Inspection Report

To: **Mark Jacklin (Keystone Generating Station)**

From: **Richard Southorn, P.E., P.G., CPSWQ**

Re: **Keystone Ash Disposal Site – Annual CCR Unit Inspection Report No. 2**

Inspection Date: **November 15, 2016**

Report Date: **January 16, 2017**

INTRODUCTION

Title 40 Code of Federal Regulations (CFR) Part 257 addresses, in part, the management of Coal Combustion Residuals (CCR Rule, or Rule) in regulated units, including landfills. Specific to §257.84(b) of the Rule, existing and new CCR landfills must be inspected on an annual basis by a qualified professional engineer. For the Keystone Generating Station (operated by GenOn Northeast Management Company, a subsidiary of NRG Energy, Inc. [NRG]), this inspection requirement applies to the existing Ash Disposal Site. In support of this obligation, Mr. Richard Southorn (a qualified professional engineer with CB&I Environmental & Infrastructure, Inc. [CB&I]) conducted an on-site inspection of the Ash Disposal Site on November 15, 2016. The findings from this second annual inspection are summarized in the remaining sections of this correspondence.

As required, this report will be placed in the Keystone facility's operating record per §257.105(g)(9), noticed to the State Director per §257.106(g)(7), and posted to the publicly accessible internet site per §257.107(g)(7). Placement of the first annual inspection report into the facility's operating record was accomplished on January 18, 2016, satisfying the entry date deadline per §257.84(b)(3)(i). Accordingly and per §257.84(b)(4), the current report will be entered into the facility's operating record no later than January 18, 2017.

BACKGROUND

The collective Ash Disposal Site consists of the contiguous East Valley and West Valley components and is operated/maintained in accordance with Pennsylvania Department of Environmental Protection (PADEP) Solid Waste Permit No. 300837. Stage I of East Valley was constructed first and became operational in 1985. Stage I was initially constructed in the northern part of East Valley, with Stage II being later constructed in the southern half of East Valley and piggy-backed over the Stage I area. West Valley comprises Stage III of the disposal site, and it along with Stage II of East Valley, are the

currently active portions. Disposal of CCR materials in West Valley began in 2002. When completed, West Valley will piggy-back over the western part of the East Valley Disposal Site. Stage IV of the disposal site is permitted and in the early stages of construction. It will be constructed in the southern part of West Valley and will be a horizontal and vertical expansion of the Stage III area. When ultimate development conditions are reached, Stage IV will piggy-back over Stage III as well as the western limits of East Valley (Stage I and Stage II). At such time when the permitted disposal capacity has been fully expended and final grades attained, any uncapped areas of the disposal site will be capped and closed in accordance with the approved Closure Plan.

As of the November 2016 inspection, CCR materials were being placed in the active Stage II (East Valley) and Stage III (West Valley) areas of the disposal site.

With respect to the Ash Disposal Site, CB&I's evaluation has focused on the following items as outlined in §257.84(b)(1)(i-ii):

- *A review of available information regarding the status and condition of the CCR unit, including, but not limited to, files available in the operating record; and*
- *A visual inspection of the CCR unit to identify signs of distress or malfunction.*

Specific to CB&I's preparation of the annual inspection report, and per §257.84(b)(2)(i-iv), the following aspects have been addressed:

- *Any changes in geometry of the structure since the previous annual inspection;*
- *The approximate volume of CCR contained in the unit at the time of the inspection;*
- *Any appearances of an actual or potential structural weakness of the CCR unit, in addition to any existing conditions that are disrupting or have the potential to disrupt the operation and safety of the CCR unit; and*
- *Any other change(s) which may have affected the stability or operation of the CCR unit since the previous annual inspection.*

OPERATING RECORDS REVIEW

Principal items reviewed as part of this year's inspection included, but were not limited to: Design Drawings, 2016 Weekly and Periodic Landfill Inspection Reports, 2015 Annual Landfill Operations Report (dated, June 2016), and Solid Waste Permit No. 300837. During the site inspection, Mr. Southorn interviewed facility personnel (Mr. Mark Jacklin) to verify the information contained within the operating record.

Environmental Control System Overview

i. Bottom Liner System

a. East Valley is underlain by a single synthetic liner system.

b. West Valley has a double-liner system with one component being a geosynthetic clay liner.

ii. Leachate Collection System

a. The East Valley and West Valley leachate collection systems are represented by piping networks located above the liner system. East Valley leachate is routed to the existing Pump Station and then pumped to the station's Industrial Wastewater Treatment (IWT) plant. West Valley leachate flows by gravity directly to the IWT. Following processing at the IWT and eventually at the Final Wastewater Treatment (FWT) plant, the treated effluent is discharged in accordance with the station's National Pollutant Discharge Elimination System (NPDES) Permit.

iii. Stormwater Management

a. "Contact" stormwater at both East Valley and West Valley is collected in the West Valley Equalization Pond to allow for solids settling and is then routed to the IWT for treatment.

b. Non-contact stormwater at both East Valley and West Valley is routed to dedicated NPDES-permitted outfalls for direct discharge to surface water.

Summary of Landfill Construction

i. Moving forward, the remaining active areas of East Valley and West Valley will continue to receive CCR. Construction of the permitted West Valley expansion area will continue as well.

Review of Prior Inspections

i. Weekly inspections: A review of weekly inspections has concluded that no significant deficiencies occurred at the facility that required remedial actions.

ii. Annual inspections: A review of the previous annual inspection report has determined that there were no deficiencies or releases, actual or potential structural weaknesses, or concern to the stability of the land form. All environmental control systems were in good operating condition and functioning as intended.

CCR Disposal

i. Based on review of the 2015 Annual Landfill Operations Report and subsequent information provided by NRG, the total in-place disposal quantity of CCR materials is presently estimated at approximately 28,006,851 cubic yards (cy) (27,669,542 cy through December 2015 plus 337,309 cy through early-December 2016).

SITE INSPECTION

The site inspection was performed on November 15, 2016 by Mr. Southorn. The inspection focused on identification of standard geotechnical signs of distress or malfunction. Specific aspects such as slumping at the toe of slope, tensile cracking, abnormal or excessive erosion on the side slopes, slope bulging, and groundwater/surface water seepage or ponding were assessed. If present, these readily visible signs are potential indicators of structural weakness of the CCR Landfill unit.

Visual Signs of Distress or Malfunction

i. No visual signs of distress or malfunction were observed during the inspection. Stormwater drainage features, slope appearance and stability, leachate conveyance mechanisms, and overall site conditions were assessed. Closed portions of the East Valley exhibited well established vegetative cover.

Review of Environmental Control Systems

i. With no evidence to the contrary, the bottom liner systems at East Valley and West Valley are believed to be in good operating condition and functioning as intended. At the time of the inspection, conveyance systems to the IWT were operating as designed.

CONCLUSIONS

Changes in Geometry

i. As of the date of this inspection, peak fill elevations in the active disposal area were at approximately 1,370 feet mean sea level.

In-Place CCR Disposal Quantities

i. Based on review of the 2015 Annual Landfill Operations Report and subsequent information provided by NRG, the total in-place disposal quantity of CCR materials is presently estimated at approximately 28,006,851 cubic yards (cy) (27,669,542 cy through December 2015 plus 337,309 cy through early-December 2016).

Appearance of an Actual or Potential Structural weakness of the CCR Unit

i. At the time of inspection, there were no signs of distress or malfunction that would indicate actual or potential structural weakness at East Valley or West Valley.

Changes that may Affect the Stability or Operation of the CCR Unit

i. There have been no changes to the East Valley or West Valley areas that pose a threat or concern to the stability of the land form.

RECOMMENDATIONS

1. Continue operation and maintenance in the active areas as currently performed.

2. Ensure adequate access to the closed portions of the landfill to maintain the ability to perform weekly visual site structural inspections.

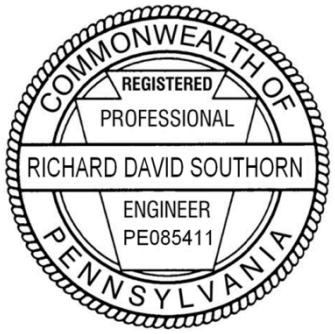
There were no deficiencies or releases identified during the 2016 annual inspection that required the owner or operator to perform corrective actions per §257.84(b)(5).

PROFESSIONAL ENGINEER'S CERTIFICATION

In accordance with §257.84(b) of the Rule, I hereby certify based on a review of available information within the facility's operating records and observations from my personal on-site inspection (including the photographs contained in Attachment 2), that the Keystone Ash Disposal Site does not exhibit any appearances of actual/potential structural weakness that would be disruptive to the normal operations of the East Valley and West Valley CCR Units. Both units are being operated and maintained consistent with recognized and generally accepted good engineering standards and practices.

Certified by: _____

Date: 1/16/17



Richard Southorn, P.E., P.G., CPSWQ
Professional Engineer Registration No. PE085411
CB&I Environmental & Infrastructure, Inc.

ATTACHMENTS

1. Site Map
2. Inspection Photo Log

REFERENCES

1. Residual Waste Major Permit Modification, Keystone Station Disposal Site, July 1996.
2. 2015 Keystone Generating Station Annual Landfill Operations Report, June 2016.
3. Weekly and Periodic Landfill Inspection Reports, 2016.
4. 40 Code of Federal Regulations, Part 257.

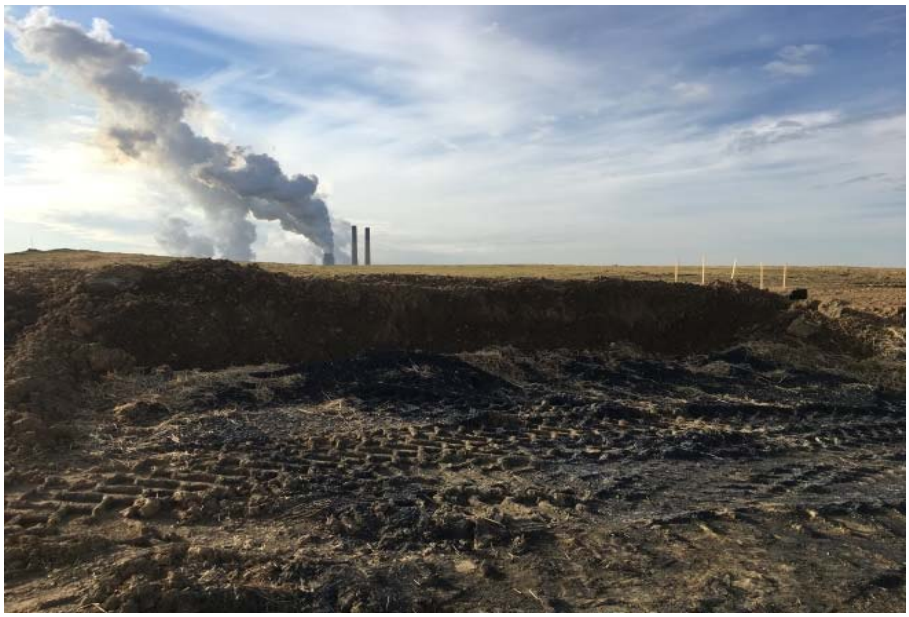
Attachment 1

Site Map

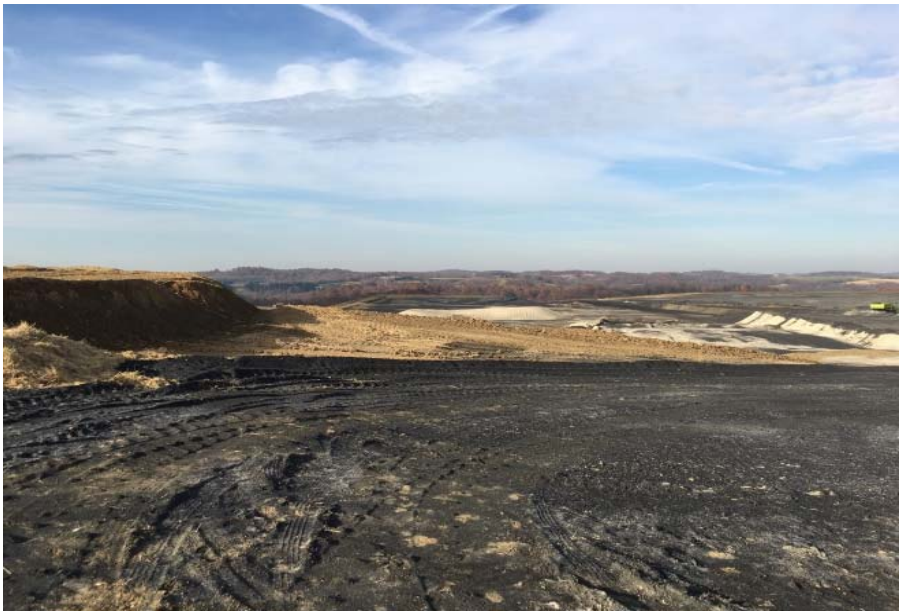
2016 ANNUAL INSPECTION PHOTOGRAPH
(ARROW DENOTES DIRECTION OF VIEW)
2015 ACTIVE AREA
COMPLETED AREA
COMPLETED AREA
INACTIVE AREA
WEST VALLEY
EAST VALLEY
K-58 1291.26
K-21 1117.35
STORM WATER POND
HOMER CITY-WAYNE 345 KV LINE
ALLEGHENY HYDRO 125KV LINE
ALLEGHENY HYDRO 125 KV LINES
HOMER CITY-WAYNE 345 KV LINES
ST. RT 210
CULTIVATED FIELD
TREES
TRAIL
TOWER
TOWERS
WALL
WALLS
SILO
CONC.
PROPERTY LINE
CULV
POND W EL 987.8
POND W EL 984.9
N 495000
N 494000
N 493000
N 492000
N 491000
N 490000
E 1525000
E 1526000
E 1527000
E 1528000
E 1529000
E 1530000
E 1531000
LEGEND
PROPERTY LINES
1250 ELEVATION AS OF 4/27/15
1250 ELEVATION AS OF 4/5/16
MP-16 MONITORING WELLS
SW OR SP SURFACE MONITORING LOCATIONS
LIMIT OF 2015 ACTIVE AREA
LIMIT OF INACTIVE AREA
LIMIT OF ASH DISPOSAL
FUTURE LIMIT OF ASH DISPOSAL
LIMIT OF COMPLETED AREA
MAP REFFERENCE: TOPOGRAPHIC CONTOURS OUTSIDE THE ACTIVE DISPOSAL AREA ARE BASED ON FIELD AND AERIAL SURVEYS AS OF MAY 2008 PROVIDED TO GAI BY RELIANT ENERGY ON 2/9/2009.
COMMONWEALTH OF PENNSYLVANIA REGISTERED PROFESSIONAL ENGINEER Kent C. Cockley PE-053618E
GenOn
"AutoCAD" Supported Drawing
PERMIT # 300837
Operations Technical Support
Engineering Approvals
Civil TWH 6/13/02
MDG 4/10/02
Station: KEYSTONE
Unit(s): UNIT #1 & #2
Discipline: CIVIL
Title: ASH DISPOSAL SITE
ANNUAL LANDFILL REPORT
EAST & WEST VALLEY TOPOGRAPHIC PLAN
TASK D-5973
1"=200'
D-744-3089
14
9 5/20/11 EJM WDR REV PER 2010 SURVEY DATED 4/28/11
8 5/10/10 EJM WDR REV PER 2009 SURVEY DATED 4/27/10
7 4/1/09 EJM WDR REV PER 2008 SURVEY DATED 4/16/09
6 5/20/08 EJM WDR REV PER 2007 SURVEY DATED 5/1/08
14 6/27/16 EJM KCC REV PER 2015 SURVEY DATED 4/5/16
13 6/19/15 JCN WDR REV PER 2014 SURVEY DATED 4/27/15
12 5/14/14 EJM KCC REV PER 2013 SURVEY DATED 04/01/14
11 5/08/13 EJM WDR REV PER 2012 SURVEY DATED 4/23/13
10 4/30/12 EJM WDR REV PER 2011 SURVEY DATED 4/20/2012
GAI CONSULTANTS INC.
Z:\ENERGY\2012\C120375.04 - NRG-2015 OPER & MAPPING\CAD\PRODUCTION DRAWINGS\D-744-3089.DWG

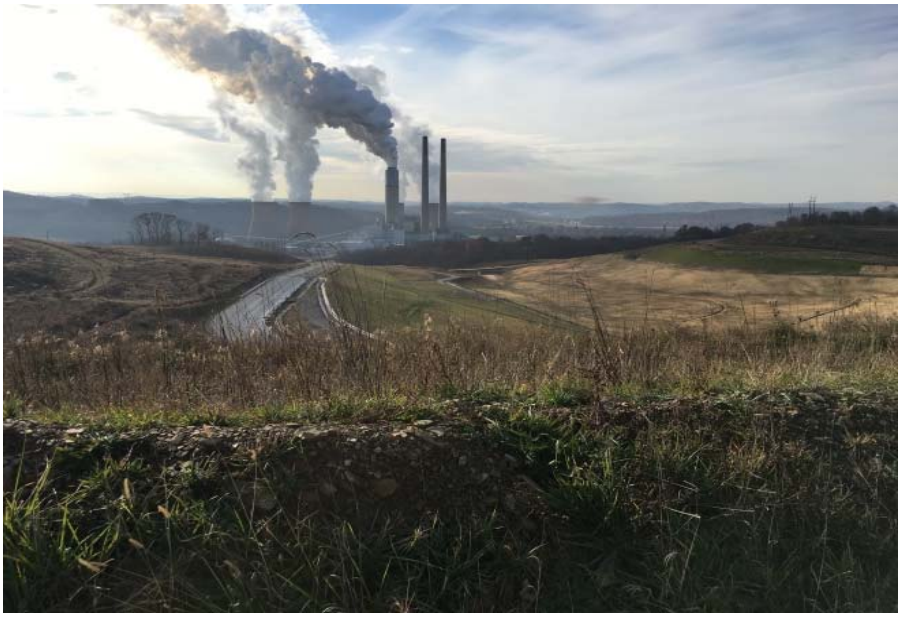
Attachment 2

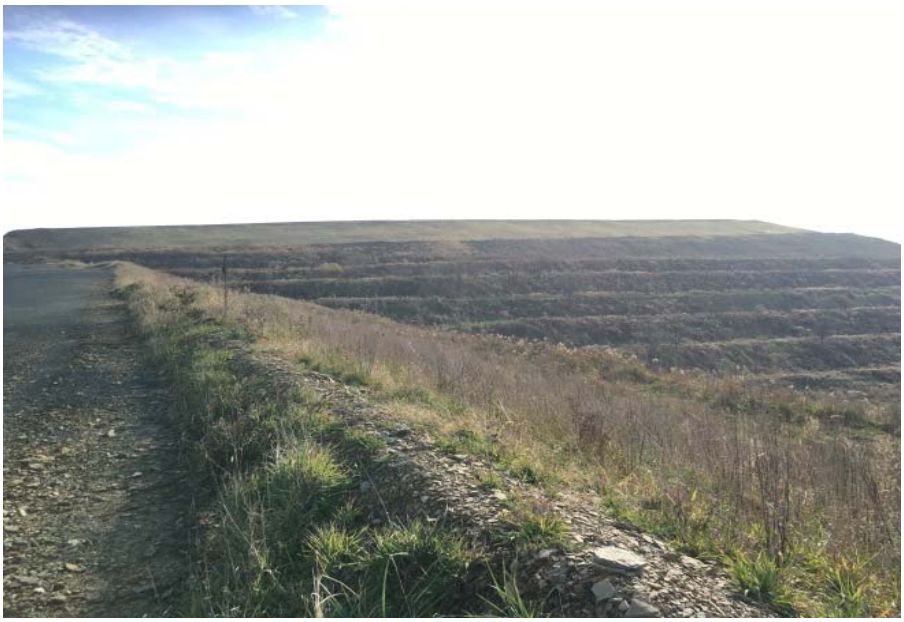
Photo Log

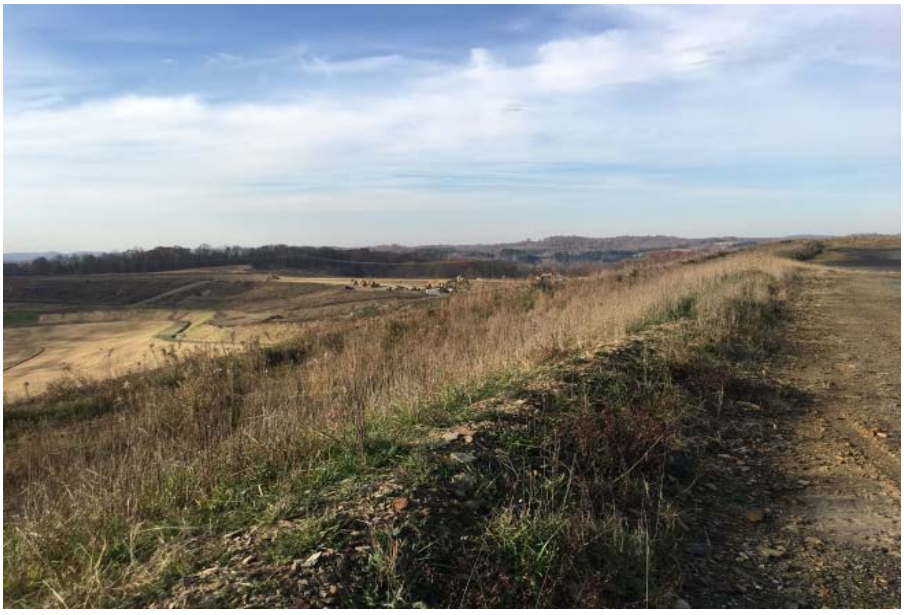
Photograph No. 1 **Date:** November 15, 2016 **Direction:** South	
Description: Southern end of installed final cover in the East Valley disposal area. No evidence of erosion or sloughing.	

Photograph No. 2 **Date:** November 15, 2016 **Direction:** Southwest	
Description: Continuing view of installed final cover in the East Valley disposal area. No evidence of erosion or sloughing.	

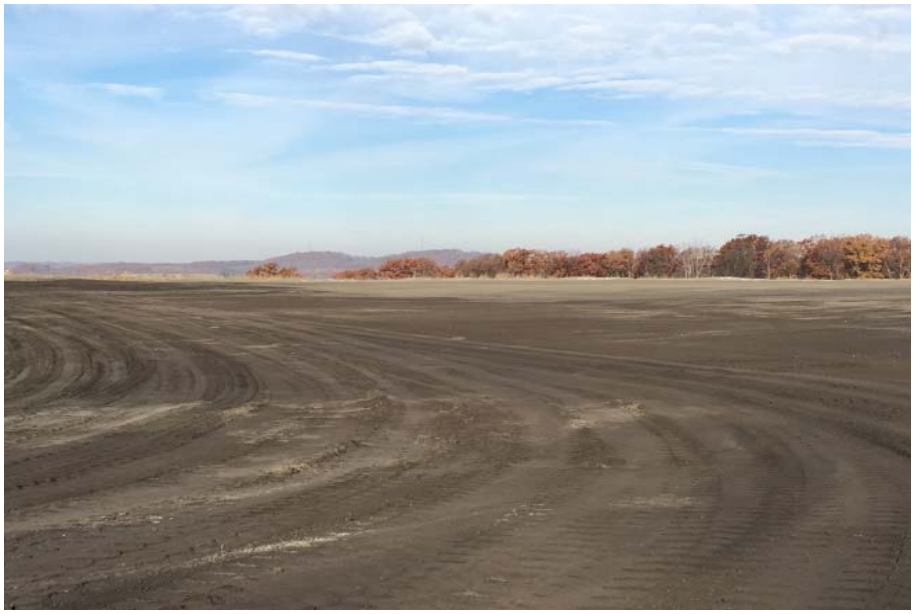
Photograph No. 3 **Date:** November 15, 2016 **Direction:** West	
Description: Continuing view of installed final cover in the East Valley disposal area (West Valley disposal area in the background). No evidence of erosion or sloughing.	

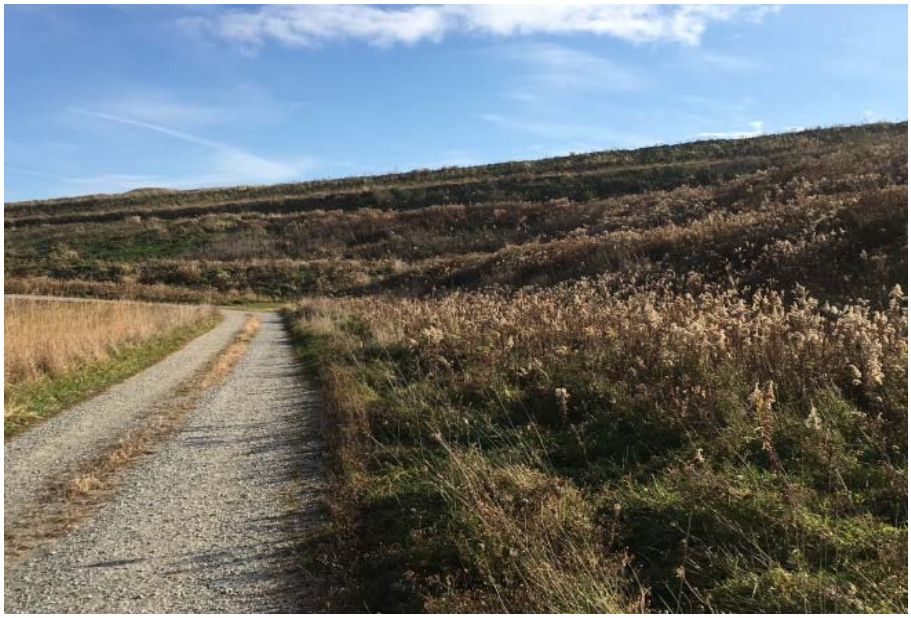
Photograph No. 4 **Date:** November 15, 2016 **Direction:** South	
Description: Overview of ongoing Stage IV expansion at West Valley.	

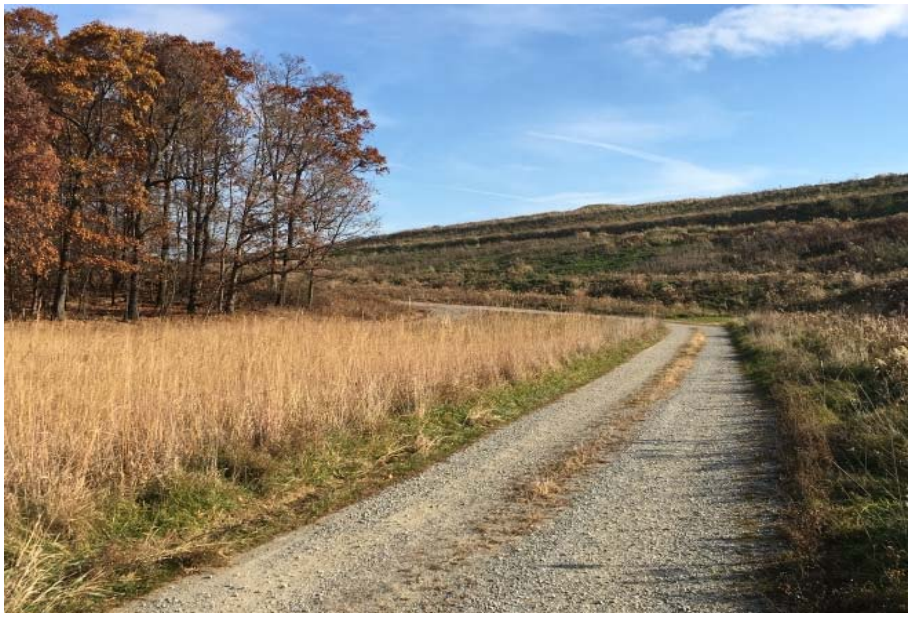
Photograph No. 5 **Date:** November 15, 2016 **Direction:** East	
Description: Closed side slopes and terrace benches of the East Valley disposal area. Vegetation is well established. No evidence of erosion or sloughing.	

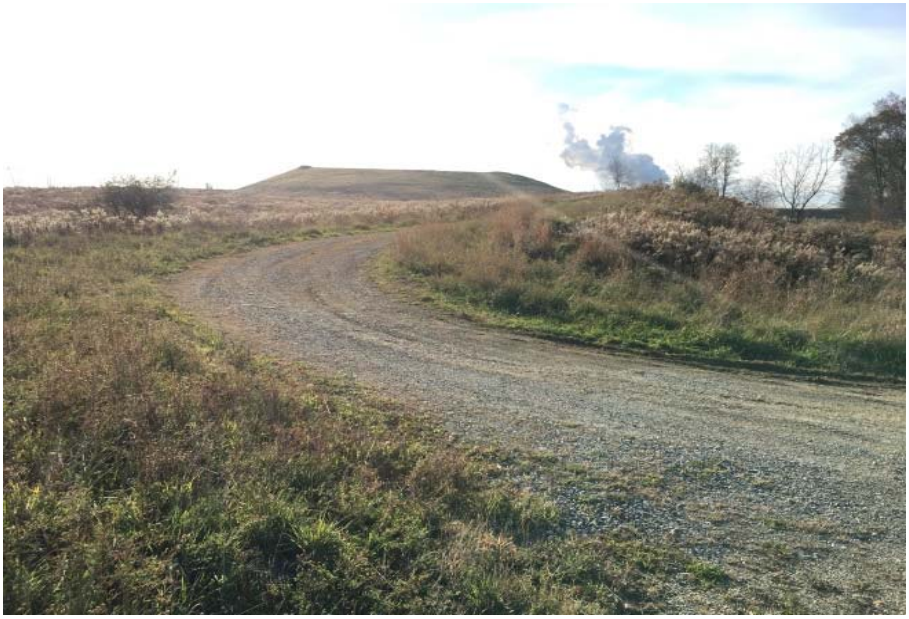
Photograph No. 6 **Date:** November 15, 2016 **Direction:** West	
Description: Active filling operations in West Valley disposal area and landfill side slopes. No evidence of erosion or sloughing.	

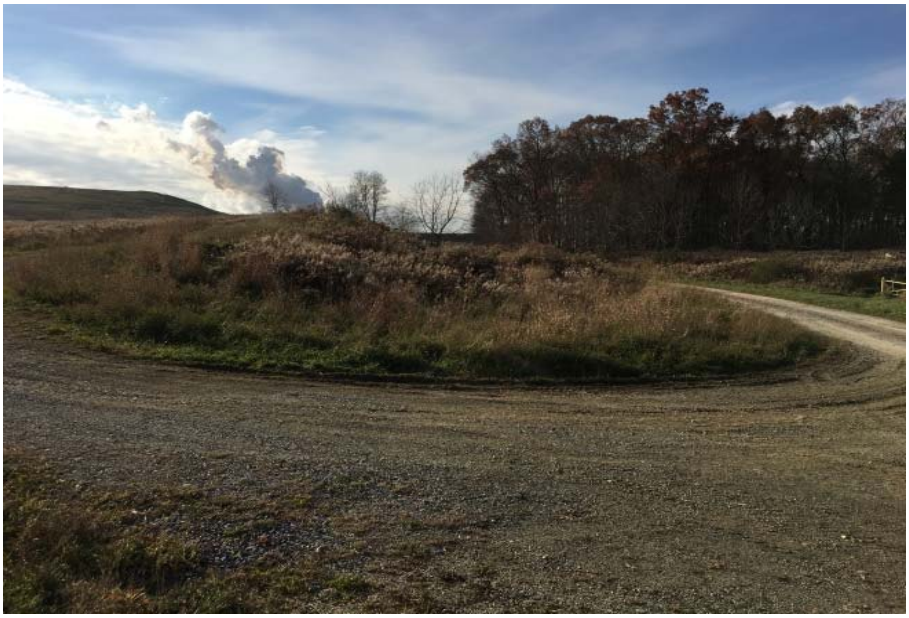
Photograph No. 7 **Date:** November 15, 2016 **Direction:** South	
Description: Panoramic view between East Valley and West Valley disposal areas (generating station in background).	

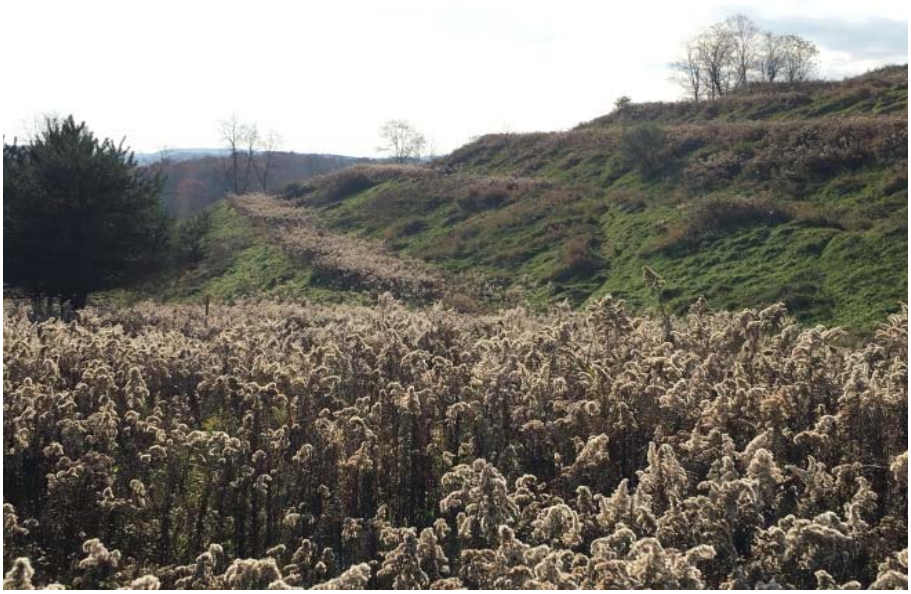
Photograph No. 8 **Date:** November 15, 2016 **Direction:** Northwest	
Description: Active filling in West Valley disposal area. Area is flat and well compacted. No evidence of erosion or airborne dust.	

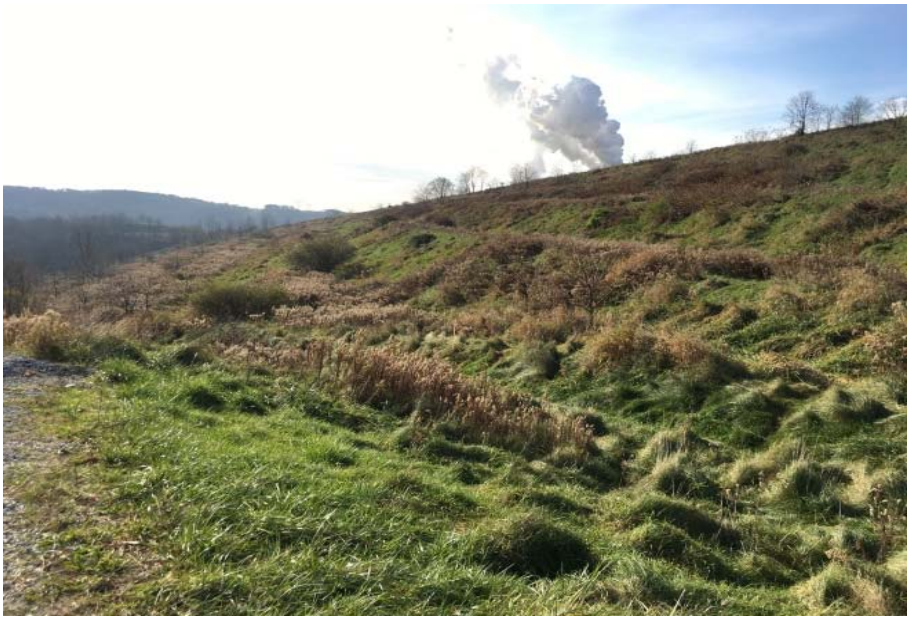
Photograph No. 9 **Date:** November 15, 2016 **Direction:** East-Northeast	
Description: Closed side slopes and terrace benches of the West Valley disposal area. Vegetation is well established. No evidence of erosion or sloughing.	

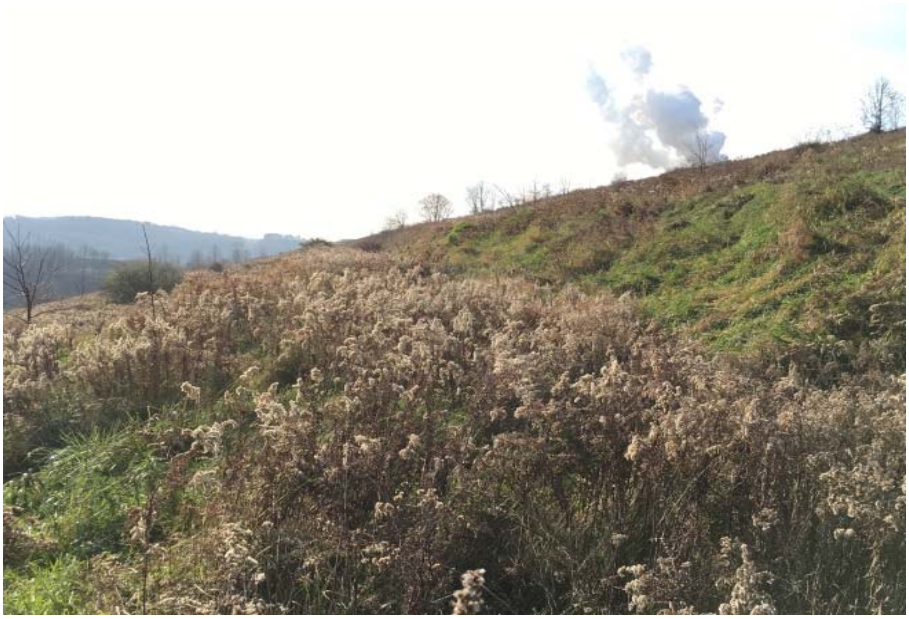
Photograph No. 10 **Date:** November 15, 2016 **Direction:** Northeast	
Description: Closed side slopes and terrace benches of the West Valley disposal area. Vegetation is well established. No evidence of erosion or sloughing.	

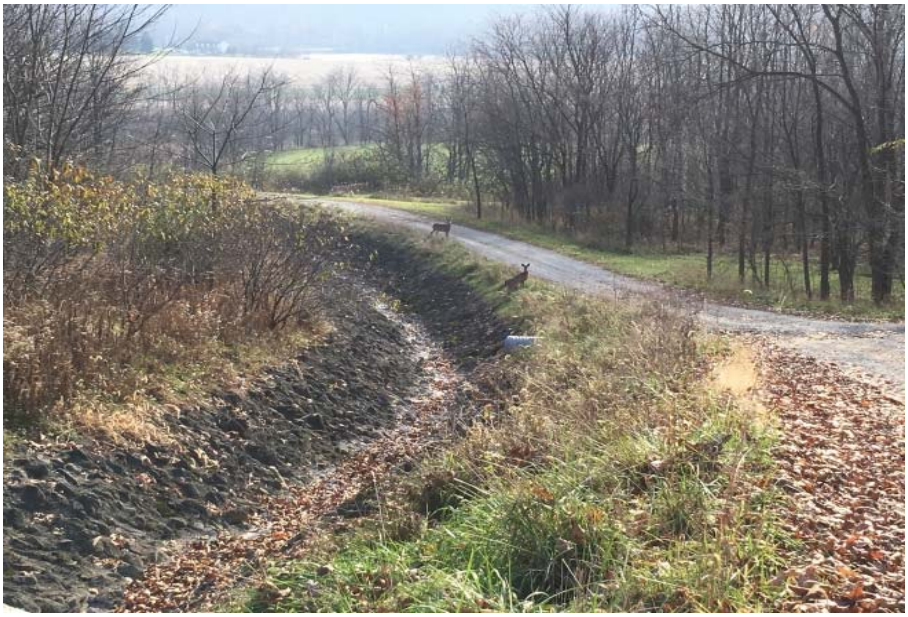
Photograph No. 11 **Date:** November 15, 2016 **Direction:** South	
Description: Closed portion of the East Valley disposal area with active filling operations in background.	

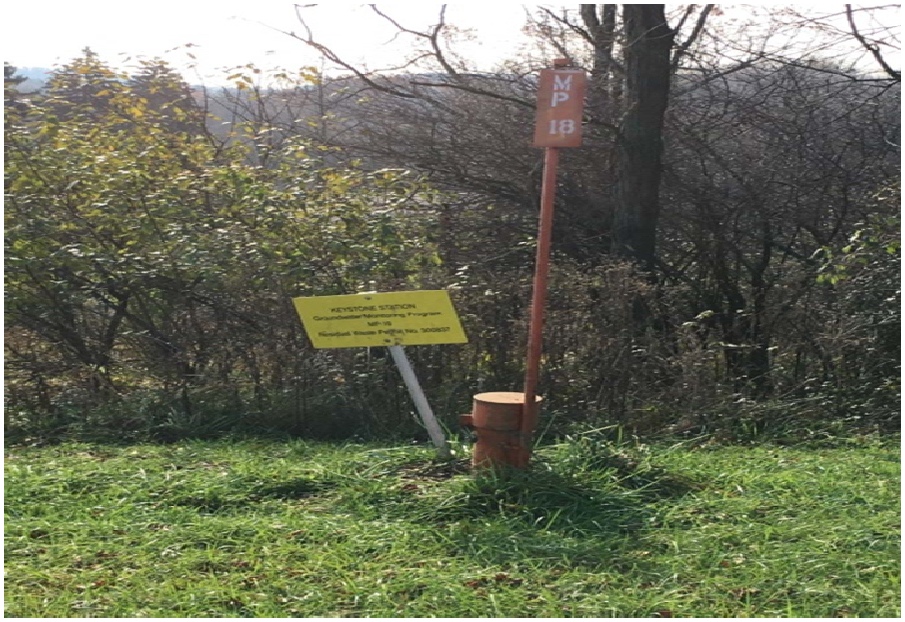
Photograph No. 12 **Date:** November 15, 2016 **Direction:** South	
Description: Closed portion of the East Valley disposal area with active filling operations in background.	

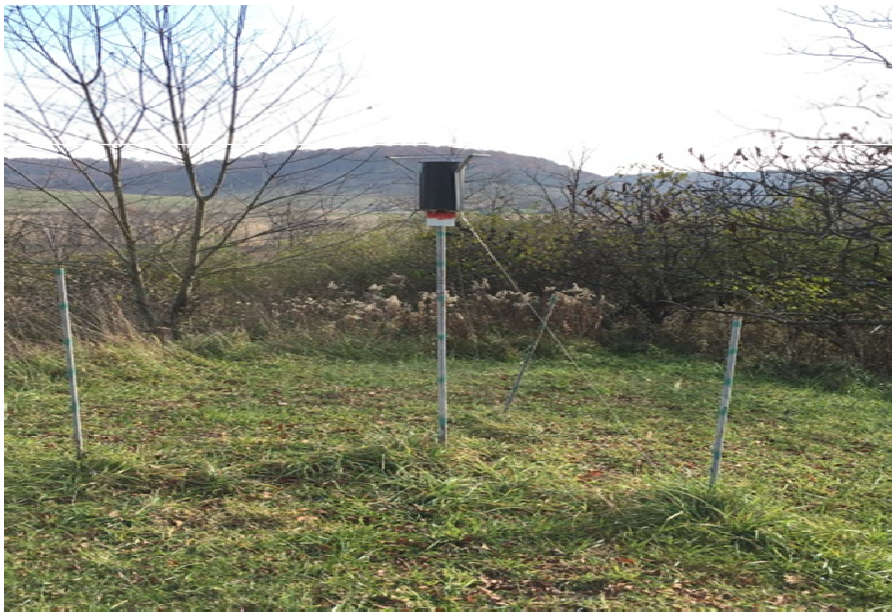
Photograph No. 13 **Date:** November 15, 2016 **Direction:** South	
Description: Terrace benching along closed portion of the East Valley disposal area. No evidence of erosion or sloughing.	

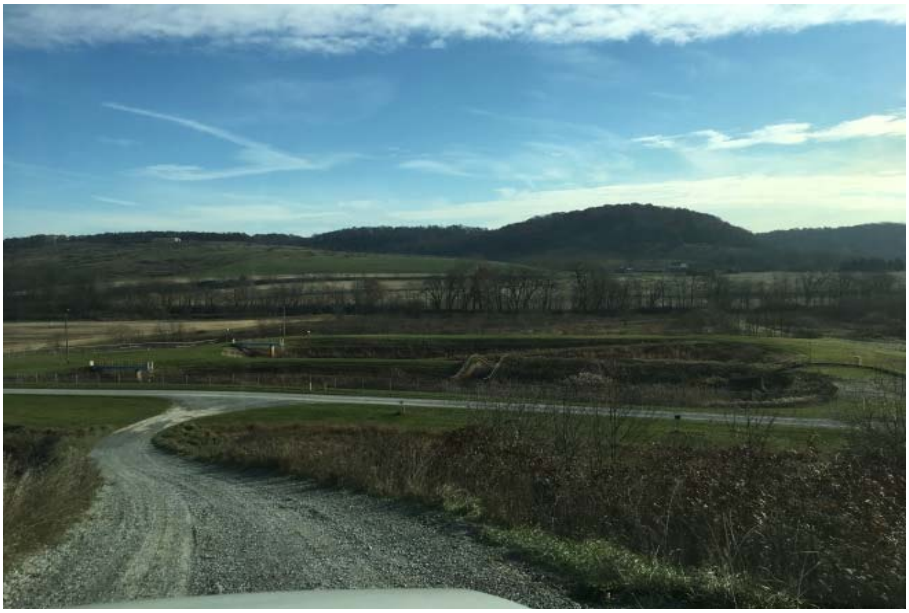
Photograph No. 14 **Date:** November 15, 2016 **Direction:** South	
Description: Continued view of terrace benching along closed portion of the East Valley disposal area. No evidence of erosion or sloughing.	

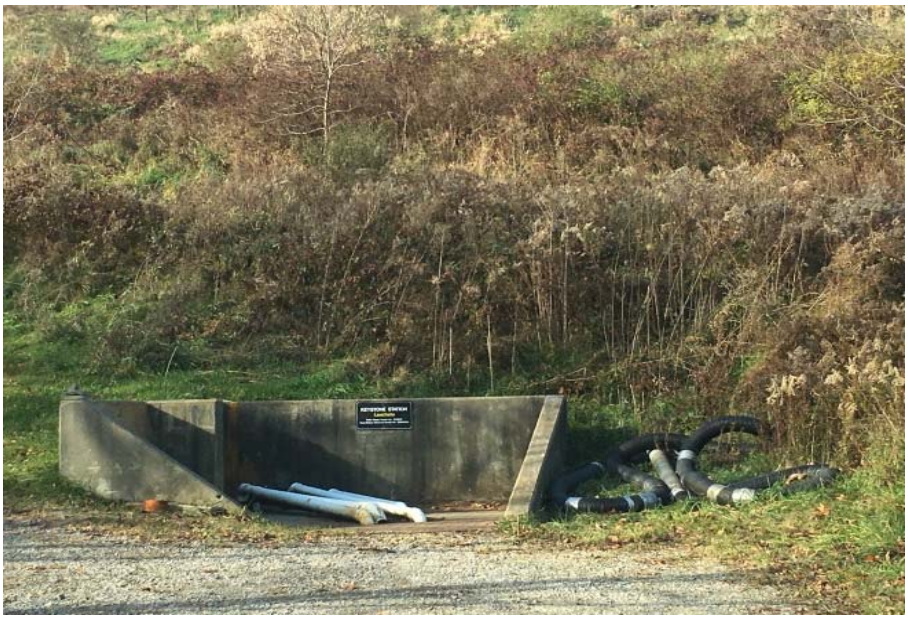
Photograph No. 15 **Date:** November 15, 2016 **Direction:** South	
Description: Continued view of terrace benching along closed portion of the East Valley disposal area. No evidence of erosion or sloughing.	

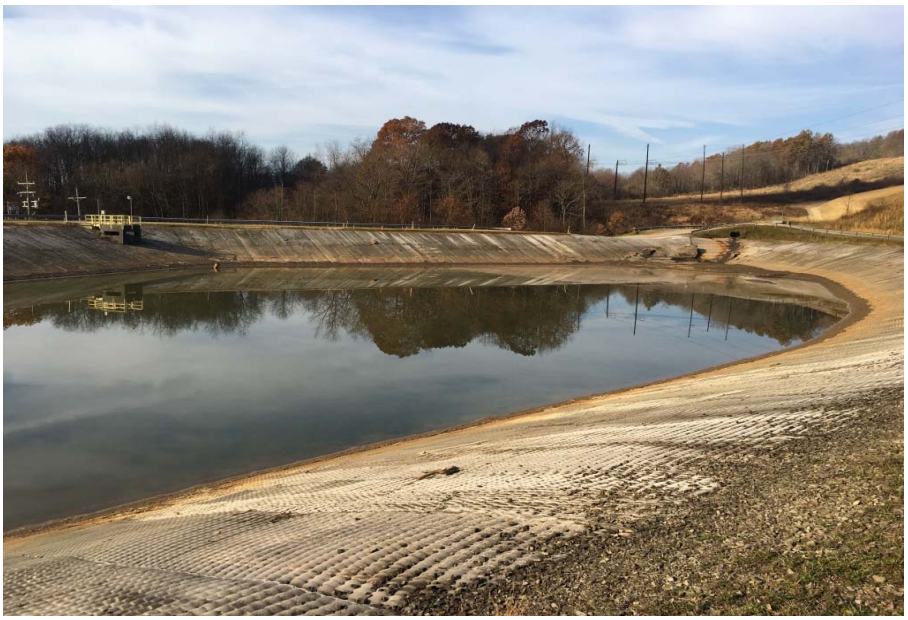
Photograph No. 16 **Date:** November 15, 2016 **Direction:** Southeast	
Description: "Non-contact" stormwater drainage channel along eastern perimeter of East Valley disposal area. No evidence of erosion or obstruction.	

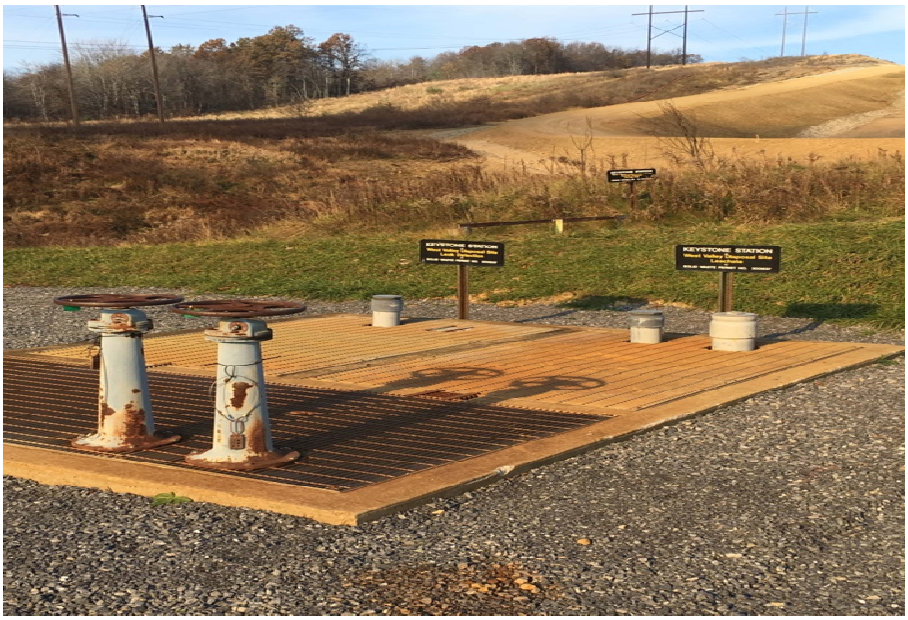
Photograph No. 17 **Date:** November 15, 2016 **Direction:** South	
Description: Monitoring Well MP-18 along eastern perimeter of East Valley disposal area. Clear designation and signage.	

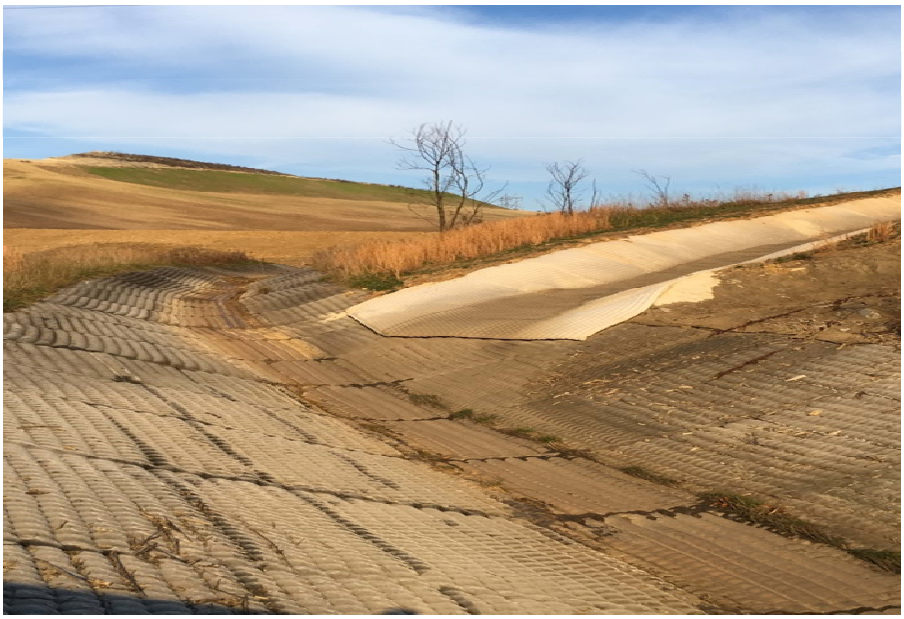
Photograph No. 18 **Date:** November 15, 2016 **Direction:** South	
Description: Dust-fall monitor utilized to assess potential fugitive emissions.	

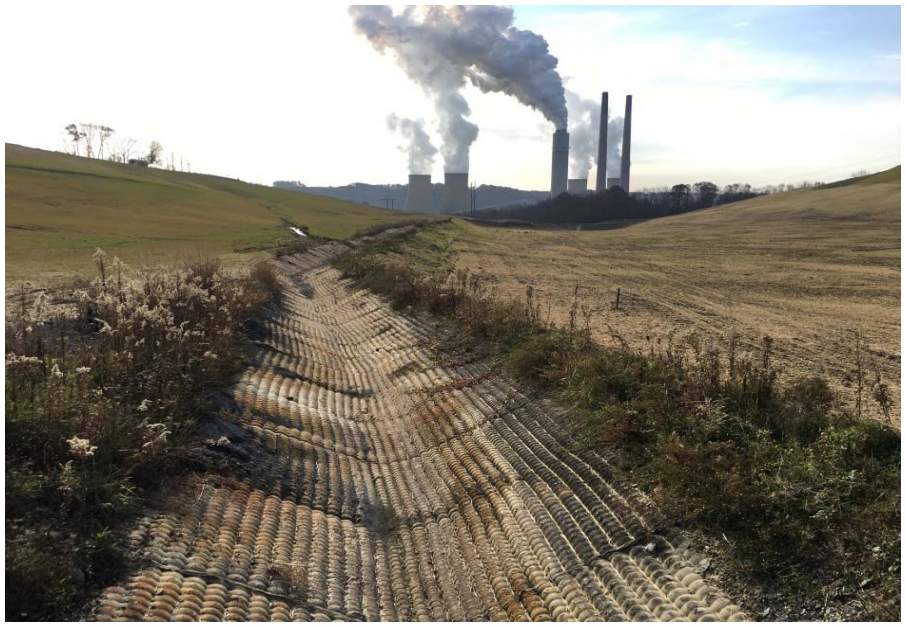
Photograph No. 19 **Date:** November 15, 2016 **Direction:** East	
Description: Leachate ponds formerly associated with East Valley operations.	

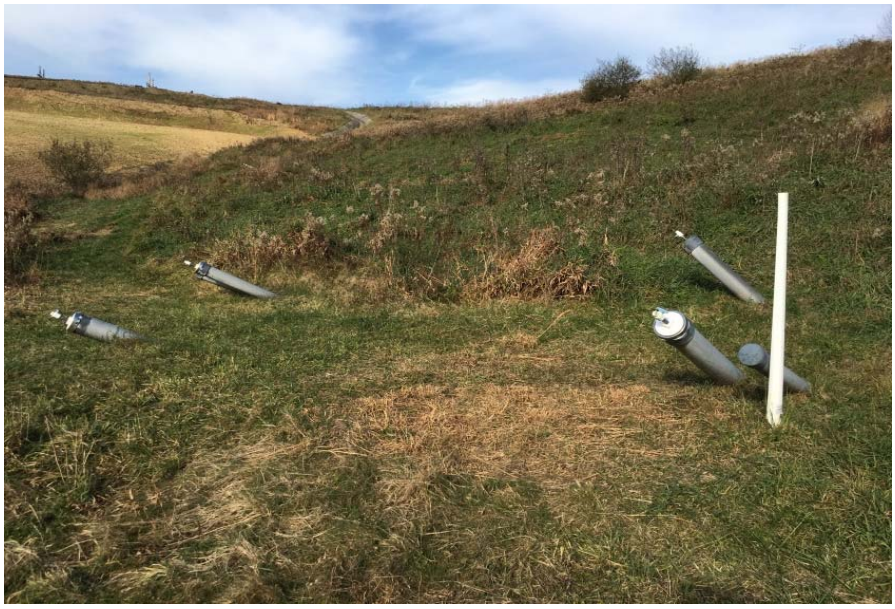
Photograph No. 20 **Date:** November 15, 2016 **Direction:** East	
Description: East Valley leachate collection structure (routes to Pump Station and then to IWT facility).	

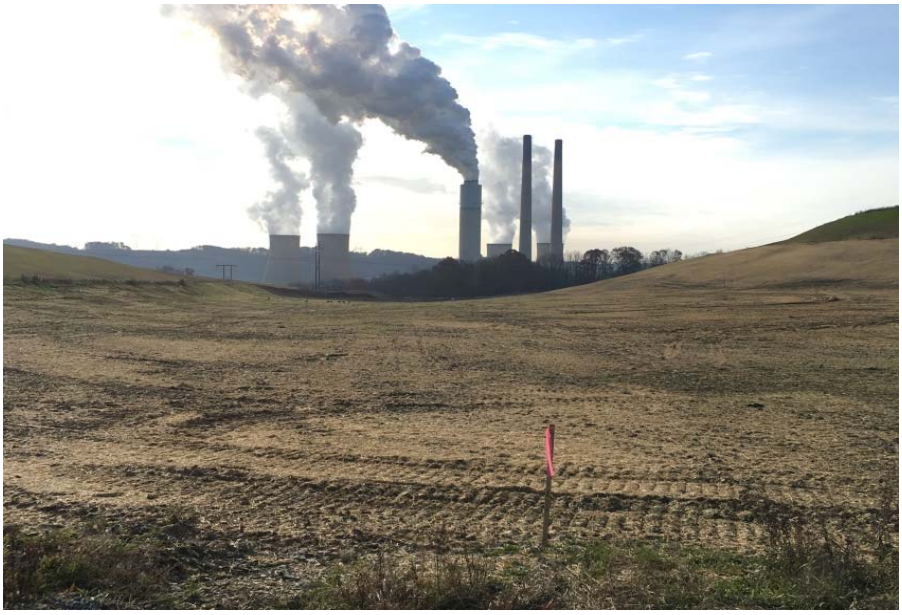
Photograph No. 21 **Date:** November 15, 2016 **Direction:** West-Southwest	
Description: West Valley equalization pond. No evidence of erosion or malfunction.	

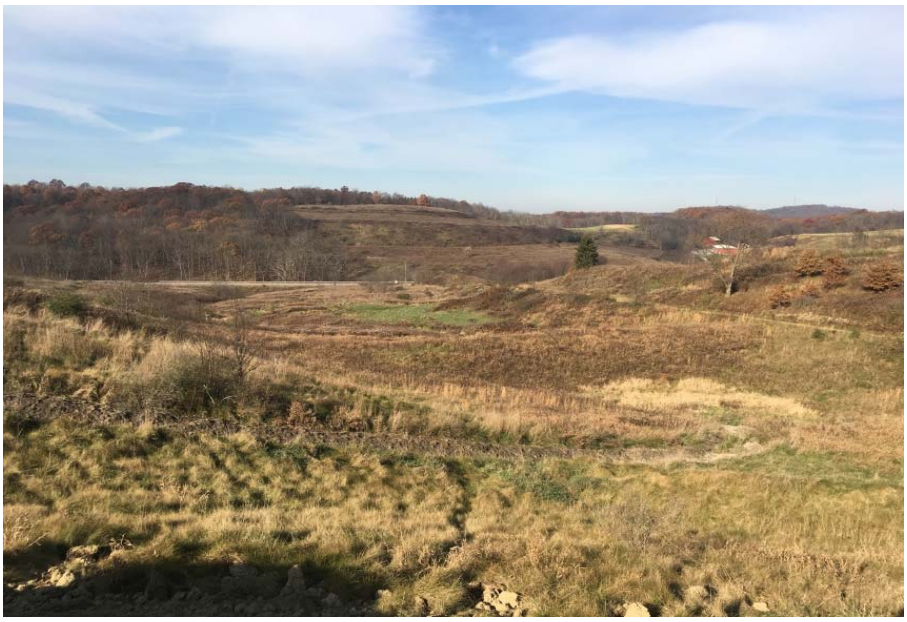
Photograph No. 22 **Date:** November 15, 2016 **Direction:** North	
Description: Leachate collection box and valve station for the West Valley equalization pond. No evidence of malfunction.	

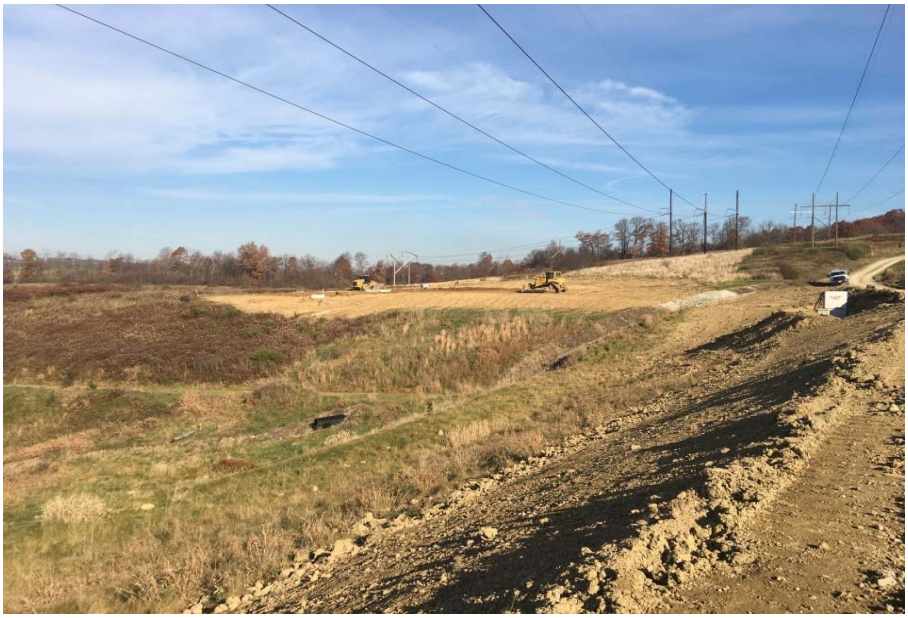
Photograph No. 23 **Date:** November 15, 2016 **Direction:** North	
Description: "Contact" stormwater drainage channel. No evidence of erosion or obstruction.	

Photograph No. 24 **Date:** November 15, 2016 **Direction:** South	
Description: "Non-contact" stormwater drainage channel between valley areas. No evidence of erosion or obstruction.	

Photograph No. 25 **Date:** November 15, 2016 **Direction:** Northwest	
Description: Leachate collection system cleanouts along interim toe of West Valley disposal area southern slope.	

Photograph No. 26 **Date:** November 15, 2016 **Direction:** Southwest	
Description: Regraded and seeded area of the West Valley Stage IV expansion. No evidence of erosion.	

Photograph No. 27 **Date:** November 15, 2016 **Direction:** West	
Description: Closed portion along the northwest perimeter of the West Valley disposal area. Vegetation is well established. No evidence of erosion or sloughing.	

Photograph No. 28 **Date:** November 15, 2016 **Direction:** North	
Description: Continued view of closed portion along the northwest perimeter of the West Valley disposal area. Vegetation is well established. No evidence of erosion or sloughing.	