WELL WORK PERMIT
Vertical / Plugging

APPALACHIAN POWER CO DBA AEP (A)
US RT. 33, MOUNTAINEER PLANT

NEW HAVEN, WV 252650419

Re: Permit approval for AEP MW 1
47-053-00489-00-00

This well work permit is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to any additional specific conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas Inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days of completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

Per 35 CSR 4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: AEP MW 1
Farm Name: APPALACHIAN POWER CO
U.S. WELL NUMBER: 47-053-00489-00-00
Vertical / Plugging
Date Issued: 3/24/2017

03/24/2017

5300489P

PERMIT CONDITIONS

West Virginia Code §22-6-11 allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. All pits must be lined with a minimum of 20 mil thickness synthetic liner.
2. In the event of an accident or explosion causing loss of life or serious personal injury in or about the well or while working on the well, the well operator or its contractor shall give notice, stating the particulars of the accident or explosion, to the oil and gas inspector and the Chief within twenty-four (24) hours.
3. Well work activities shall not constitute a hazard to the safety of persons.

03/24/2017

5300489P

WW-4B
Rev. 2/01

1) Date _____, 2016
2) Operator's
Well No. AEP MW-1
3) API Well No. 47- 53 - 00489

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

APPLICATION FOR A PERMIT TO PLUG AND ABANDON

4) Well Type: Oil _____/ Gas _____/ Liquid injection _____/ Waste disposal _____/
(If "Gas, Production ____ or Underground storage ____) Deep X / Shallow ____
Other: Test Well - Class V CO2 Injection Monitoring Well

5) Location: Elevation 585.8 ft. Watershed Ohio River
District Graham County Mason Quadrangle New Haven

6) Well Operator Appalachian Power Company dba American Electric Power
Address C/O American Electric Power Land Management
1 Riverside Plaza – 16th Floor, Columbus OH 43215

7) Designated Agent Richard D. Thompson
Address Rt. 62, PO Box 419
New Haven, WV 25625-0419

8) Oil and Gas Inspector to be notified
Name Jamie Stevens
Address 105 Kentuck Road
Kenna, WV 25248

9) Plugging Contractor
Name Battelle Memorial Institute
Address 505 King Avenue
Columbus, OH 43201

10) Work Order: The work order for the manner of plugging this well is as follows:

See attached Plugging summary text, table, and diagram for work order description.

* SEE ATTACHED WELL MARKER DOCUMENT.

* SEE ATTACHED EMAIL "A"

RECEIVED
Office of Oil and Gas
JAN 04 2017
WV Department of
Environmental Protection

Notification must be given to the district oil and gas inspector 24 hours before permitted work can commence.

Work order approved by inspector _____ Date 01-04-2017

03/24/2017

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Plugging Summary – MW-1

Prior to plugging the wells, all equipment such as tubing, packer, gauges and wellheads will be removed from the wells.

A cement retainer will be set in the 4-1/2" casing approximately 55 ft. above the top perforation at approximately 7,640 ft. The perforations (7,695 – 7,800 ft.) will be squeezed off by pumping . Class H cement through a tubing string which will be stabbed into the cement retainer. When the squeeze job is complete, the tubing will be pulled out of the cement retainer and the retainer will be closed so that the cement cannot come back up hole, making a mechanical seal in the 4-1/2" casing in addition to the cement plug. A 250 ft. . Class H . cement plug will be spotted on top of the retainer in the 4-1/2" casing from approximately 7,390 – 7,640 ft. ~~The 50/50 Pozmix cement blend will be used for these two plugs due to its corrosion-resistant qualities~~. A gel spacer will be spotted in the 4-1/2" casing from 5,300 – 7,390 ft.

The 4-1/2" production/deep string casing will be shot off at the free point (to be determined by running a free point test or tool) at approximately 5,300 ft.

A Class A cement plug will be spotted in the 7" casing on top of the 4-1/2" casing stub from approximately 5,150 – 5,300 ft. A gel spacer will be spotted in the 7" casing from approximately 4,600 – 5,150 ft.

The 7" intermediate string casing will be shot off at the free point (to be determined by running a free point test or tool) at approximately 4,600 ft.

A Class A cement plug will be spotted in the 9-1/2" open hole on top of the 7" casing stub from approximately 4,350 – 4,600 ft. A gel spacer will be spotted in the 9-1/2" open hole from approximately 1,850 – 4,350 ft.

A cement retainer will be set in the 10-3/4" casing at approximately 1,750 ft. A Class A cement plug will be squeezed through a tubing work string below the cement retainer in the 10-3/4" casing and the 9-1/2" open hole from 1,750 – 1,850 ft. A 100 ft. Class A cement plug will be spotted on top of the cement retainer in the 10-3/4" casing from 1,650 – 1,750 ft. A gel spacer will be spotted in the 10-3/4" casing from approximately 1,100 – 1,650 ft.

The final surface plug, Class A cement, will be spotted from surface (0 ft.) to 1,100 ft. The wellhead will be removed and marked in compliance with plugging and abandoning requirements.

5300489P

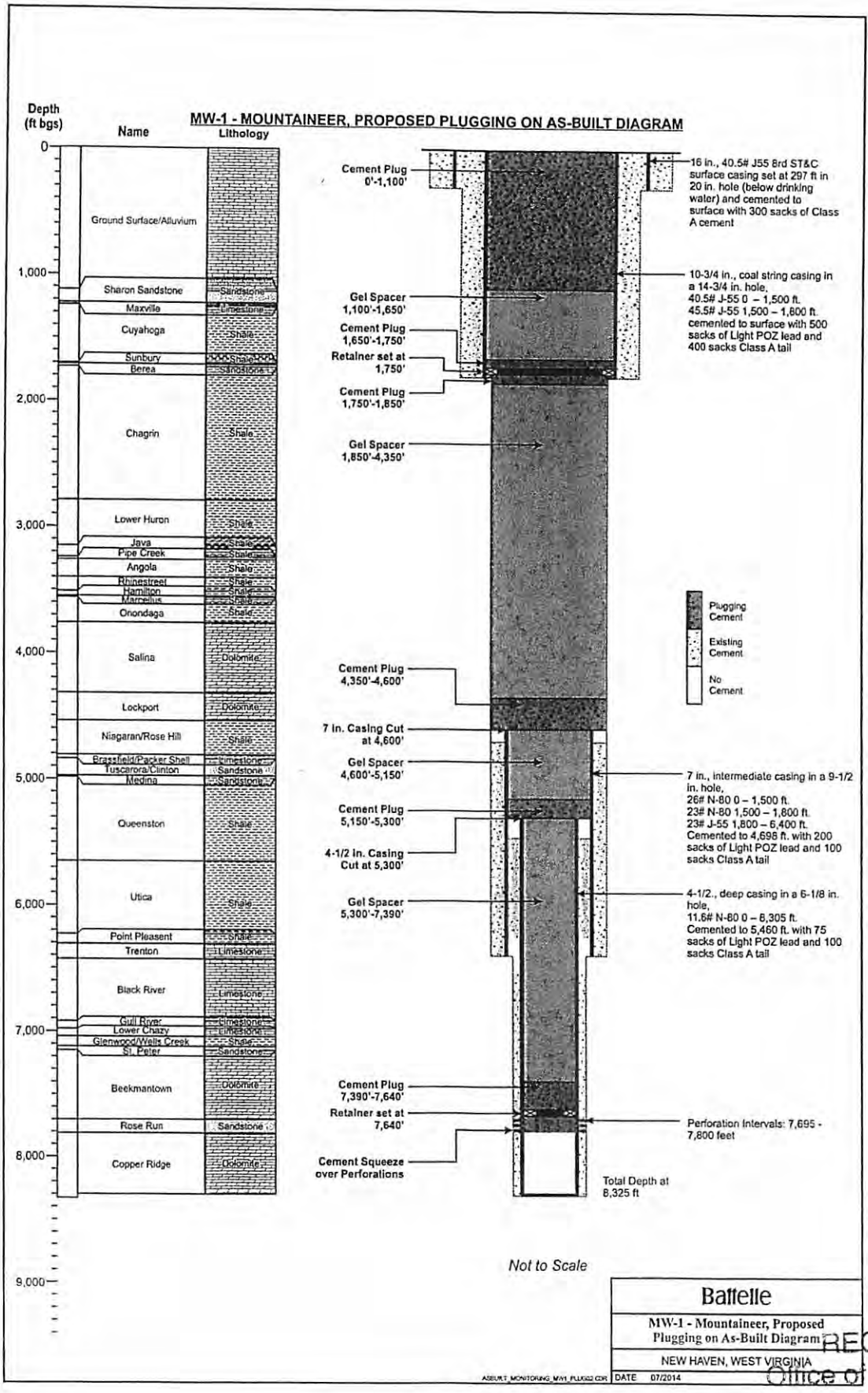
MW-1						
Zone of Interest Description	Depth Interval, ft.	Plugging Material		[C]asing / [H]ole Size	Additives	
		Type	Quantity		Type	Grade
Set Cement Retainer	7640	Cement Retainer	N/A	[C] 4-1/2", 11.60#/ft. Casing	N/A	N/A
★ Squeeze Perforations	7640 - 7800	50/50 Class H	Calculate	[C] 4-1/2", 11.60#/ft. Casing	Bentonite	2%
★ Cement Retainer Plug	7390 - 7640	Class H	Calculate	[C] 4-1/2", 11.60#/ft. Casing	Bentonite	2%
Gel Spacer	5300 - 7390	Bentonite Gel	35 barrels	[C] 4-1/2", 11.60#/ft. Casing	Bentonite	6%
Cut 4-1/2" Casing	5300	Casing Cutter	N/A	[C] 4-1/2", 11.60#/ft. Casing	N/A	N/A
4-1/2" Casing Cut Plug	5150 - 5300	Class A	30 sacks	[C] 7", 23#/ft. Casing	N/A	N/A
Gel Spacer	4600 - 5150	Bentonite Gel	25 barrels	[C] 7", 23#/ft. Casing	Bentonite Gel	6%
Cut 7" Casing	4600	Casing Cutter	N/A	[C] 7", 23#/ft. Casing	N/A	N/A
7" Casing Cut Plug	4350 - 4600	Class A	110 sacks	[H] 9-1/2" Hole	N/A	N/A
Gel Spacer	1850 - 4350	Bentonite Gel	220 barrels	[H] 9-1/2" Hole	Bentonite Gel	6%
Coal String Casing Seat Lower Plug	1750 - 1850	Class A	45 sacks	[H] 9-1/2" Hole [C] 10-3/4", 45.5 #.ft. Casing	CaCl	3%
Coal String Casing Seat Cement Retainer or Bridge Plug	1750	Cement Retainer	N/A	[C] 10-3/4", 45.5 #.ft. Casing	N/A	N/A
Coal String Casing Seat Upper Plug	1650 - 1750	Class A	50 sacks	[C] 10-3/4", 45.5 #.ft. Casing	CaCl	3%
Gel Spacer	1100 - 1650	Bentonite Gel	55 barrels	[C] 10-3/4", 45.5 #.ft. Casing [C] 10-3/4", 40.5 #.ft. Casing	Bentonite Gel	6%
Surface Plug	0 - 1100	Class A	520 sacks	[C] 10-3/4", 40.5 #.ft. Casing	CaCl	3%

★ APPROVED EXCEPTION TO THE RULE

SEE ATTACHED EMAIL "A".

AF.
01-04-17

5300489P



AF 01-04-17

5300489 P

McLaughlin, Jeffrey W ATTACHED EMAIL "A"

From: Timothy W Lohner <twlohner@aep.com>
Sent: Tuesday, March 21, 2017 2:52 PM
To: McLaughlin, Jeffrey W
Cc: Indrajit Bhattacharya; Caitlin McNeil (mcneilce@battelle.org)
Subject: APCO Mountaineer Plant Application to Plug and Abandon Wells - Cement Mix Approvals

Jeff, this is a request for WVDEP approval to use a 50/50 POZ cement mix or a Class H premium cement mix, in lieu of a Class A cement, for the lower most plugs in the two CO2 monitoring wells at the APCO Mountaineer Plant. The original well plugging permit applications specified the use of a 50/50 POZ cement mix. This substitution was recommended due to the CO_2/corrosion resistant properties of the cement. The physical properties of this cement also make it an ideal substitute for setting deep cement plugs in high temperature scenarios.

Since these two wells have not been exposed to CO_2, a Class H premium cement mix, which has the ability to be set at these depths (7,000 ft.+), could also be used. It has material properties that make it suitable for pumping into the formations that will be squeezed off, including the Rose Run sandstone, which is a tight sand in this well. No retarder additive would be needed if the Class H cement is approved for use by the WVDEP.

The plugging permits were submitted with information on the cement type, including the number of sacks to be used during the well plugging. With the requested change (assuming it is approved), the wells will be plugged with an equivalent amount of cement to match the depths/intervals to be plugged. Adjustments will be made to increase the number of sacks of cement to match the height of the plug, as described in the permit. Pumped plug depths will be the same as those described in the original permit application.

Agency approval of either cement mix would be appreciated and we thank you for this requested change.

Tim

Tim Lohner, Ph.D. Consulting Environmental Specialist
Water and Ecological Resource Services
American Electric Power, 1 Riverside Plaza, Columbus, OH 43215
614-716-1255 twlohner@aep.com

AMERICAN ELECTRIC POWER

OK
JWM

03/24/2017

should contain the name, address and telephone number of the person filing the comment, the well operator's name and well number, and the approximate location of the proposed well site including district and county as indicated in the permit application. Comments may be accompanied by other pertinent documents in support of the comment. Other than as prescribed in this rule, no particular form for the comment is prescribed.

5.5. Identification Markings.

5.5.a. Every well shall have attached or stamped, in a permanent manner, the API identification number which consists of the state (47), county (001 through 109), and permit number. Such number shall be no less than one-half (1/2) inch in height and detectable by any interested person approaching the well. Any additional information the well operator may desire to display may be incorporated in the permanent identification plat or stamp in such a manner that it will not confuse or distort the permanent API identification number.

5.5.b. Except as provided below, upon the completion of the plugging and filling of any abandoned well, a permanent monument or marker consisting of a length of pipe (minimum diameter size six (6) inches) filled with concrete (or the equivalent thereof if approved by the Chief) shall be erected over the well; the marker shall extend no less than thirty (30) inches above the surface and not less than ten (10) feet below the surface and into the well, and shall be sealed with concrete for the purpose of making the marker permanent. The API well identification number which consists of the state (47), county (001 through 109), and permit number shall be attached or stamped in a permanent manner to said monument; and such numbering shall be no less than one half (1/2) inch in height and detectable by any interested person approaching the marker. The erection of the marker shall in no way interfere with the bleeder pipe from the well where such pipe is required, or the vent or other device installed pursuant to W. Va. Code § 22-6-24. Such manner shall be accurately described on Form WR-38, "Affidavit of Plugging and Filling Well" (*see* subsection 13.10 below) as to time and manner of plugging and filling the well, and shall be approved by the Chief as a satisfactory landmark that may be used as such in the location of adjacent wells. Two (2) permanent reference points with courses and distances from the abandoned well shall be designated and prescribed on the plat required by subdivision 5.2.d above in the form prescribed by section 9 below, accompanying Form WW-4, "Notice of Intention to Plug and Abandon a Well," if any change in the plat is necessary, accompanying Form IV-38, "Affidavit of Plugging and Filling Well" (*see* subsection 13.10 below).

5.6. Parties Responsible. All contractors and drillers, including all service companies carrying on business or doing work in oil and gas fields in West Virginia, as well as lease holders and operators generally, shall take notice of and are hereby directed to observe and apply the provisions of W. Va. Code § 22-6 and this rule; and all contractors, drillers, service companies and operators shall be held responsible for violations thereof.

5.7. Evidence of Performance.

5.7.a. After the completion of the work authorized to be done by any permit required by W. Va. Code § 22-6-6, the permittee shall comply with filing requirements of W. Va. Code § 22-6-22 and section 12 of this rule.

5.7.b. In addition to the requirements of subdivision 5.7.a, following completion of plugging a well, the permittee shall also comply with the affidavit requirements of W. Va. Code § 22-6-23 and subsection 13.10 below.

5300489P

WR-35
Rev (5-01)

DATE: 6/5/09
API # : 47-5300489

State of West Virginia
Department of Environmental Protection
Office of Oil and Gas

Well Operator's Report of Well Work

Farm name: Appalachian Power Co. Operator Well No.: MW-1

LOCATION: Elevation: 585.8 ft. Quadrangle: New Haven

District: Graham County: Mason
Latitude: 6,641 Feet South of 39 Deg. 00 Min. 00 Sec.
Longitude 7,655 Feet West of 81 Deg. 55 Min. 00 Sec.

Company: Appalachian Power Co. DBA AEP

	Casing & Tubing	Used in drilling	Left in well	Cement fill up Cu. Ft.
Address: U.S.Rt. 62, Mountaineer Plant New Haven, WV 25265-0419	16"	279'	279'	219 cf
	10-3/4"	1800'	1800'	1000 cf
Agent: Richard D. Thompson	7"	6400'	6400'	400 cf
Inspector: Jamie Stevens	4-1/2"	8335'	8335'	240 cf
Date Permit Issued: 08/29/2008	2-3/8"	7617'	7617'	-
Date Well Work Commenced: 11/01/2008				
Date Well Work Completed: 05/18/09				
Verbal Plugging:				
Date Permission granted on:				
Rotary X Cable Rig: UDI 51				
Total Depth (feet): 8,335'				
Fresh Water Depth (ft.): 250'				
Salt Water Depth (ft.): 1,232'				
Is coal being mined in area (N/Y)? Yes				
Coal Depths (ft.): 417'-1073' layered				

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Office of Oil & Gas
JUL 22 2009
WV Department of Environmental Protection

OPEN FLOW DATA

Formation of interest: Rose Run Pay zone depth (ft): 7695'
Gas: Initial open flown: 0 MCF/d Oil: Initial open flow: 0 Bbl/d
Final open flow: 0 MCF/d Final open flow: 0 Bbl/d
Time of open flow between initial and final tests: n/a Hours
Static rock Pressure 0 psig (surface pressure) after 24 Hours

Formation of interest: Copper Ridge Pay zone depth (ft): 7806'
Gas: Initial open flow: 0 MCF/d Oil: Initial open flow: 0 Bbl/d
Final open flow: 0 MCF/d Final open flow: 0 Bbl/d
Time of open flow between initial and final tests: n/a Hours
Static rock Pressure n/a psig (surface pressure) after Hours

NOTE: ON BACK OF THIS FORM PUT THE FOLLOWING: 1). DETAILS OF PERFORATED INTERVALS, FRACTURING OR STIMULATING, PHYSICAL CHANGE, ETC. 2). THE WELL LOG WHICH IS A SYSTEMATIC DETAILED GEOLOGICAL RECORD OF ALL FORMATIONS, INCLUDING COAL ENCOUNTERED BY THE WELLBORE.

Signed: Richard D Thompson
By: Richard D. Thompson
Date: 7/9/09

03/24/2017

AEP Mountaineer Plant, MW-1 Perforations

Run	Perforated Zone	Lithology
1	7,695 - 7,718	Rose Run sandstone
2	7,747 - 7,762	Rose Run sandstone
3	7,766 - 7,780	Rose Run sandstone
4	7,780 - 7,800	Rose Run sandstone
Shot Density = 2 shots per foot 400 gallons 15% HCl spotted prior to perforating, swabbed back		

AEP Mountaineer Plant, MW-1 Well Log Summary

Lithology or Formation	Formation Top (measured depth)
Ground Surface/Alluvium/ Undiff. Pennsylvania Bedrock	0-1,156*
Sharon Sandstone	1,120
Maxville Limestone	1,218
Cuyahoga Shale	1,238
Sunbury (Coffee) shale	1,700
Berea sandstone	1,710
Chagrin shale	1,730
Lower Huron shale	2,788
Java shale	3,146
Pipe Creek shale	3,246
Angola shale	3,264
Rhinestreet shale	3,402
Hamilton shale	3,508
Marcellus shale	3,553
Onondaga limestone	3,558
Salina dolomite	3,758
Lockport dolomite	4,323
Niagaran/Rose Hill shale	4,538
Brassfield/Packer Shell limestone	4,810
Tuscarora/Clinton sandstone	4,842
Medina sandstone	4,980
Queenston shale	4,984
Utica Shale	5,650
Point Pleasant Shale	6,234
Trenton limestone	6,311
Black River limestone	6,430
Gull River limestone	6,924
Lower Chazy limestone	6,980
Glenwood/Wells Creek shale	7,038
St. Peter sandstone	7,116
Beekmantown dolomite	7,147
Rose Run sandstone	7,695
Copper Ridge dolomite	7,806

*Coal found between 417'-1073'

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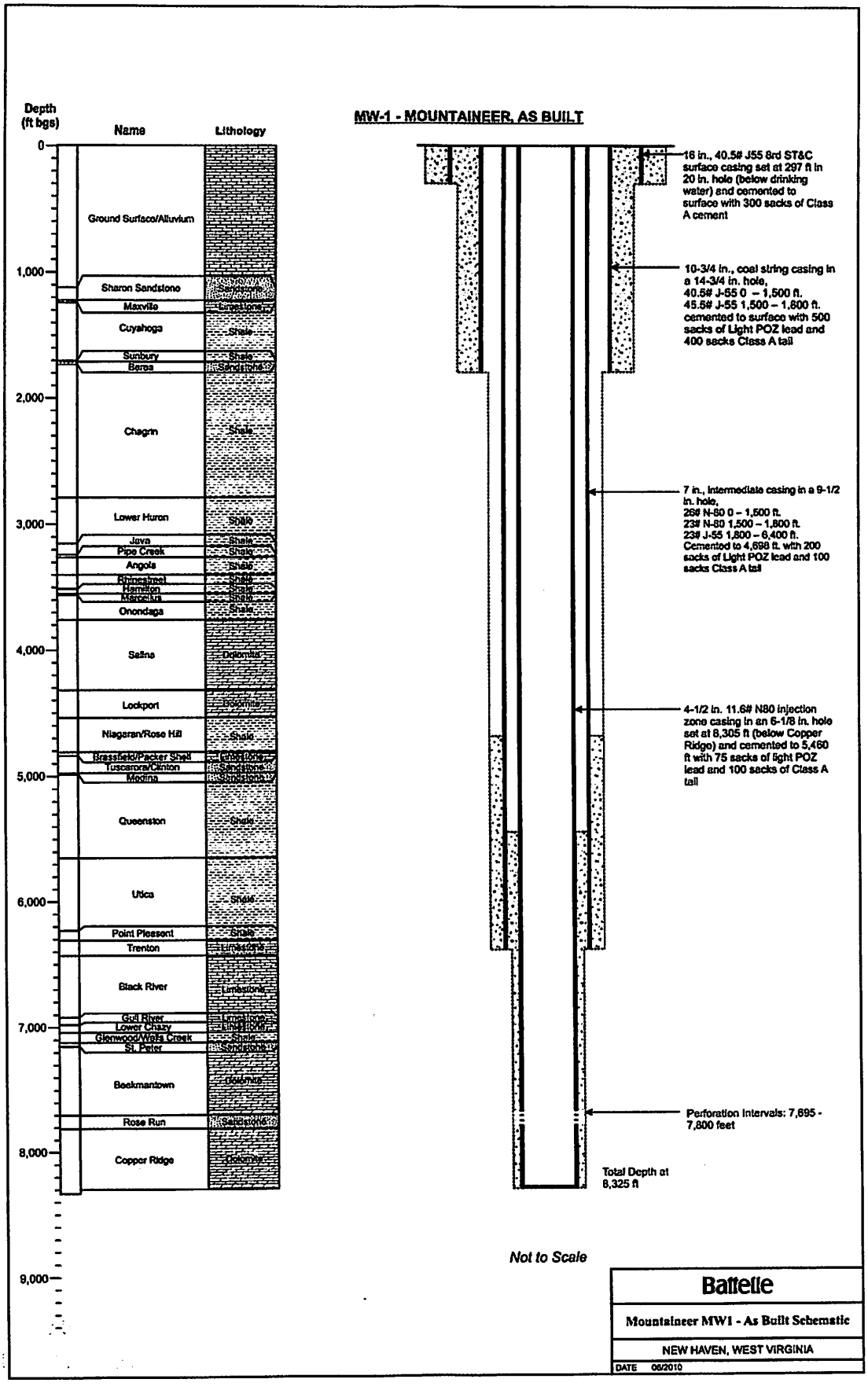

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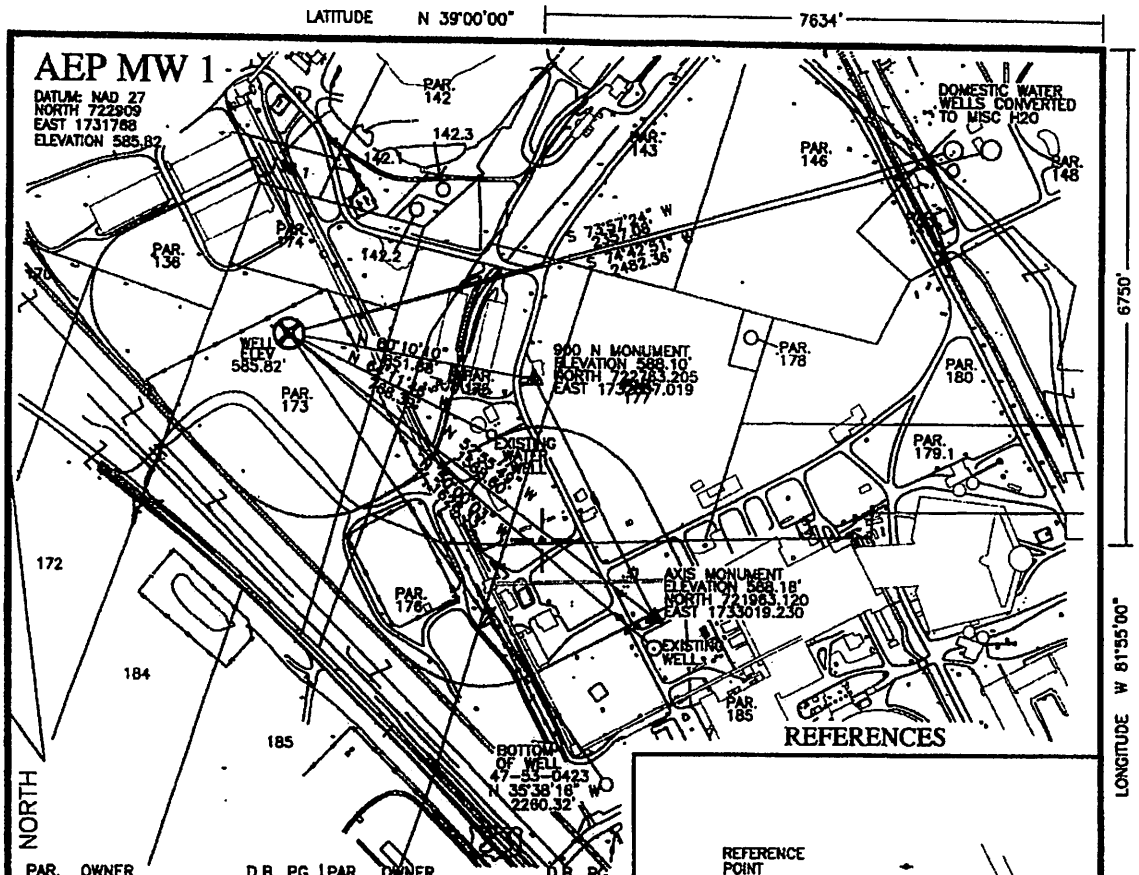
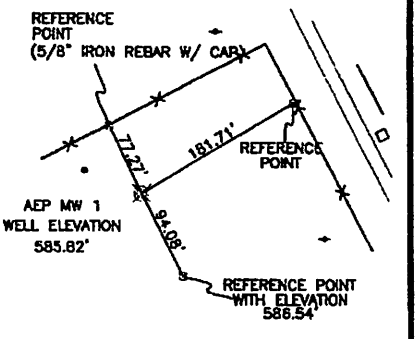


REFERENCES

PAR.	OWNER	D.B.	PG.	PAR.	OWNER	D.B.	PG.
136	APP. POWER CO.	235	323	173	APP. POWER CO.	237	263
138	APP. POWER CO.	234	265	174	APP. POWER CO.	237	263
138.1	APP. POWER CO.	234	208	175	APP. POWER CO.	237	263
142	APP. POWER CO.	237	263	176	APP. POWER CO.	237	263
142.1	APP. POWER CO.	234	173	177	APP. POWER CO.	234	217
142.2	APP. POWER CO.	237	263	178	APP. POWER CO.	237	263
142.3	APP. POWER CO.	237	263	179.1	APP. POWER CO.	237	263
143	APP. POWER CO.	237	263	184	APP. POWER CO.	237	263
146	APP. POWER CO.	237	263	185	APP. POWER CO.	237	263
147	APP. POWER CO.	237	263	204	STATE RD. COMM.	208	270
172	APP. POWER CO.	237	263				



1"=150'

Point Surveying Mapping
PO BOX 28
MILLWOOD, WV 25262
(304) 273-2915 Phone
(304) 273-2916 Fax
Professional Land, Site, Construction Industrial Surveying

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

FILE No _____
SCALE 1" = 500'
MINIMUM DEGREE OF ACCURACY 1:2500
PROVEN SOURCE OF ELEVATION NOTED ON PLAT
DATE 05-21-2008
DRAWN BY J. SWISHER

I THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

(SIGNED) _____

R.P.E. _____ R.P.S. _____

DELBERT F. BRATCHER LICENSED No. 867 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

STATE OF WEST VIRGINIA
DIVISION OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

DATE _____ 20__
OPERATOR'S WELL No. AEP MW 1
API WELL No.
47 (STATE) 053 (COUNTY) -00489 (PERMIT)

FORM IV-6 (8-78)

WELL TYPE: OIL ___ GAS ___ LIQUID INJECTION ___ WASTE DISPOSAL ___ IF "GAS" PRODUCTION ___ STORAGE ___ DEEP ___ SHALLOW ___ OTHER X
LOCATION: ELEVATION 585.82' WATER SHED MIDDLE OHIO
DISTRICT GRAHAM COUNTY MASON
QUADRANGLE NEW HAVEN
SURFACE OWNER APPALACHIAN POWER CO ACREAGE 2460
OIL & GAS ROYALTY OWNER APPALACHIAN POWER CO LEASE ACREAGE N/A
LEASE No. N/A

PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___ PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _____

PLUG AND ABANDON ___ CLEAN OUT AND REPLUG ___
TARGET FORMATION ROSE RUN-COPPER RIDGE ESTIMATED DEPTH 8400 FT
WELL OPERATOR APPALACHIAN POWER CO DESIGNATED AGENT RICHARD D. THOMPSON
ADDRESS US RT. 33 MOUNTAINEER PLANT ADDRESS US RT. 33 MOUNTAINEER PLANT
NEW HAVEN, WV 25265-0419 NEW HAVEN, WV 25265-0419

01-04-17

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Office of Oil and Gas
JAN 04 2017
WV Department of Environmental Protection

03/24/2017

5300489P

WW-4A
Revised 6-07

1) Date: 11-21-16
2) Operator's Well Number
AEP MW-1

3) API Well No.: 47 - 53 - 00489

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
NOTICE 0F APPLICATION TO PLUG AND ABANDON A WELL

4) Surface Owner(s) to be served: ✓ Waiver
(a) Name: Appalachian Power Company
Address: dba American Electric Power
c/o American Electric Power Land Management
(b) Name
Address: 1 Riverside Plaza – 16th Floor
Columbus, OH 43215
(c) Name
Address

5) (a) Coal Operator
Name: No coal interests with declaration
Address
(b) Coal Owner(s) with Declaration
Name: No coal interests with declaration
Address
Name
Address
(c) Coal Lessee with Declaration
Name: No coal interests with declaration
Address

6) Inspector: Jamie Stevens
Address: 105 Kentuck Road
Kenna, WV 25248
Telephone: 304-206-7775

TO THE PERSONS NAMED ABOVE: You should have received this Form and the following documents:

(1) The application to Plug and Abandon a Well on Form WW-4B, which sets out the parties involved in the work and describes the well its and the plugging work order; and
(2) The plat (surveyor's map) showing the well location on Form WW-6.

The reason you received these documents is that you have rights regarding the application which are summarized in the instructions on the reverses side. However, you are not required to take any action at all.

Take notice that under Chapter 22-6 of the West Virginia Code, the undersigned well operator proposes to file or has filed this Notice and Application and accompanying documents for a permit to plug and abandon a well with the Chief of the Office of Oil and Gas, West Virginia Department of Environmental Protection, with respect to the well at the location described on the attached Application and depicted on the attached Form WW-6. Copies of this Notice, the Application, and the plat have been mailed by registered or certified mail or delivered by hand to the person(s) named above (or by publication in certain circumstances) on or before the day of mailing or delivery to the Chief.

NOTARIAL SEAL
STATE OF OHIO
Paula L. Reardon
Notary Public, State of Ohio
My Commission Expires
January 21, 2019

Well Operator: Appalachian Power Company dba American Electric Power
By: Todd Ireland P. Todd Ireland
Its: Manager, Real Estate Asset Manager
Address: 1 Riverside Plaza – 16th Floor
Columbus, OH 43215
Telephone: 614-716-6835

Subscribed and sworn before me this 21st day of November, 2016
Paula L. Reardon Notary Public
My Commission Expires 1-21-19

RECEIVED
Office of Oil and Gas
JAN 04 2017
WV Department of Environmental Protection

Oil and Gas Privacy Notice

The Office of Oil and Gas processes your personal information, such as name, address and phone number, as a part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use of your personal information, please contact DEP's Chief Privacy Officer at deppprivacyoffier@wv.gov.

03/24/2017
AF 9-01-17

5300489P

SURFACE OWNER WAIVER

Operator's Well Number AEP MW-1

INSTRUCTIONS TO SURFACE OWNERS NAMED ON PAGE WW4-A

The well operator named on page WW-4A is applying for a permit from the State to plug and abandon a well. (Note: If the surface tract is owned by more than three persons, then these materials were served on you because your name appeared on the Sheriff's tax ticket on the land or because you actually occupy the surface tract. In either case, you may be the only owner who will actually receive these materials.) See Chapter 22 of the West Virginia Code. Well work permits are valid for 24 months. If you do not own any interest in the surface tract, please forward these materials to the true owner immediately if you know who it is. Also, please notify the well operator and the Office of Oil and Gas.

NOTE: YOU ARE NOT REQUIRED TO FILE ANY COMMENT.

WHERE TO FILE COMMENTS AND OBTAIN ADDITIONAL INFORMATION:

Chief, Office of Oil and Gas
Department of Environmental Protection
601 57th St. SE
Charleston, WV 25304
(304) 926-0450

Time Limits and methods for filing comments. The law requires these materials to be served on or before the date the operator files his Application. You have **FIVE (5) DAYS** after the filing date to file your comments. Comments must be filed in person or received in the mail by the Chief's office by the time stated above. You may call the Chief's office to be sure of the date. Check with your postmaster to ensure adequate delivery time or to arrange special expedited handling. If you have been contacted by the well operator and you have signed a "voluntary statement of no objection" to the planned work described in these materials, then the permit may be issued at any time.

Comments must be in writing. Your comments must include your name, address and telephone number, the well operator's name and well number and the approximate location of the proposed well site including district and county from the application. You may add other documents, such as sketches, maps or photographs to support your comments.

The Chief has the power to deny or condition a well work permit based on comments on the following grounds:

1) The proposed well work will constitute a hazard to the safety of persons.
2) The soil erosion and sediment control plan is not adequate or effective;
3) Damage would occur to publicly owned lands or resources;
4) The proposed well work fails to protect fresh water sources or supplies;
5) The applicant has committed a substantial violation of a previous permit or a substantial violation of one or more of the rules promulgated under Chapter 22, and has failed to abate or seek review of the violation...".

If you want a copy of the permit as it is issued or a copy of the order denying the permit, you should request a copy from the Chief.

VOLUNTARY STATEMENT OF NO OBJECTION

I hereby state that I have read the instructions to surface owners and that I have received copies of a Notice and Application For A Permit To Plug And Abandon on Forms WW-4A and WW-4B, and a survey plat.

I further state that I have no objection to the planned work described in these materials, and I have no objection to a permit being issued on those materials.

FOR EXECUTION BY A NATURAL PERSON ETC.

Signature Paula L. Reardon Date 11-21-16

NOTARIAL SEAL STATE OF OHIO

Paula L. Reardon
Notary Public, State of Ohio
My Commission Expires
January 21, 2019

FOR EXECUTION BY A CORPORATION,

Name Appalachian Power Company dba American Electric Power
By Todd Ireland
Its Manager, Real Estate Asset Manager Date

Signature P. Todd Ireland Date 11-21-16

WW-4B

API No. 47-53-00489 P
Farm Name AEP Mountaineer Power Plant
Well No. AEP MW-1

INSTRUCTIONS TO COAL OPERATORS
OWNERS AND LESSEE

The well operator named on the obverse side of WW-4 (B) is about to abandon the well described in the enclosed materials and will commence the work of plugging and abandoning said well on the date the inspector is notified. Which date shall not be less then five days after the day on which this notice and application so mailed is received, or in due course should be received by the Department of Environmental Protection Office of Oil & Gas.

This notice and application is given to you in order that your respective representatives may be present at the plugging and filling of said well. You are further notified that whether you are represented or not the operator will proceed to plug and fill said well in the manner required by Section 24, Article 6, Chapter 22 of the Code and given in detail on obverse side of this application.

NOTE: If you wish this well to be plugged according to 22-6-24(d) then as per Regulation 35CSR4-13.9 you must complete and return to this office on form OB-16 "Request by Coal Operator, Owner, or Lessee for plugging" prior to the issuance of this plugging permit.

WAIVER

The undersigned coal operator _____/ owner X / lessee _____/ of the coal under this well location has examined this proposed plugging work order. The undersigned has no objection to the work proposed to be done at this location, provided, the well operator has complied with all applicable requirements of the West Virginia Code and the governing regulations.

Date: 11-21-16

Appalachian Power Company dba American Electric Power
By: Todd Ireland D. Todd Ireland
Its Manager, Real Estate Asset Manager

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JAN 04 2017
WV Department of
Environmental Protection

03/24/2017

5300489P

WW-9
(5/16)

API Number 47 - 53 - 00489
Operator's Well No. AEP MW-1

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Appalachian Power Company dba American Electric Power OP Code _____

Watershed (HUC 10) Ohio River Quadrangle New Haven

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes ☐ No ☑

Will a pit be used? Yes ☐ No ☑

If so, please describe anticipated pit waste: _____

Will a synthetic liner be used in the pit? Yes ☐ No ☐ If so, what ml.? _____

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application (if selected provide a completed form WW-9-GPP)
_____ Underground Injection (UIC Permit Number _____)
_____ Reuse (at API Number _____)
_____ Off Site Disposal (Supply form WW-9 for disposal location)
■ Other (Explain Qualified third party hauling and disposal for any remaining fresh water or brine to be disposed of after work is complete.

BUCKEYE WATER SERVICE COMPANY, 1535 GLENN HWY, NEW CONCORD, OH 43762 Need address of disposal site

Will closed loop systembe used? If so, describe: Frac tanks to hold fresh water for cementing and brine for other well work.

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. No Drilling

-If oil based, what type? Synthetic, petroleum, etc. _____

Additives to be used in drilling medium? NA - Cement and Gel will be mixed on-site to plug and abandon the well

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. _____

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) _____

-Landfill or offsite name/permit number? _____

Permittee shall provide written notice to the Office of Oil and Gas of any load of drill cuttings or associated waste rejected at any West Virginia solid waste facility. The notice shall be provided within 24 hours of rejection and the permittee shall also disclose where it was properly disposed.

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on April 1, 2016, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

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WV Department of Environmental Protection

Company Official Signature P. Todd Ireland

Company Official (Typed Name) Todd Ireland

Company Official Title Manager, Real Estate Asset Manager

Subscribed and sworn before me this 21st day of November, 2016

Paula L. Reardon Notary Public

My commission expires 1.21.19

NOTARIAL SEAL STATE OF OHIO

Paula L. Reardon
Notary Public, State of Ohio
My Commission Expires
January 21, 2019

03/24/2017
01-04-17

5300489P

Form WW-9

Operator's Well No. AEP MW-1

Proposed Revegetation Treatment: Acres Disturbed None Prevegetation pH 7-8

Lime NA Tons/acre or to correct to pH NA

Fertilizer type NA

Fertilizer amount NA lbs/acre

Mulch NA Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
NA - Work site is a gravel lot.		N/A.	

Attach:
Maps(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided). If water from the pit will be land applied, provide water volume, include dimensions (L, W, D) of the pit, and dimensions (L, W), and area in acres, of the land application area.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Allen D. Flowers

Comments: Inspected well site on 01-04-2017. Both injection wells are located on gravel lot.

Title: OOG Inspector Date: 01-04-2017

Field Reviewed? (X) Yes ( ) No

03/24/2017

WW-9 Attatchment
Vendor Info

47-053-00489

53 00489P

Stansberry, Wade A

From: Flowers, Allen D
Sent: Monday, January 09, 2017 7:05 AM
To: Stansberry, Wade A
Subject: Re: AEP plug permit 489,490

The address for AEP plugging permit off site water disposal .
(Buckeye water service company)
1535 Glenn HWY, New Concord
OH, 43772

Thanks Wade ,,,

On Jan 6, 2017, at 8:02 AM, Stansberry, Wade A <Wade.A.Stansberry@wv.gov> wrote:

> You can send it to me.
>
> **From:** Flowers, Allen D
> **Sent:** Thursday, January 05, 2017 4:42 PM
> **To:** Stansberry, Wade A <Wade.A.Stansberry@wv.gov>
> **Subject:** AEP plug permit 489,490
>
> Hey Wade,
> I spoke with Timothy , he is the agent for AEP's plugging permits that I give you yesterday. API # 47-053-00489 and 47-053-00490.
> I wrote a note of correction on both permits located on the WW-9 form. The correction is for no vendor listed and no address of disposal site for well fluids.
> Tim sent me the vendor and address of disposal site. Would you like for me to send you the info or stop by the office and write it on the permits.
>
> Thanks for your help ,,
>
> Allen D Flowers
> Oil and Gas Inspector
> WVDEP-Office of Oil and Gas
> 601 57th Street, SE
> Charleston, WV 25304

03/24/2017

5300489P

WW-9- GPP
Rev. 5/16

API Number 47 - 53 - 00489
Operator's Well No. AEP MW-1

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
GROUNDWATER PROTECTION PLAN

Operator Name: Appalachian Power Company dba American Electric Power
Watershed (HUC 10): Ohio River Quad: New Haven
Farm Name: AEP Mountaineer Power Plant

1. List the procedures used for the treatment and discharge of fluids. Include a list of all operations that could contaminate the groundwater.

Well work will include fluid flowing between frac tanks and the well for well work tripping tubing in and out of the well and for cementing operations.

2. Describe procedures and equipment used to protect groundwater quality from the list of potential contaminant sources above.

All well working fluids, brine and fresh water, will be contained in frac tanks at the well site and plumbed to the well valves as needed. No fluid will be discharged on-site. Any remaining fluid on location in tanks at the end of well work will be hauled off by a fluid hauling vendor and disposed of at a brine disposal facility.

Need address for disposal Vendor. ?*

3. List the closest water body, distance to closest water body, and distance from closest Well Head Protection Area to the discharge area.

The Ohio River is approximately 0.5 miles north east of the wellhead.

4. Summarize all activities at your facility that are already regulated for groundwater protection.

Activities that are already regulated for groundwater protection to meet the WV Groundwater Protection Regulations (Title 47, Series 58) include coal storage and handling, waste water treatment, fly ash and gypsum handling, above- and under-ground storage tanks, and outside tank loading and unloading. These are described in the Mountaineer Groundwater Protection Plan (GWPP) (attached). The GWPP also summarizes activities managed under other regulatory programs that have relevance to groundwater protection.

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5. Discuss any existing groundwater quality data for your facility or an adjacent property.

03/24/2017

5300489P

WW-9- GPP
Rev. 5/16

API Number 47 - 53 - 00489
Operator's Well No. AEP MW-1

Existing groundwater quality data can be found in the Annual UIC Report 2016, and the June 1999 EPRI report, "Groundwater Quality at the Philip Sporn and Mountaineer Power Plants, Mason County, West Virginia." Sampling began during August 2016 to meet the Coal Combustion Residuals Rule requirements (40 CFR 257), however, the data from this sampling are not yet available.

6. Provide a statement that no waste material will be used for deicing or fill material on the property.

No waste materials will be used for deicing or fill materials on this property as related to the well work performed in accordance with this permit.

7. Describe the groundwater protection instruction and training to be provided to the employees. Job procedures shall provide direction on how to prevent groundwater contamination.

Mountaineer Plant employees receive annual training on groundwater protection practices and spill prevention and control as described in the GWPP.

8. Provide provisions and frequency for inspections of all GPP elements and equipment.

Inspections by the Mountaineer Plant Energy Production and Environmental/Lab Departments are a daily occurrence. Due to the need and the duty to provide electrical service to Appalachian Power's customers on a continuous basis, such inspections are routine and necessary.

Signature: Timothy W Lohmeyer

Date: 11/21/2016

03/24/2017

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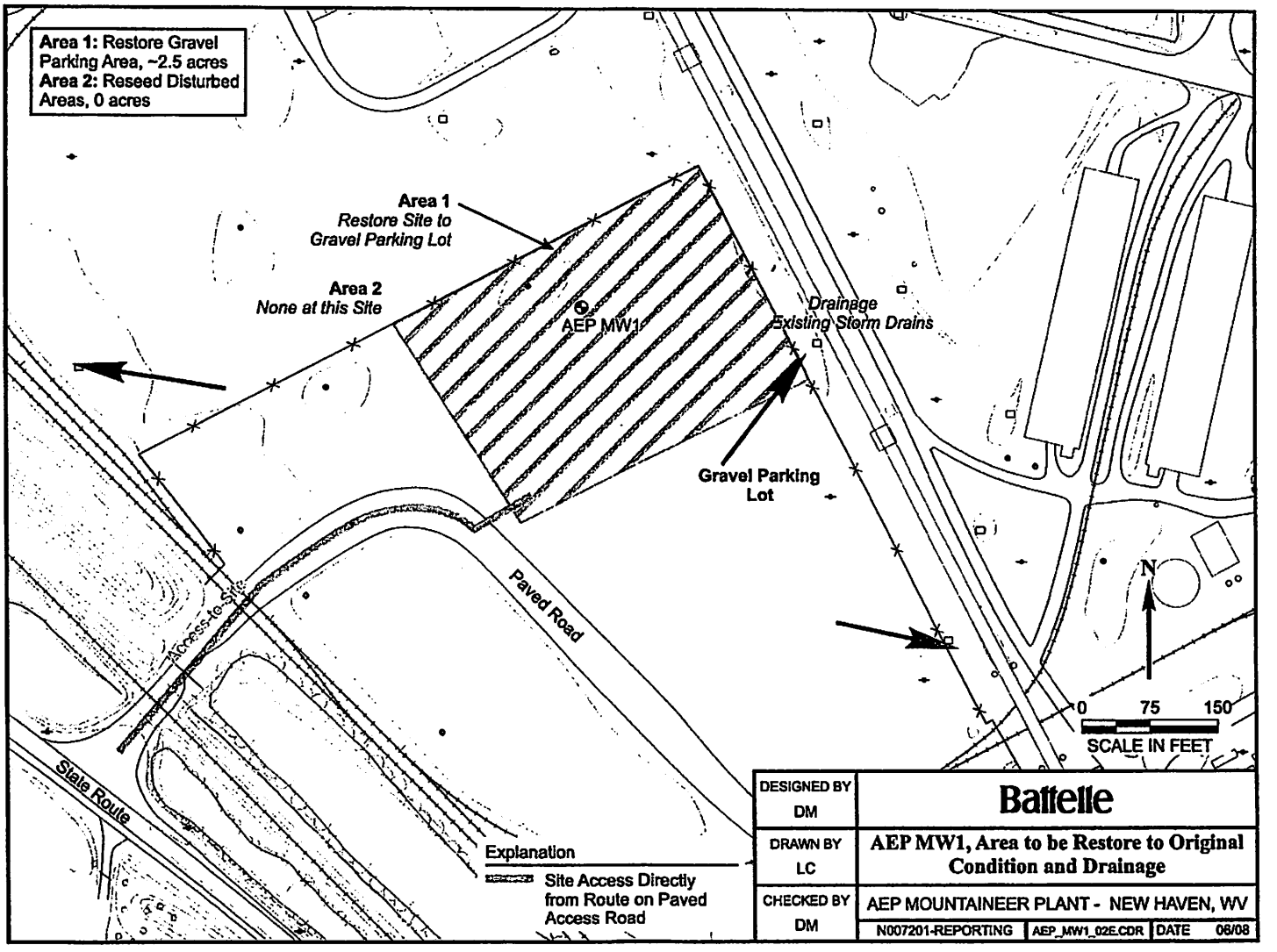

A. 01-04-17

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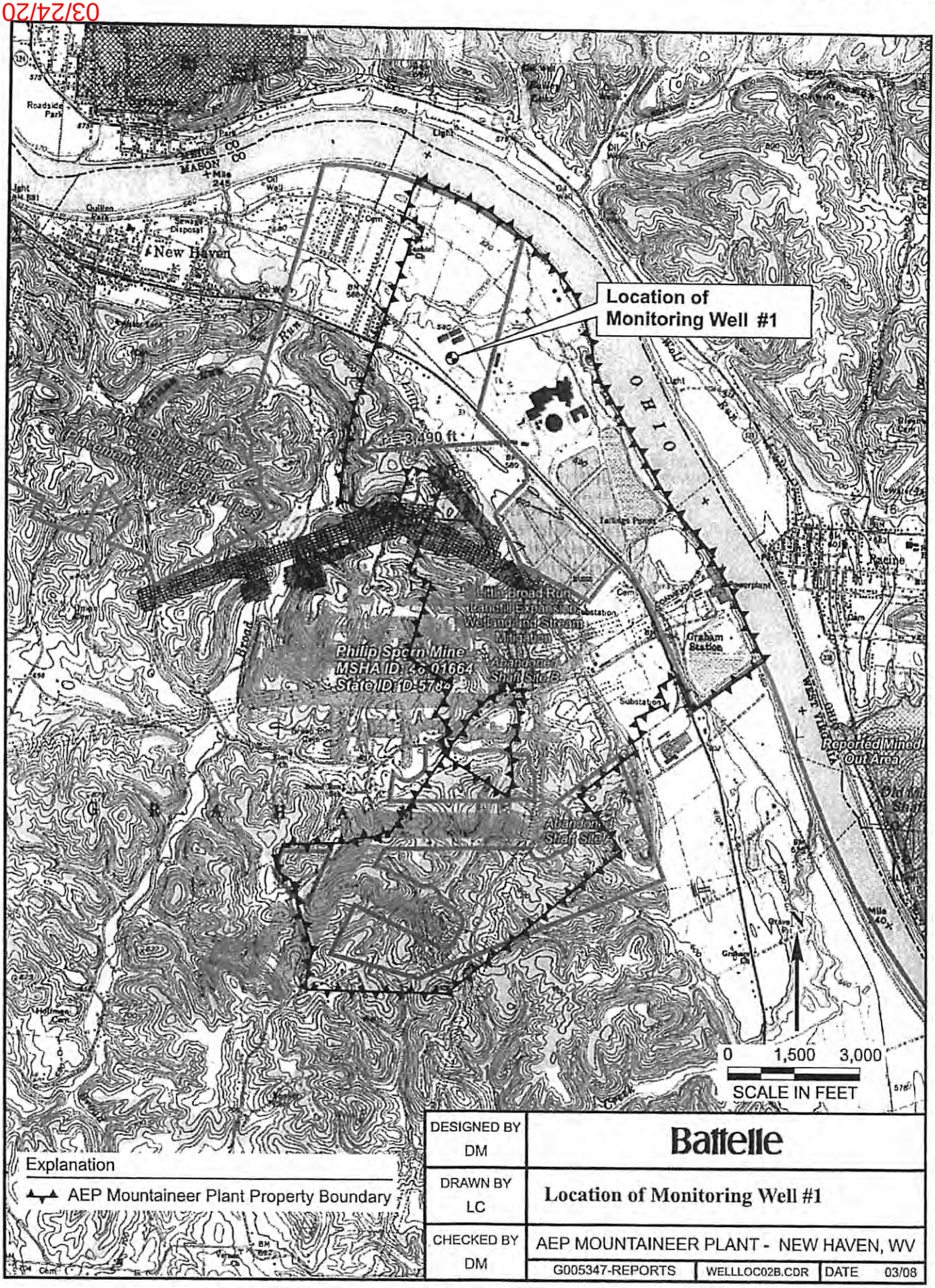
03/24/2017



DESIGNED BY DM	Battelle
DRAWN BY LC	Location of Monitoring Well #1
CHECKED BY DM	AEP MOUNTAINEER PLANT - NEW HAVEN, WV
G005347-REPORTS	WELLLOC02B.CDR DATE 03/08

5300489P

WW-7
8-30-06

West Virginia Department of Environmental Protection
Office of Oil and Gas
WELL LOCATION FORM: GPS

API: 47-53-00489 **WELL NO.:** MW-1

FARM NAME: Geologic Carbon Dioxide Storage Demonstration for AEP Mountaineer Plant

RESPONSIBLE PARTY NAME: Appalachian Power Company dba American Electric Power

COUNTY: Mason **DISTRICT:** Graham

QUADRANGLE: New Haven

SURFACE OWNER: Appalachian Power Company dba American Electric Power

ROYALTY OWNER: Appalachian Power Company dba American Electric Power

UTM GPS NORTHING: ~~418289.4~~ 4315152.2 N

UTM GPS EASTING: ~~4315152.2~~ 418 289.4 E **GPS ELEVATION:** 585.82'

The Responsible Party named above has chosen to submit GPS coordinates in lieu of preparing a new well location plat for a plugging permit or assigned API number on the above well. The Office of Oil and Gas will not accept GPS coordinates that do not meet the following requirements:

1. Datum: NAD 1983, Zone: 17 North, Coordinate Units: meters, Altitude: height above mean sea level (MSL) – meters.
2. Accuracy to Datum – 3.05 meters
3. Data Collection Method: Coordinates were determined by triangulation from monuments on plant property. GPS was not used. Survey performed by Point Survey and Mapping.

Survey grade GPS ____: Post Processed Differential _____

Real-Time Differential _____

Mapping Grade GPS ____: Post Processed Differential _____

Real-Time Differential _____

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DEC 06 2016
WV Department of Environmental Protection

4. **Letter size copy of the topography map showing the well location.**

I the undersigned, hereby certify this data is correct to the best of my knowledge and belief and shows all the information required by law and the regulations issued and prescribed by the Office of Oil and Gas.

Timothy G. Lohnes — Consulting Environ Spec. — 12/6/2016

Signature / Title / Date

03/24/2017

24.0 Groundwater Protection Plan

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3. Fly Ash Handling
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3. Fly Ash Handling
4. Underground Storage Tanks
5. Aboveground Storage Tanks
6. Outside Tank Loading and Unloading Areas
7. Metal Cleaning Waste Treatment Facility
8. Equipment Cleaning
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Figure 2. **Geologic Cross Section**

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Table 1. **Summary of Aboveground Storage Tanks**

I. Purpose

This Groundwater Protection Plan (GPP) was developed to satisfy the requirements of the West Virginia Groundwater Protection Regulations (Title 47, Series 58). The purpose of this document is to list and discuss operations at the Mountaineer Plant that may have a reasonable potential to contaminate groundwater and to discuss measures taken to prevent groundwater contamination.

II. Site Description

A. Facility Layout

The Mountaineer Plant is located on the western bank of the Ohio River near New Haven, West Virginia. The plant consists of a single 1300 MW unit that has been in commercial operation since 1980.

Condenser cooling for the generating unit is provided by a recirculating water system utilizing a natural draft hyperbolic cooling tower. Bottom ash, pyrites and other miscellaneous materials are sluiced to an on-site wastewater treatment complex consisting of two bottom ash ponds, two wastewater ponds, a recirculating water pond and a clear water pond. Particulate emissions are controlled by electrostatic precipitators. Fly ash is reused or disposed of in a landfill located off-site in the nearby Little Broad Run Hollow. A Selective Catalytic Reduction (SCR) unit for N0x control was installed in 2002.

A flue gas desulphurization unit (FGD) was added in 2007 for sulfur dioxide control.

A carbon dioxide capture and sequestration technology demonstration unit was added in 2009. The process consists of carbon dioxide capture from an approximate 2% of total gas flow side stream utilizing a chilled ammonia process developed by Alstom. In addition to the capture process, the carbon dioxide will be injected into deep wells extending into porous rock structures overlain by impermeable rock layers.

This unit was shut down in 2011. Monitoring of the injected CO2 plume and groundwater is on going as required by the WV injection permit (1189-08-053). No impact to groundwater has been observed or is expected.

The layout of major exterior plant systems is shown on Plant Layout Drawing (Figure 1). The major plant systems evaluated in this GPP include the coal storage areas and associated runoff ponds, the bottom ash/wastewater treatment complex, the fly ash handling system, aboveground and underground storage tanks, miscellaneous material storage areas and waste storage areas.

B. Geological and Hydrological Description of the Facility

There are three principal potential sources of potable groundwater in the Mountaineer Plant vicinity: (1) the Pleistocene-aged valley-fill of the Ohio River; (2) the Quaternary-aged alluvium and colluvium in the small stream valleys; and (3) the sandstone units within the Pennsylvanian-aged bedrock. The Mountaineer Plant is located above the Ohio River valley-fill aquifer on the western bank of the Ohio River.

Of these, the Ohio River valley-fill aquifer is by far the most productive, with the ability to yield as much as 1,000-3,000 gpm to wells which induce infiltration from the Ohio River (McGuinness and Meyer, 1965). The other two sources may, in some cases, be capable of supplying water for individual home or farm usage, but most often produce less than 5 gpm in the area (Wilmoth, 1974, and AEPSC, 1978). A geologic cross-section is shown on Figure 2.

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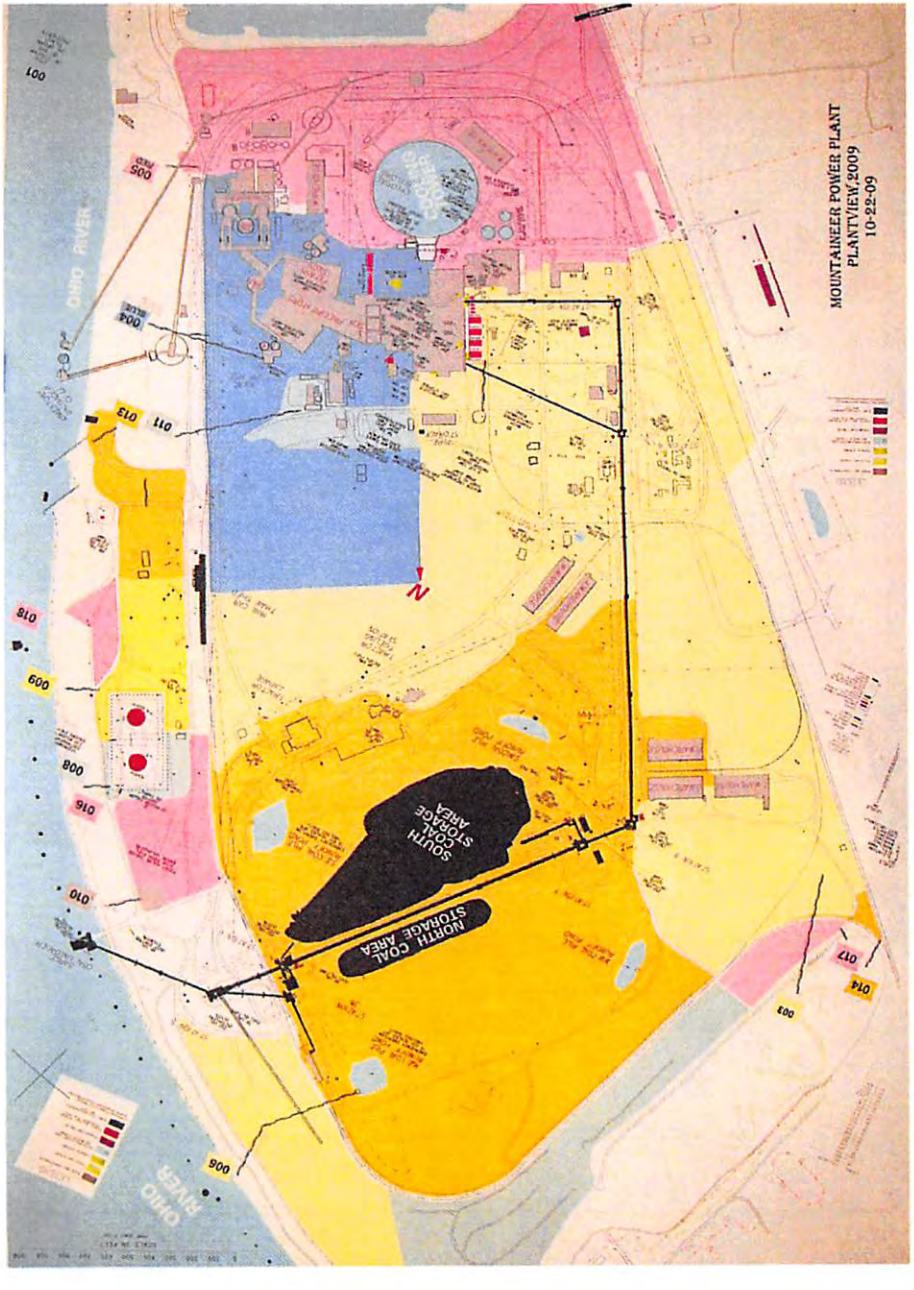
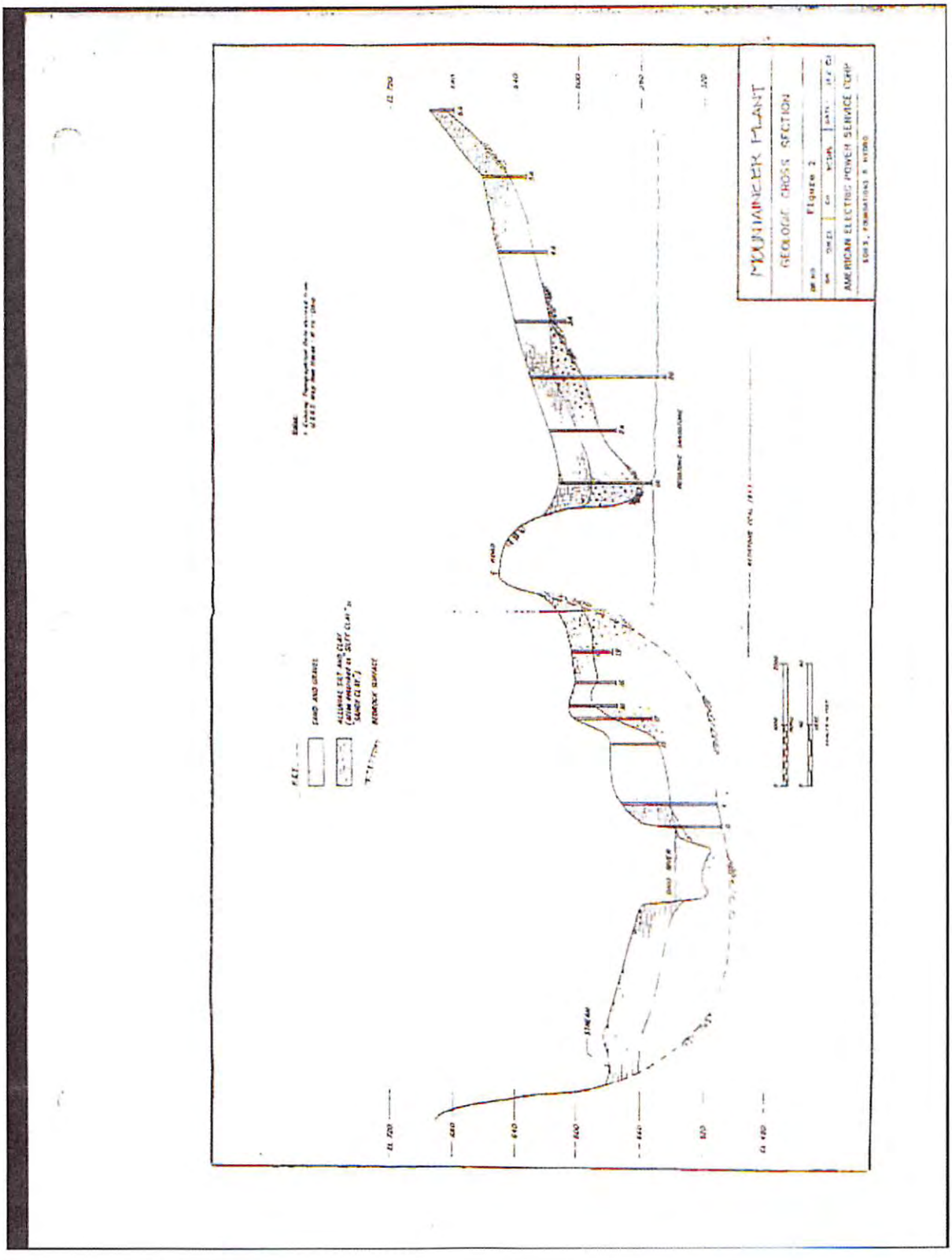

MOUNTAINEER POWER PLANT
PLANTVIEW.2009
10-22-09
OHIO RIVER
OHIO RIVER
SOUTH COAL STORAGE AREA
NORTH COAL STORAGE AREA
001
003
004
005
006
007
008
009
010
011
013
014
016
017
018

5300489 P


MUSKINGUM RIVER PLANT
GEOLOGIC CROSS SECTION
Figure 2
AMERICAN ELECTRIC POWER SERVICE CORP

Ohio River Valley-Fill Aquifer. During the Pleistocene, or "Ice Age" epoch of geologic time, during a period when the glaciers were in retreat, rivers such as the Ohio cut their beds deeply into the underlying bedrock. The glaciers again advanced, and in their final oscillations filled these valleys with a thick section of sand and gravel carried by the large volumes of glacial meltwater. In the final stages of deglaciation, the rising sea level backed up the waters of the Mississippi River, which created a slackwater condition on its tributaries. This condition resulted in the deposition of a blanket of silt and clay, which is widely observed overlying the sand and gravel valley-fill of the Ohio River (Walker, 1957).

The result of this geologic sequence is a river-valley aquifer of sand and gravel which is generally unconfined if the water table falls below the upper silts and clays, but may be confined or semi-confined if the water table rises to, or above, the level of these "capping" deposits.

The upper 15 to 40 feet of the valley-fill deposit consists of clay, sandy clay and alternating thin layers of sand and clay. Below this lies roughly 20 to 60 feet of permeable sand and gravel, terminating at the ancient bedrock river channel in a white or gray sandstone which is judged to be the Redstone sandstone of the Monongahela formation.

Pumping tests performed on monitoring wells in the sand and gravel aquifer in the plant vicinity were not performed at high enough pumping rates to quantify the aquifer's transmissibility; however, pumpage at 34 gpm for 24 hours caused essentially no drawdown, indicating extremely high permeabilities. Much higher rates of pumpage, on the order of 1,000-3,000 gpm, can be sustained from this aquifer, when flow is induced from the river to the well (McGuinness and Meyer, 1965). Wells established in this aquifer in the 1950s to obtain cooling water for the Sporn Plant indicated the following drawdowns (Wilmoth, 1966):

Well Diameter (inches)	Pumping Rate (gpm)	Drawdown (feet)	Saturated Depth (feet)
6	240	10	25
10	330	11	25
8	500	5.5	25
8	330	11	25
6	240	10	25

Rough calculations from these data using well specific capacity and tables prepared for 6" diameter wells (Walton, 1970) indicate a permeability of 10^{-2} or 10^{-1} cm/sec for these sand and gravel beds.

It is an axiom of groundwater hydrology in humid regions that groundwater flow sustains river flow; therefore, the direction of groundwater movement in such an aquifer is generally toward the river, with a slight downstream component. The normal river pool at this location is at elevation 538, and the groundwater table in the plant vicinity has been reported at depths ranging between elevations 540 and 545, with locally higher levels. The natural groundwater table gradient is typically flat, ranging between 0.001 and 0.01 ft/ft. With these physical parameters, flow rates in the sand and gravel aquifer can be expected to range between 0.1 ft/day and 10 ft/day. Because the principal direction of flow is toward the river from either side, the river itself creates something of a groundwater boundary at its center. Thus, groundwater will flow riverward until the centerline is reached, and then must either enter the river or turn downstream.

Alluvial/Colluvial Tributary Valley-Fill Aquifers. As the level of very gently dipping bedrock of this Appalachian Plateau region was uplifted in the distant past, an extremely regular pattern of dendritic drainage has been carved into the rock by many small streams. A great number of these small stream valleys debouch on the much larger valley of the Ohio River. A notable example of such a valley near the Mountaineer Plant site is Little Broad Run. This valley contains essentially two types of material: a lower, gray sand in the valley bottom which pinches out at about elevation 625 ft; and a layer which blankets this sand and the bedrock above, consisting primarily of shale-derived clay containing blocks of sandstone. The basal sand unit is likely a continuation of the highest Pleistocene River terrace observed in the Ohio River valley in Figure 2, and is probably in hydraulic connection with the lower valley-fill aquifer. The groundwater table in this small valley sand unit is essentially coincident with the top of the sand. The fine-grained material above this sand unit represents a normal post-glacial alluvial accumulation, and the sandstone blocks represent a colluvial, or rock-fall contribution.

The lower sand portion of this valley-fill is probably an excellent source of water, and is basically an up-gradient portion of the Ohio River valley-fill aquifer. But the upper reaches of this valley, and all reaches of valleys not debouching on the Ohio River, are not good producers of groundwater. Only small wells for individual supply are really possible in the latter areas, and these wells must tap zones which either are adjacent to concentrated rock fractures, or are local colluvial accumulations.

Pennsylvanian Bedrock Aquifers. As noted previously, the entire study region belongs to the Appalachian Plateau geologic province, which is a region of beds which dip so gently as to appear nearly flat-lying. The gentle bedrock dip in

the Mountaineer Plant vicinity is to the ESE, bottoming at the axis of the Parkersburg syncline. The effect of this geologic structure upon groundwater motion in regional aquifers would be to induce flow toward the ESE until the synclinal trough was reached. Although this flow path would be followed for aquifers which carry the bulk of their water in interstitial pores, it is unlikely that too great a flow occurs in this manner.

With such geological restrictions, fresh groundwater is to be found in parts of only two bedrock formations in the Mountaineer Plant vicinity: the lower portion of the Monongahela formation, and the upper portion of the Conemaugh formation.

In general, residents of the immediate area have had little luck in tapping the bedrock for groundwater (AEPSC, 1978), however, two wells which reach the Monongahela formation are reported (Wilmoth, 1966 and Carlston & Graeff, 1956). One of these is reported to yield about 2 gpm, while the other yields more than 20 gpm. Both wells were completed at about elevation 500, which is approximately the level of the Ohio River bedrock channel, implying that these wells probably tap the Redstone sandstone above the Redstone coal, and that they may be in hydraulic connection with the Ohio River valley-fill aquifer.

Interconnections. Three principal aquifers have been identified in the Sporn Plant vicinity: 1) the Ohio River valley-fill, which is of paramount importance, 2) basal sand units in small valleys tributary to the Ohio River and, 3) sandstone bedrock of Pennsylvania age, principally the Redstone sandstone of the Monongahela formation. It appears likely that all three of these freshwater sources are in hydraulic connection; the tributary sands appear to be essentially a continuation of the Ohio River valley-fill aquifer, with the latter unit having been deposited directly over the Redstone sandstone (in a channel cut into that bedrock unit). Water which directly enters the Ohio River valley aquifer is not likely to reach the tributary aquifers, since these lie up-gradient, but may travel to the underlying sandstone aquifer. Water entering this sandstone aquifer may travel downdip to the ESE, but more likely flows readily along fracture paths paralleling the Ohio River.

III. Operational Description of the Facility

A. Inventory of Facility Operations that May Have A Reasonable Potential to Contaminate Groundwater

American Electric Power, Allegheny Power, and the Electric Power Research Institute, in conjunction with the West Virginia Division of Environmental Protection conducted a four-year joint study to comprehensively evaluate coal piles, bottom ash and fly ash ponds, wastewater ponds and other areas at twelve West Virginia power plants for their effects (if any) on the underlying groundwater resources. This study (hereinafter referred to as the

"EPRI Study") was initiated in response to the Requirements Governing Ground Water Standards (§46-12), the Ground Water Protection Regulations (§47-58) and Ground Water Quality Standard Variances (§47-57). The EPRI Study provided the technical support for a class variance request, which was filed on April 19, 1999. The results of this Study were incorporated into the appropriate parts of this GPP. Mountaineer Plant was not included in the variance request, since no sources of groundwater contamination were identified at this facility.

The following sections summarize locations at the Plant where materials which may have a reasonable potential to contaminate groundwater are stored, piped or otherwise handled and evaluates their potential to contaminate groundwater.

1. **Coal Storage and Handling**

The largest and most significant material storage area located on the plant site is the twenty-six acre coal yard where approximately 500,000 tons of coal is stockpiled for plant use. Coal is usually shipped to the Plant by river barges, although rail shipments are received on an infrequent basis. Barges are unloaded by a rotating bucket unloader. Coal is moved from the unloader to the coal yard and plant by a series of covered conveyors.

The coal yard, located north of the main plant, was constructed utilizing bottom ash from the Philip Sporn Plant. Runoff from the coal storage area is collected in four collection ponds before it is pumped to the bottom ash pond.

Two coal stations (Station #9 and Station #6) at the Plant are equipped to sample coal. As part of the normal operation of Station #6 sampler, reject coal from the sampling system is temporarily stored on a concrete pad at the base of the station. Stormwater run-off from the Station #6 reject coal pad is diverted to the main coal yard catch basins.

As part of the overall coal yard storm drainage system, sumps have been constructed underneath or near most conveyor systems. These systems consist of concrete-lined, clay-lined or combination concrete/clay-lined sumps that collect stormwater from the immediate vicinity of the conveyor system. The collected water is vacuumed out of the sumps as necessary and taken to the coal yard where it is utilized for dust control or discharged into one of the stormwater collection ponds.

In addition, water which drains from the coal as it is conveyed or during washings is captured by a series of drip pans underneath the conveyor belts. This water is diverted to a central drain and is discharged to a series of concrete sumps located immediately

adjacent to the conveyor structures. Water collected in these sumps is vacuumed out and taken to the coal yard where it is used for dust control or discharged into one of the runoff collection impoundments.

The coal storage complex potential groundwater impacts were considered in the EPRI Study and no contamination was found in this area.

2. Wastewater Treatment Complex

All process wastewater generated at the plant is treated in the wastewater treatment complex. For a specific characterization of the Plant's wastewaters, refer to NPDES Permit No. WV0048500.

The complex consists of two 14.3-acre bottom ash ponds, two 9.0-acre wastewater ponds, one 8.0-acre clearwater pond, and one 5.6-acre reclaim pond. The metal cleaning waste tank and basin are also located within this complex. The two strings of bottom ash - wastewater ponds are alternated in and out of service. Bottom ash is recovered from whichever pond is out-of-service and is beneficially reused. Most of this material is used as drainage columns or blankets for the Little Broad Run Landfill.

The East Wastewater pond was divided by a dike to create a basin for collection of leachate from Little Broad Run Landfill so the leachate could be further treated by the selenium reduction bioreactor. This divided section is lined with a clay liner and a plastic geomembrane liner to prevent groundwater contamination.

Coal yard runoff and wastewaters from the boiler room and fly ash silo sumps, bottom ash and pyrites are pumped to the bottom ash pond through a combination of aboveground and underground steel piping. Effluent from the bottom ash ponds enters the wastewater ponds, which also receive effluent from cooling tower blowdown and other miscellaneous wastewaters. Effluent from the wastewater ponds enters the reclaim pond and flows on to the Clearwater pond, where it is discharged to the Ohio River in accordance with the NPDES permit. Some of the reclaim water is also recycled back to the plant. The impoundments within the wastewater complex are lined with a clay liner.

The wastewater treatment complex potential groundwater impacts were considered in the EPRI Study and no contamination was found in this area.

3. Fly Ash Handling

Fly ash produced at this plant is managed through a "dry" fly ash handling system. This system consists of four flat bottom silos which provide a total temporary storage capacity of 11,000 tons. Each silo is equipped with a telescoping dry fly ash unloader which is used to load bulk tanker trucks with fly ash for off-site beneficial reuse or disposal.

All fly ash that is not sold for beneficial reuse is disposed of at Appalachian Power's Little Broad Run Landfill, located off-site. The Little Broad Run Landfill is permitted under the WV Solid Waste Rules and NPDES Permit No. WV0077038.

The vacuum pump system associated with the operation of fly ash silos generates an acidic condensate in the vacuum pump venting system. Two vent pipes have been installed and extended outside of each pump building to divert the condensate away from building. The PVC vent piping extends some distance to the east of each pump building. Small earthen impoundments have be constructed at the open end of the vent piping where the condensate drains from the pipes. These impoundments have been lined with limestone gravel to neutralize the acidic condensate.

The on-site dry ash handling system does not have a reasonable potential to contaminate groundwater.

4. Gypsum Handling

Synthetic gypsum is produced by the FGD system. The gypsum is dewatered by using one of three vacuum belts. The gypsum is taken to the Little Broad Run Landfill by one of the three following methods. (Method one is the primary means).

1. Transported via conveyor belts directly to the stack out pad at the Little Broad Run landfill.

2. Transported via conveyor belts to the emergency stack out pad near the FGD unit and then loaded onto, and transported by, truck to the Little Broad Run landfill. The emergency stack out pad is a constructed, concrete pad.

3. Discharged on to a concrete pad directly from the vacuum belts in the FGD unit. It is loaded onto, and transported by, truck to the Little Broad Run landfill.

Off spec gypsum from other AEP Facilities is received at Mountaineer

plant by barge and is unloaded onto the conveyor system where it is transported to the Little Broad Run landfill.

The chloride purge stream section of the FGD unit provides reduction of chlorides in the FGD process water. In addition, a selenium reduction unit was installed in 2011. This unit utilizes bacteria (Pseudomonas sp) to change the oxidation state of the selenium so it can be removed in the existing chloride purge stream system. Sludge produced by this process is dewatered on filter presses and transported by truck to the Little Broad Run landfill. This process is performed on completely concreted floors and roadways.

5. Underground Storage Tanks

Non-regulated Underground Storage Tanks. There are two non-regulated underground storage tanks (USTs) in use at this facility, which are ignition oil drain tanks located just north of the plant near the ignition oil pump skid. These USTs are constructed of single-wall steel and are coated with two coats of Nocor No. 705 Fast-Cote. These tanks rest on concrete slabs supported by compacted clay soils. The tanks are equipped with moderate lengths of underground steel piping.

These tanks may have the potential to contaminate groundwater. This potential is limited as a result of the ignition oil drain tanks being equipped with high level alarms to prevent overfilling.

6. Aboveground Storage Tanks

The location, capacity and contents of the Plant's aboveground storage tanks (ASTs) are summarized in Table 1. At times, there may be additional petroleum ASTs located on the Plant property which are owned and operated by contractors working at the Plant.

Two fuel oil, one sulfuric acid, and two urea solution ASTs will be discussed in this section (Tanks 1,2,21,48 and 49); the remaining tanks will be discussed in Section III B.5 of this GPP since they do not have a significant potential to contaminate groundwater.

Petroleum Aboveground Storage Tanks. The two largest petroleum ASTs at this facility have a capacity of 1.5 million gallons each and contain No. 2 fuel oil used to supply the generating unit with fuel oil for boiler startups and coal augmentation. Both tanks are constructed of steel and rest on earthen foundations. An earthen secondary containment dike has been constructed around each tank with capacities large enough to contain the volume of the tank plus sufficient freeboard to allow for

precipitation. Each tank is equipped with significant lengths of underground fiberglass piping

These tanks have a reasonable potential to contaminate groundwater due to their size. However, this risk is mitigated through the Plant's spill response procedures, high level alarms, operational inspections and the soil containment dikes. In addition, the EPRI Study assessed the risks associated with these aboveground petroleum storage tanks and did not find any contamination in these areas of the plant.

The delivery piping system which delivers fuel from the two 1.5-million- gallon tanks to the main plant systems has a potential to contaminate groundwater due to its length, size and location. The risk is somewhat mitigated due to the fact that the system consists of fiberglass supply and return lines contained inside a 36" high density polyethylene (HDPE) pipe. There are also inspection sumps strategically located throughout the system. The piping system is inspected monthly and results of these inspections are kept on file in the Plant Environmental Coordinator's office.

Sulfuric Acid Aboveground Storage Tanks. There are two sulfuric acid ASTs in service at this facility – The Pretreatment Acid Tank is a 16,500 gallon tank. This tank rests on concrete saddle-type foundations and has a concrete dike constructed around it. A layer of coarse limestone gravel, which is designed to neutralize any released material, covers the area enclosed by the dike underneath the tank. This tank poses a minor risk to soil and groundwater since it has a permeable secondary containment base. However, this risk is mitigated since the tank has a concrete dike constructed around it to prevent spilled materials from migrating away from the spill area, and has limestone gravel in the bottom of the containment area to neutralize the acid.

SCR Urea Aboveground Storage Tanks. Two of the urea solution AST's that were installed in 2002 as part of the "Ammonia on Demand" system have a potential to contaminate groundwater. A 94,200 gallon recycle tank containing < 5% urea and a 140,800 gallon solution storage tank containing 40% urea are mounted on concrete bases. Containment for these tanks is an impervious clay dike on 3 sides and a concrete wall on one side. The containment will hold tank contents plus a 4 inch rainfall. Potential to contaminate groundwater would exist for these two tanks due to the clay containment.

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TABLE 1
SUMMARY OF ABOVEGROUND STORAGE TANKS

Tank	Location	Capacity (gallons)	Contents	Potential to Contaminate Groundwater
1	Ignition Oil Tank Yard	1,500,000	No. 2 Fuel Oil	Yes
2	Ignition Oil Tank Yard	1,500,000	No. 2 Fuel Oil	Yes
4&5	Diesel Oil Tank No. 1 & 2	2@5,000 ea	Diesel Fuel	No
6	Steam Cleaning Area	275	Diesel Fuel	No
7	ConVault Gasoline	2,000	Gasoline	No
8	Contractor Gasoline	500	Gasoline	No
9&10	Tractor Garage	2@1,500 ea	Lubricating Oil	No
11&12	Tractor Service Bldg.	2@1,000 ea	Lubricating Oil	No
13-15	Used Oil Storage Area	8,000, 1,600 & 1,000	Used Oil	No
16	Contractor Storage	4,000	Diesel Fuel	No
17	Contractor Storage	1000	Diesel Fuel	No
18-19	Fire Protection Pumps	2@ 275 ea	Diesel Fuel	No
20	Yard Tractor Service Bldg.	1,000	Transmission Fluid	No
21	Pretreatment Area	16,500	Sulfuric Acid	Yes
22	Pretreatment Vault	22,500	Sodium Hydroxide	No
23	Unit Caustic Vault	12,000	Sodium Hydroxide	No
24	Metal Cleaning Waste Tank	1,500,000	Metal Cleaning Waste	No
25&26-26B	Near Cooling Tower	3@ 1500	HEDP/Gengaurd	No
27-34	Coal Stations	8@ 325 ea	Diethylene Glycol	No
35	Near Ignition Oil Tanks	1,000	Betz FS-20	No
36	Pretreatment Area	10,000	Aqua Ammonia	No
37-43	Coal Stations 5,6.7, 7S.8,9.10	7 @ 5,000 ea	No. 2 Fuel Oil	No
44	Coal Barge Unloader	4,000	Dust Suppressant	No
45	Coal Station 8	3,000	Dust Suppressant	No
46-47	Urea Mix Tanks	2 @ 3300 ea.	40% Urea Solution	No
48	Urea Recycle Tank	94,200	<5% Urea Solution	Yes
49	Urea Storage Tank	140,800	40% Urea Solution	Yes
50-59	Gypsum Stations	2-500 gal	No. 2 Fuel Oil	No
60	Limestone Pile	3-1000 gal 500 gal	Diesel Fuel	
61	New Oil Area	493 gal	Kerosene	
62-64	FGD Area	2 @ 1,000 gal.	No. 2 Fuel Oil	No
65	Bioreactor Sulfuric Acid Tank	1 @ 2,000 gal. 14,300 gal.	Sulfuric Acid	No
66	Bioreactor Nutrient Tank	12,770 gal.	Molasses mixture	No
67	FGD Quench Pump	70 gal.	No. 2 Fuel Oil	No

7. Outside Tank Loading and Unloading Areas

The plant receives bulk shipments of No. 2 fuel oil from trucks at the plant's truck unloading station. Fuel oil is transferred from this facility through underground Fiberglass piping to the two 1.5 million gallon AST's.

The fuel transfer piping has the potential to contaminate groundwater due to the length of the piping and the amount of fuel received and handled at the Plant. This risk is somewhat mitigated since it is secondarily contained inside a 15" high density polyethylene (HDPE) pipe. Inspection sumps are strategically located throughout the system. Inspections are performed monthly and results of these inspections are kept on file in the Plant Environmental Coordinator's office. Plant personnel are prepared to implement the Integrated Contingency Plan if a spill should occur.

The barge unloading facility and associated piping has been drained, flushed and isolated. It is no longer capable of being used to unload fuel oil from barges. The barge unloading facility is now in caretaker status as per 33 CFR Part 154.

B. Inventory of Facility Operations That Are Not Expected to Contaminate Groundwater

The following Plant operations are not expected to contaminate groundwater, but were included in this GPP to demonstrate that these areas were evaluated.

1. Coal Storage and Handling

Coal Yard Runoff Piping System. Runoff water from the coal yard is captured in four coal yard runoff impoundments. From there it is pumped to the wastewater treatment complex through a combination of aboveground and underground HDPE piping. This piping system does not have a significant potential to contaminate groundwater.

Coal Transfer Stations. There are eight coal transfer stations and a barge unloading station at this facility. These stations generally contain coal conveyor belt motor housings and/or coal loading or off-loading points. Several of these locations are equipped with concrete water collection sumps. The water collected in these sumps consists of conveyor system washdown water and possibly oil residuals

from the coal handling equipment (conveyor motors, etc.). This water is transferred via vacuum truck to the coal yard runoff ponds. The coal transfer stations do not have a significant potential to contaminate groundwater.

2. **Fly Ash Handling**

Fly ash generated at this facility is handled utilizing a "dry" system as described in Section III.A.3 of this GPP. Fly ash which is not sold for beneficial reuse is transported by truck to the Little Broad Run Landfill for disposal. No significant potential for groundwater contamination was identified with the on-site dry fly ash handling system.

3. **Gypsum Handling**

Synthetic Gypsum generated at this facility is handled in a dewatered state as described in section III.A.4 of this GPP. No significant potential for groundwater contamination was identified with the on-site dry fly ash handling system.

4. **Underground Storage Tanks**

The deep well injection operation for sequestering carbon dioxide is covered by Underground Injection Control Permit. Permit #11-89-08-053.

Regulated Underground Storage Tanks. There are no regulated underground storage tanks at this facility.

Non-regulated Underground Storage Tanks. The two non-regulated USTs (heating oil tanks) in service at this facility are discussed in Section III.A.5 of this GPP.

5. **Aboveground Storage Tanks**

Petroleum Aboveground Storage Tanks. Forty one of the forty three petroleum ASTs at this facility do not have the reasonable potential to contaminate groundwater due to their size, location and plant-implemented administrative controls. (Tanks 3-20, 35, 37-43, 50-59, 62-64, and 67) These systems are summarized in Table 1 of this GPP and are described in detail in the Mountaineer Plant SPCC Plan, which is located in Section 16 of the Integrated Contingency Plan on file at the Mountaineer Plant's Environmental Department.

Used Oil Storage Tanks. Twenty-one small capacity used oil collection tanks are located throughout the main plant building. These tanks are routinely emptied into one of three larger exterior used oil

collection tanks located immediately behind the ignition oil skid, due east of the auxiliary boilers. These tanks consist of one 1,000-gallon, one 1,600-gallon and one 8,000-gallon tank which all rest within a covered curbed concrete containment pad equipped with a runoff collection sump.

Aqua Ammonia Aboveground Storage Tank . There is one 10,000-gallon aqua ammonia AST in service at this facility. This tank is situated within a lined concrete secondary containment basin. Any material released from the process piping would be diverted to the turbine room sump. No significant potential to contaminate groundwater was identified regarding this tank or its associated piping systems. Tank 36

SCR Urea Aboveground Storage Tanks. Two urea solution mix tanks were installed in 2002 as part of the "Ammonia on Demand" system that provides ammonia to the SCR reactors for nitrous oxide emission reduction. Two 3300 gallon mix tanks, containing up to a 40% urea solution, are mounted on concrete bases. The tanks are inside a building on a curbed pad, sloped and drained to divert any spilled material to a wastewater sump. Tank 46-47

Sodium Hydroxide Aboveground Storage Tanks. There are two sodium hydroxide AST's in service at this facility. These tanks are situated below grade within concrete vaults. No significant potential to contaminate groundwater was identified regarding these tanks or their associated piping systems. Tank 22-23

HEDP/Gengaurd Aboveground Storage Tanks. There is one 1500-gallon HEDP and two 1500 gallon Gengaurd ASTs in service at this facility. These polyethylene tanks rest in a lined concrete containment basin located in a building at the base of the cooling tower basin. No significant potential to contaminate groundwater was identified regarding these tanks or their associated piping systems. Tanks25-26 & 26B

Diethylene Glycol Aboveground Storage Tanks. There are eight 250 to 325-gallon diethylene glycol ASTs in service at this facility. Diethylene glycol is used to deice the coal conveyor belts. All connective piping associated with these systems is aboveground. Tank 27-34

The tanks are in service only during the winter months. During the warmer seasons, these tanks are stored at the "T" construction building. These tanks have no significant potential to contaminate groundwater.

Dust Suppressant Aboveground Storage Tanks. There are two dust suppressant ASTs in service at this facility. There is a 4000 gallon tank at the barge unloader and a 3000 gallon tank at Station 8. Both

are plastic tanks and are in plastic containment structures. Various commercial dust suppressants are used to suppress dust the coal conveyor belts. All connective piping associated with these systems is aboveground. These tanks are no longer in service, Tank 44-45

Bioreactor Sulfuric Acid Aboveground Storage Tank.
This tank is a 14,300 gallon double walled carbon steel tank located at the FGD water treatment area. It is used for pH control of the selenium reduction bioreactor unit. The bioreactor unit was added in 2011 to control levels of selenium in the plant effluent. This tank poses little to no risk to groundwater because it is a double walled tank and all areas around the tank are concrete. Tank 65

Bioreactor Nutrient Above Ground Storage Tank
There is a 12,770 gallon fiberglass tank located inside the CPS building to supply nutrient for the bacteria in the selenium reduction unit. This tank is inside of a containment curb inside of the CPS building. Therefore, it has no significant potential to contaminate groundwater. Tank 66

Limestone Storage Diesel Fuel Tank
There is one 500 gallon Convault tank diesel fuel tank at the limestone pile area for refueling equipment. This tank is double wall and protected by a concreate shell therefore it has no significant potential to impact groundwater. Tank 60

Kerosene Tank
There is one 493 gallon kerosene tank located at the new oil storage area. The tank is located inside the concrete containment for the new oil storage therefore; it has no significant potential to impact groundwater. Tank 61

6. Outside Tank Loading and Unloading Areas

The tanker truck fuel unloading station is located just south of the 1,500,000-gallon storage tanks. This station consists of a concrete containment area which would collect any spilled oil. This containment area flows to a concrete sump where storm water and spilled material can be collected and disposed of properly.

7. Metal Cleaning Waste Treatment Facility

There is one 1,500,000-gallon, epoxy-lined, single-wall steel, metal cleaning waste treatment tank in service at this facility. The tank is located within a compacted clay-lined secondary containment dike.

Wastewater from the cleaning operation is pumped from the steam generators to the metal cleaning waste tank through a combination of aboveground and underground steel piping. Following treatment, wastewater is pumped from the tank to the wastewater treatment complex through aboveground piping. As necessary, sludge is removed from the bottom of the tank and is disposed offsite at an appropriate facility. No significant potential to contaminate groundwater was identified regarding this tank or its associated piping systems. Tank 24

8. **Equipment Cleaning**

As part of the Plant's routine maintenance activities, heavy equipment used in the coal yard is steam cleaned periodically on the diesel refuel pad. Rinse waters are diverted to the coal pile runoff ponds. Light vehicles are washed in the pretreatment area or in the coal yard service center. Wash and rinse waters are diverted to either a water treatment sump or the coal yard runoff impoundments.

On an as-needed basis, the coal handling stations are also washed. Washwater runoff generated from this activity is diverted to the coal yard runoff impoundments.

No significant potential to contaminate groundwater was identified with respect to these activities.

9. **Yard Storage**

This facility occasionally utilizes areas near the construction warehouses for outside storage of miscellaneous piping materials. The piping materials are stored on racks above a concrete pad. Yard storage was expanded to the northeast plant outside area during SCR construction 2001-2002. No significant potential to contaminate groundwater was identified regarding these areas.

10. **Drum Storage**

New Petroleum Products. Many new oil products received at this facility, such as hydraulic oils, motor oils and transformer oils, are delivered in 55-gallon drums. There is one outside, new petroleum product drum storage area in use at this facility located just south of the main plant building.

This covered storage area consists of a lined concrete slab with a continuous concrete containment curb. Drums are supported on

steel racks. No significant potential to contaminate groundwater was identified regarding this storage area.

Used Oils. There is one used oil storage area in service at this facility, located just north of the main plant. In this area, three used oil storage tanks rest on a lined concrete pad equipped with concrete containment curbing. No significant potential to contaminate groundwater was identified regarding his storage area.

Hazardous Waste. Hazardous wastes are temporarily stored in the east portion of the "paint warehouse" located to the west of the cooling tower. The wastes are temporarily stored in drums on a curbed concrete floor. The area is located within a fully enclosed pre-engineered metal building. No significant potential to contaminate groundwater was identified regarding this storage area.

11. **Previously Closed Areas**

Former Metal Cleaning Waste Basin. Formerly, steam generator metal cleaning wastes were treated in a lined impoundment located in the same area as the existing metal cleaning treatment facility. This impoundment was closed in 1990 by dewatering and removing the bottom sludges. A second metal cleaning waste pond was located north of the closed pond. This second pond was never used. It was dewatered and regraded and now provides secondary containment for the existing metal cleaning waste tank.

Miscellaneous Materials Disposal. Over the years, an area north of the north coal yard has been utilized as a disposal area for concrete, cooling tower mud and other similar materials. Stormwater runoff from the area has been diverted to the northeast coal yard runoff impoundment. Pieces of concrete and other similar construction debris are also stored in a small area east of the rail car shaker.

12.

C. Description of Procedures to Protect Groundwater

The following sections describe groundwater protection practices utilized by the Mountaineer Plant for specific operations. In general, water which seeps from the Plant site travels downward at a slow rate through the clayey deposits below. The presence of approximately 25 feet of clayey deposits overlying the valley-fill aquifer will cause the movement of water from the potential sources of contamination to the aquifer to be extremely small in quantity and slow in

velocity. During such slow travel, there exists a substantial opportunity for the attenuation of waste constituents through ion exchange with clay minerals. Upon reaching the sand and gravel aquifer, remaining waste constituents will face considerable dilution and dispersion. Should such water finally leave these clayey deposits, hydrologic principles indicate that its path will turn sharply toward the river, traveling fairly close to the top of the sand and gravel aquifer, until it reaches and recharges the river. Waste constituents which are borne with the water's flow will follow the same path.

1. **Coal Storage and Handling**

The coal storage yard is one of the major outdoor material storage areas located on the Plant site. Coal is stored on the ground overlying in-situ clayey silt to silty clay soils. The pile is managed, shaped and compacted to promote runoff and to minimize ponding or seepage of incidental rainfall into the pile. The storage area is graded to promote drainage to the coal yard impoundments.

2. **Bottom Ash/Clearwater Pond Complex**

The bottom ash/wastewater treatment complex consists of six impoundments as described in Section III.A.2. The ponds are constructed within compacted clayey silt. These compacted soils form a barrier to contaminant migration.

3. **Fly Ash Handling**

Fly ash is managed utilizing a dry system which consists of four concrete silos that are designed to allow trucks to pull through the bottom of the silo where the ash is loaded. The silo truck loading areas are equipped with curtain sprayers to eliminate fugitive dust. The fly ash is also conditioned as it is loaded to keep dusting to a minimum. Excess water from curtain sprayers or truck washdowns is captured in a floor sump and is discharged to the plant's wastewater treatment system.

Earthen collection impoundments have been constructed to collect condensate that drips from the fly ash silo vacuum pump venting system. These impoundments are lined with coarse limestone gravel to neutralize the acidic condensate. The impoundments are routinely inspected and the limestone is replenished as necessary.

4. **Underground Storage Tanks**

The ignition oil drain receiver and overflow tanks are equipped with high level alarms. There are no regulated UST's in service at this facility.

5. Aboveground Storage Tanks

The two 1,500,000-gallon No. 2 Fuel Oil ASTs are surrounded by earthen dikes. The containment capacity of the impounded areas is designed to retain the contents of the tank plus sufficient freeboard to prevent spillage to the surrounding environment.

Spills of petroleum product to surface water and/or the ground are promptly cleaned up and waste materials properly managed. Oil is skimmed or vacuumed off the water and placed in oil/water separation tanks until disposal can be arranged. Visible traces of the spill are removed from the ground and placed in a plastic-lined, diked area. The material is then covered with plastic until disposal and/or treatment can be arranged.

The piping systems which connect the two 1.5-million-gallon fuel oil ASTs to the main plant systems were installed within in-situ silty soils. Both piping systems were newly installed in 2004 and consist of fiberglass lines for fuel oil transport that are secondarily contained inside larger diameter high density polyethylene (HDPE) pipe. Inspection sumps are strategically located throughout the systems in order to perform visual inspections for leaks. Both systems are inspected monthly and copies of the completed inspections are located in the Plant Environmental Coordinator's office.

The pretreatment sulfuric acid aboveground storage tank is enclosed by a concrete dike. The area underneath the sulfuric acid tank is layered with coarse limestone gravel to neutralize any releases from the tank.

The Bioreator sulfuric acid tank is a dual walled tank to provide containment of any leakage of the primary tank. The containment tank is inspected regularly to assure inner tank integrity.

If any of the coal station diethylene glycol AST's should fail, the released material would be confined within the coal station sump collection system.

Spillage from either the urea solution recycle tank or storage tank would be recovered for reuse and/or pumped out of the containment for proper disposal. Lining integrity would be restored if contaminated with urea solution.

Secondary containment basins are inspected routinely by Plant personnel. Accumulated rainwater is inspected and tested, if

necessary, prior to discharge. All containments are vacuumed and placed either on the coal pile or into the coal pile runoff ponds. Bulk oil and chemical storage tanks are inspected on a routine basis for deterioration.

The Plant's Integrated Contingency Plan provides for timely containment and abatement of all spills at the Plant.

6. Outside Tank Loading and Unloading Areas

The fuel oil truck unloading facility described in Section III.B.6 of this GPP is available for use if necessary.

7. Metal Cleaning Waste Treatment Facility

The Metal Cleaning Waste Treatment Tank is located within a clay-lined secondary containment basin that is large enough to contain the volume of the tank plus sufficient freeboard to allow for precipitation.

8. Equipment Cleaning

An equipment cleaning area exists adjacent to the coal yard where heavy equipment is routinely washed or steam cleaned. Rinse and wash waters drain to a catch basin, and then to the coal pile runoff ponds.

9. Drum Storage

Drums containing new oil products are stored on a lined concrete pad with concrete containment curbs. This area is located to the southeast of the main plant.

Drums containing hazardous waste are temporarily stored on a curbed concrete floor located in the east end of the "paint warehouse."

10. Sumps and Pumps

Sumps and pumps within the Plant and adjacent structures on the Plant site are generally imbedded into the concrete foundation of the Plant or structure and, therefore, do not have a significant potential to contaminate groundwater.

11. Pipelines

A variety of pipelines have been installed to convey a wide range of products to the Plant from various tanks and other miscellaneous material storage areas. Pipelines and other piping systems are designed and constructed with specific materials and installation procedures such that the product being conveyed does not produce a corrosive or deleterious effect on the pipe. Most of the Plant's pipelines are believed to be constructed within the native silty soils which underlie the site.

IV. Summary of Activities Carried Out Under Other Regulatory Programs That Have Relevance to Groundwater Protection

The following sections summarize regulatory programs, both state and federal, which have an impact on groundwater protection practices. Specifically, these programs are:

A. Spill Prevention Control and Countermeasures (SPCC)

This program was mandated by the Federal Water Pollution Control Act, and was incorporated into 40 CFR Part 112; it is intended to prevent the release of oil (petroleum) into or upon navigable waters of the United States or adjoining shorelines, and is applied to facilities which have any oil storage tanks larger than 660 gallons in size, and/or an aggregate storage capacity greater than or equal to 1320 gallons. These regulations require that a SPCC Plan be developed, implemented, and maintained at the facility.

The SPCC Plan for this facility is reviewed at least triennially and kept up-to-date. A copy of the Plan is available for inspection at the Plant's Environmental Department or in Section 16 of the Integrated Contingency Plan.

B. EPA Facility Response Plan

This program is mandated by the Federal Water Pollution Control Act (more commonly referred to as the "Clean Water Act"), as amended by the Oil Pollution Act of 1990, and incorporated into 40 CFR Part 112. In brief, this program requires all facilities which have a total oil storage capacity greater than or equal to one million gallons (and may cause substantial environmental harm), or which transfer oil over water to or from vessels, and also have a total oil storage capacity equal to or greater than 42,000 gallons, to prepare and maintain a Facility Response Plan on-site. This facility meets the first of these criteria and, therefore, has a Facility Response Plan incorporated into the Mountaineer Plant Integrated Contingency Plan (ICP). A copy of the Plan is available for inspection at the Plant's Environmental Department. The ICP is reviewed and updated at least annually.

C. West Virginia Above Ground Storage Tank Response Plan

This program is mandated by the West Virginia Above Ground Storage Tank Act (W.Va. Code §22-30-9). The plan addresses the required information as provided by the interim guidance criteria of the West Virginia Department of Environmental Protection (WVDEP) and is applicable to registered tanks under the program

D. Toxic Substances Control Act

This facility does not handle any oils containing concentrations of polychlorinated biphenyls (PCBs) greater than 50 ppm. Therefore, the federal regulations promulgated for managing PCBs (40 CFR Part 761) do not apply to this facility.

E. Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA)

This facility occasionally handles materials containing CERCLA hazardous substances as part of the steam-electric generation process. The Plant complies with all CERCLA requirements, as mandated by 42 U.S.C. § 9601 et seq., and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Records documenting CERCLA/SARA activities at this facility may be reviewed at the Plant's Environmental Department.

F. West Virginia Underground Storage Tank Regulations

These regulations (CSR Title 33, Series 30) govern the installation, operation, release response and closure activities for certain petroleum underground storage tanks located in the State of West Virginia.

At present, this facility does not own or operate underground storage tanks regulated under CSR Title 33, Series 30.

G. West Virginia Hazardous Waste Regulations (Small Quantity Generator)

This facility is regulated under WV CSR Title 33, Series 20, as a "small quantity" hazardous waste generator. The EPA Identification Number for this facility is WVD 980554463. Records regarding the facilities hazardous waste generation and disposal activities can be reviewed at the Plant's Environmental Department.

H. National Pollutant Discharge Elimination System (NPDES)

This facility is regulated under WV CSR Title 47, Series 10, as an NPDES permittee. The Plant's NPDES permit number is WV0048500. The NPDES permit, discharge monitoring reports (DMRs), analytical testing results, and other related documents are available for inspection at the Plant's Environmental Department.

I. West Virginia Requirements Governing Groundwater Standards

As required by WV CSR Title 46, Series 12, the Mountaineer Plant complies with the West Virginia Requirements Governing Groundwater Standards.

J. West Virginia Groundwater Quality Standard Variances

WV CSR Title 47, Series 57 allows for the granting of variances from the groundwater standards. No groundwater quality standard variances have been filed for this facility, since no groundwater standards have been exceeded.

K. West Virginia Proof of Proper Solid Waste Disposal Regulations

As required under WV CSR Title 33, Series 7, this facility retains all receipts for the collection and disposal of all solid wastes generated at this facility.

L. West Virginia Solid Waste Regulations

This facility is regulated under WV CSR Title 33, Series 1. In general, this facility meets the requirements of the regulation by properly handling the solid waste it generates, as specified in § 1.3. and § 7.2. of the Solid Waste Regulations.

M. West Virginia Special Rules

This facility is subject to 47 CSR 11, Special Rules, which establish requirements governing pollution control measures which are considered special situations that are not generally covered in Title 46 Series 1 (Water Quality Standards) or Title 47 Series 10 (formerly Title 46 Series 2).

N. West Virginia Underground Injection Control Regulations

This facility is regulated under WV Code, Chapter 22, Article II (water pollution control act) Section 8, Chapter 22, Article 12 (Groundwater Protection Act) and Legislative Rules, Title 47, Series 13 (Underground Injection Control) Sections 12 and 13.

Permits related to this operation are: Oil and Gas Exploration (API 4705300423, API 47-5300489, 47-5300490, API -47-5300491, API 47-5300506), underground injection control authorization to operate A Class 5 Type X25 injection well permit number 1189-08-053.

V. Discussion of Available Information Regarding Groundwater Quality

The EPRI Study involved the collection of a significant amount of groundwater quality data at the Plant site. Detailed information on the groundwater quality at this facility can be found in the June 1999 EPRI report entitled, "Groundwater Quality at the Philip Sporn and Mountaineer Power Plants, Mason County, West Virginia".

VI. Disposal Practices

Waste products generated by the Mountaineer Plant are properly managed in compliance with all federal, state and local laws and regulations. No waste products are improperly used as fill or cover material.

1. Solid Waste (Refuse)

The Mountaineer Plant retains records demonstrating that a solid waste collection service is utilized for delivering wastes to an approved solid waste disposal facility. These records are retained for a minimum of three years.

2. Non-hazardous Special Solid Wastes

Non-hazardous special wastes (e.g., sandblasting grit, petroleum contaminated soil), which are not otherwise properly treated on-site, are disposed of in an approved landfill. Waste materials are profiled for hazardous characteristics and a Solid Waste Profile is submitted to the West Virginia DEP, Office of Solid Waste, requesting permission for disposal. Small quantities of asbestos-containing wastes are sent to the Philip Sporn Plant for storage and subsequent disposal at permitted landfills that accept asbestos. Wastes are manifested and records are maintained at the Plant for at least three years.

3. Other Non-hazardous Waste

Non-hazardous parts washer solvents are recycled through an approved contractor. Antifreeze is recycled on-site. Spec used oil is burned on site in space heaters. Manifests and records are maintained at the Plant for a minimum of three years.

4. Hazardous Waste

Hazardous wastes generated at the Plant are properly disposed of at an approved licensed facility. Hazardous parts washer solvent is recycled through an approved contractor. Wastes are manifested and records are maintained at the Plant for a minimum of three years.

VII. Provisions for Training Regarding Responsibility to Ensure Groundwater Protection

The Mountaineer Plant employees are instructed and trained on groundwater protection practices. All employees have received initial spill response training and receive annual spill refresher training.

The Plant has developed and is prepared to implement, if necessary, an ICP which details procedures for responding to, cleaning up and disposing of spilled materials. The ICP includes information required in the Spill Prevention Control and Countermeasures (SPCC) Plan, the EPA and Coast Guard Facility Response Plans and the Emergency Operating Plan.

VIII. List of Procedures to be Employed in the Design of New Equipment

The Plant's Environmental Department will be notified whenever new equipment, which may have the potential to contaminate groundwater, is being considered for installation at this facility to ensure that the equipment is designed to protect groundwater.

1. Outside Material Storage or Disposal Areas

New areas used for the storage or disposal of raw materials, products or wastes, which have the potential to contaminate the groundwater, will be designed, constructed and operated to prevent the release of contaminants to groundwater.

2. Impoundments

New wastewater impoundments will be designed with an appropriate liner and operated to prevent the contamination of groundwater. The impoundment design will be based on the anticipated design flows and appropriate design storm events to allow for sufficient freeboard.

3. Pipelines, Ditches, Pumps, and Drums

Pipelines conveying materials that have the potential to contaminate groundwater will preferentially be installed aboveground and will be corrosion resistant to the elements and to the product to be conveyed.

Ditches will not be installed as primary conveyances for materials that have the potential to contaminate groundwater unless an appropriate liner has been installed.

Pumps and ancillary equipment handling materials that have the potential to contaminate groundwater will be selected and installed to prevent or contain spills or leaks.

Drums containing materials that have the potential to contaminate groundwater, will be stored so that spills and leaks are contained. Measures will be taken to control drum deterioration and/or damage due to handling.

4. Tanks and Sumps

New tanks containing materials that have the potential to contaminate groundwater will only be installed underground if there are overriding safety, legal, security or fire protection concerns.

New underground storage tanks and associated piping containing materials that have the potential to contaminate groundwater will be double-walled and the outer wall will be constructed of non-corrosive materials. Appropriate leak detection systems will be installed for regulated UST.

New aboveground tanks, which have the potential to contaminate the groundwater, will be equipped with secondary containment. The volume of the secondary containment will be designed based on the capacity of the largest tank plus sufficient freeboard for precipitation.

Sumps containing materials that have the potential to contaminate groundwater will be designed, constructed and operated utilizing leak detection, secondary containment or other appropriate controls that are capable of preventing groundwater contamination.

IX. Inspections

Inspections by the Energy Production, and Environmental/Lab Departments are a daily occurrence at the Mountaineer Plant. Due to the need and the duty to provide electrical service to Appalachian Power's customer on a continuous basis, such inspections are routine and necessary.

In addition, the Mountaineer Plant Environmental Coordinator, or his designee, will conduct a monthly visual inspection of the following areas: storm water outlets, outdoor construction activities, coal combustion by-product transport and disposal practices, equipment/materials storage areas, and areas known to be susceptible to erosion.

X. References Cited

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Carlston, C.W. and G.D. Graeff, (1956). Geology and Economic Resources of the Ohio Valley in West Virginia, West Virginia Geological and Economic Survey.

Leonards, A. B. Huang and Jose Ramos. 1991. Piping and Erosion Tests at Conner Run Dam, Journal of Geotechnical Engineering, Vol. 117, No. 1.

McGuinness, C.L. and G. Meyer, (1965). West Virginia's Water Situation - The Role of Ground Water, W.V. Geological Survey Newsletter, January 1965, pp. 2-6.

Walker, E.H. (1957). "The Deep Channel and Alluvial Deposits of the Ohio Valley in Kentucky", U.S. Geological Survey Professional Paper 1411, 25pp., 2 maps, 15 cross-sections.

Walton, W.C. (1970). Groundwater Resource Evaluation, McGraw Hill, Inc., New York.

Wilmoth, B.M. 1966. Groundwater in Mason and Putnam Counties, West Virginia Geological and Economic Survey Bulletin 32. 152 pp.

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AMERICAN ELECTRIC POWER

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1 Riverside Plaza
Columbus, OH 43215-2373
AEP.com

December 1, 2016

Gene Smith, Assistant Chief
Office of Oil and Gas - Permitting
Department of Environmental Protection
601 57th Street SE
Charleston, WV 25304

Re: Appalachian Power Company (dba AEP) Mountaineer Plant
Notice and Application to Plug and Abandon Wells
MW-1 and MW-2

This shall serve as notification of our intent to plug and abandon wells MW-1 (API 47-530-0489) and MW-2 (API 47-530-0490) and request plugging permits for the described work. The wells are Class V, CO_2 deep monitoring wells, which have not been in contact with any injected CO_2. The wells are located at the AEP Mountaineer Plant in Mason County, WV. All required forms are submitted with this notification, including:

WW-4A (Notice of Application to Plug and Abandon a Well),
WW-4B (Application for a permit to Plug and Abandon),
Surface Owner Waiver,
Instructions to Coal Operators,
WW-9 (Reclamation Plan),
WW-9-GPP (with Groundwater Protection Plan), and
a copy of the well plat (originals on file with the WVDEP).

A waste water pit will not be constructed during the well plugging, instead, tanks will be used to collect any wastewater, which will be hauled off-site and disposed of by a qualified third party. Since a pit will not be constructed, there are no permit fees associated with this application.

The original mylar well plats and required $5000 cash performance bonds for these wells are on file with the WVDEP. Once plugging, filling and reclamation work on the wells has been completed, affidavits (Form WR-38) will be filed with your office.

Please let me know if there is anything we can do to expedite issuance of the permits and don't hesitate to contact me at 614-716-1255 or at twlohner@AEP.com if you have any questions.

Sincerely,

Timothy Lohner, Ph.D.
Environmental Services

Enclosures

cc: Jamie Stevens – WVDEP, OO&G (w/enclosures)
HC 62, P.O. Box 1C, Kenna, WV 25248