Department of Energy

Portsmouth/Paducah Project Office
1017 Majestic Drive, Suite 200
Lexington, Kentucky 40513
(859) 219-4000

JUN 2 8 2018

PPPO-02-4907680-18

Mr. Brian Begley
Federal Facility Agreement Manager
Division of Waste Management
Kentucky Department for Environmental Protection
300 Sower Boulevard, 2nd Floor
Frankfort, Kentucky 40601

Ms. Julie Corkran
Federal Facility Agreement Manager
U.S. Environmental Protection Agency, Region 4
61 Forsyth Street
Atlanta, Georgia 30303

Dear Mr. Begley and Ms. Corkran:

TRANSMITTAL OF THE POSTCONSTRUCTION REPORT FOR THE NORTHEAST PLUME OPTIMIZATION AT THE PADUCAH GASEOUS DIFFUSION PLANT, PADUCAH, KENTUCKY (DOE/LX/07-2419&D2/R1)

References:

1. Letter from J. Corkran to T. Duncan, "EPA Acknowledgement and Comments: Postconstruction Report for the Northeast Plume Optimization at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, (DOE/LX/07-2419&D2), Secondary Document, transmittal dated May 15, 2018 (PPPO-02-4762649-18B)," dated June 1, 2018
2. Letter from A. Webb to T. Duncan, "Approval of the Postconstruction Report for the Northeast Plume Optimization at the Paducah Gaseous Diffusion Plant (DOE/LX/07-2419&D2), Paducah Site, Paducah, McCracken County, Kentucky, #KY8-890-008-982," dated May 22, 2018
3. Letter from T. Duncan to B. Begley and J. Corkran, "Transmittal of the Postconstruction Report for the Northeast Plume Optimization at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky, DOE/LX/07-2419&D2," (PPPO-02-4762649-18B), dated May 15, 2018

Please find enclosed the revised *Postconstruction Report for the Northeast Plume Optimization at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-2419&D2/R1 (PCR) for approval. This version of the PCR has been revised to address comments received from the U.S. Environmental Protection Agency on June 1, 2018. The Kentucky Department for Environmental Protection approved the PCR on May 22, 2018. The results from the hydraulic assessment activities will support changes to be made in extraction rates that will optimize remediation and containment. The status of the shutdown/restart hydraulic monitoring and

quarterly/semiannual chemical monitoring results for the first six months of operation will be presented in the Federal Facility Agreement Semiannual Progress Report, in accordance with the *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (DOE/OR/07-1535&D3/R6) and the *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R3.

A redlined version of the document and comment response summary are enclosed to assist with the review.

If you have any questions or require additional information, please contact David Dollins at (270) 441-6819.

Sincerely,

Tracey Duncan
Federal Facility Agreement Manager
Portsmouth/Paducah Project Office

Enclosures:
1. Postconstruction Report for NE Plume Optimization, DOE/LX/07-2419&D2/R1—Clean
2. Postconstruction Report for NE Plume Optimization, DOE/LX/07-2419&D2/R1—Redline
3. Comment Response Summary—EPA

e-copy w/enclosures:
april.webb@ky.gov, KDEP
brian.begley@ky.gov, KDEP
bwhatton@tva.gov, TVA
christopher.jung@ky.gov, KDEP
corkran.julie@epa.gov, EPA
dave.dollins@lex.doe.gov, PPPO
edward.winner@ky.gov, KDEP
frnpcorrespondence@pad.pppo.gov, FRNP
gaye.brewer@ky.gov, KDEP
hjlawrence@tva.gov, TVA
james.miller@pad.pppo.gov, FRNP
jana.white@pad.pppo.gov, FRNP
jennifer.woodard@lex.doe.gov, PPPO
joel.bradburne@lex.doe.gov, PPPO
karen.walker@pad.pppo.gov, FRNP
kelly.layne@pad.pppo.gov, FRNP
kim.knerr@lex.doe.gov, PPPO
leo.williamson@ky.gov, KDEP
mike.guffey@ky.gov, KDEP
mmcrae@TechLawInc.com, EPA
myrna.redfield@pad.pppo.gov, FRNP
nathan.garner@ky.gov, KYRHB
pad.rmc@swiftstaley.com, SSI
richards.jon@epamail.epa.gov, EPA
rkdehart@tva.gov, TVA
robert.edwards@lex.doe.gov, PPPO
stephaniec.brock@ky.gov, KYRHB
tracey.duncan@lex.doe.gov, PPPO
todd.powers@pad.pppo.gov, FRNP

DOE/LX/07-2419&D2/R1
Secondary Document

Postconstruction Report for the Northeast Plume Optimization at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

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DOE/LX/07-2419&D2/R1
Secondary Document

Postconstruction Report for the Northeast Plume Optimization at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky

Date Issued—June 2018

U.S. DEPARTMENT OF ENERGY
Office of Environmental Management

Prepared by
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC,
managing the
Deactivation and Remediation Project at the
Paducah Gaseous Diffusion Plant
under Contract DE-EM0004895

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CONTENTS

ACRONYMS v

1. GENERAL INTRODUCTION 1

2. BRIEF DESCRIPTION OF HOW OUTSTANDING ITEMS NOTED IN THE PREFINAL INSPECTION WERE RESOLVED 1

3. EXPLANATIONS OF MODIFICATIONS TO THE ORIGINAL REMEDIATION DESIGN AND REMEDIAL ACTION WORK PLANS 2

4. AS-BUILT DRAWINGS 3

5. SYNOPSIS OF THE CONSTRUCTION WORK AND CERTIFICATION THAT THE CONSTRUCTION WORK HAS BEEN COMPLETED 3

APPENDIX A: ASSESSMENT CHECKLIST, ASSESSMENT PLAN, AND ASSESSMENT REPORT A-1

APPENDIX B: HYDROSTATIC TEST B-1

APPENDIX C: WELL RELOCATION APPROVAL E-MAILS C-1

APPENDIX D: AS-BUILT DRAWINGS (ON CD) D-1

APPENDIX E: STEP TEST SUMMARY E-1

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ACRONYMS

amsl	above mean sea level
DOE	U.S. Department of Energy
EW	extraction well
FFA	Federal Facility Agreement
gpm	gallons per minute
HDPE	high-density polyethylene
IRA	interim remedial action
MW	monitoring well
NEP	Northeast Plume
PGDP	Paducah Gaseous Diffusion Plant
PZ	piezometer
RAWP	remedial action work plan

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1. GENERAL INTRODUCTION

The Northeast Plume (NEP) Interim Remedial Action (IRA) Optimization Project was implemented to increase trichloroethene (TCE) mass removal, to enhance control of the Northeast Plume migration at the eastern edge of the U.S. Department of Energy-owned Paducah Gaseous Diffusion Plant (PGDP) industrial facility, and to reduce further migration off-site. The project included installation of two new extraction wells (EWs) (EW234 and EW235). The wells were installed in optimized locations within and adjacent to the PGDP industrial facility. Based on EW step tests, EW234 is anticipated to operate between 100 and 200 gpm, and EW235 is anticipated to operate between 75 and 150 gpm, with a total system flow rate of no more than 300 gpm for the optimized NEP Containment System as discussed in Section 2.2.1 of the *Operation and Maintenance Plan for the Northeast Plume Containment System Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/OR/07-1535&D3/R6 (O&M Plan). High density polyethylene (HDPE) piping transfers extracted groundwater to the C-765/C-765-A Treatment Facilities for treatment. The original EWs (EW331 and EW332) were taken off-line on September 2, 2017, but remain in stand-by mode, pursuant to Section 1.2 of the approved *Remedial Action Work Plan for Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, DOE/LX/07-1280&D2/R3 (RAWP). Project mobilization to install monitoring wells (MWs), including a transect of seven MWs to the east of C-400 (MW524 through MW530), began on July 12, 2016. Construction of the MW transect began on July 19, 2016, and was completed on September 21, 2016.[1] Sample results from the MW transect confirmed anticipated conditions,[2] leading to a second phase of the project drilling and construction. Mobilization for installation of the remaining MWs and PZs and the EWs began on March 7, 2017, and construction began on March 22, 2017. Demobilization was completed for the final drill crew on August 23, 2017, and for the construction crew on October 10, 2017. Construction of the Northeast Plume Containment System was complete on October 10, 2017. Subsequently, tests consistent with the RAWP to optimize TCE mass removal were initiated.

2. BRIEF DESCRIPTION OF HOW OUTSTANDING ITEMS NOTED IN THE PREFINAL INSPECTION WERE RESOLVED

A site walkdown was performed to identify a list of items that needed to be completed prior to project turnover to operational personnel. The items were documented and checked off as completed. The list is provided below. The project team also created an operational assessment checklist identifying major components to complete prior to turnover to operations. The checklist was signed off on by the Contractor Operations and Maintenance Manager; Project Manager; and Project, Operation, and Maintenance Manager attesting that the Northeast Plume Optimization extraction well system was ready for operation and maintenance by the Contractor Northeast Plume Operations personnel. Copies of the signed project Assessment Checklist, Assessment Plan, and Assessment Report are included in Appendix A.

[1] A piezometer (PZ) was installed adjacent to each of the two EW locations during this period.

[2] Refer to *Memorandum of Agreement for Resolution of Formal Dispute of the Explanation of Significant Differences to the Record of Decision for the Interim Remedial Action of the Northeast Plume at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky (DOE/LX/07-1291&D2), and Remedial Action Work Plan for the Optimization of the Northeast Plume Interim Remedial Action at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky* (*DOE/LX/07-1280&D2)* (DOE 2015).

Northeast Plume Optimization Project: List of Outstanding Construction Items

- None.

Northeast Plume Optimization Project: List of Add On Items

- Hydrostatic testing of the complete process line system, including the run from the equalization tank of the original EW field to the treatment units of the optimized EW system. All seven process line systems were pressure tested between June 22 and August 3, 2017. All seven process line segments passed testing criteria. Testing results are provided in Appendix B.

- Resizing of the well pump in EW235 based on step test results (refer to Step Test Data Package—Appendix E) to accommodate lower-than-design, specific capacity of the well. The EW235 submersible pump and motor were resized to an optimized pumping range of 75-150 gpm on July 5, 2017.

3. EXPLANATIONS OF MODIFICATIONS TO THE ORIGINAL REMEDIATION DESIGN AND REMEDIAL ACTION WORK PLANS

The RAWP, provides details for EW, MW, and PZ locations. Some of these locations were modified from the original design. The relocations were documented by the Federal Facility Agreement (FFA) parties through e-mail submittals and approvals (refer to Appendix C), and as-built drawings were revised to reflect the changes. The changes that resulted in a relocation of a well by 10 ft or more are described below.

The locations of EW234 and its adjacent PZ, PZ534, were switched to position the drill rig for EW234 (taller drill rig mast than the one used to drill PZ534) an adequate distance from overhead power lines. The relocation moved EW234 30 ft to the west, but still within the targeted high-concentration core of the NEP. EW235 was moved 10 ft north, upon approval of the FFA parties, to address a site security protocol, strictly prohibiting the staging of any equipment within 10 ft of the "Limited Area" perimeter fence. Relocations of 10 ft or more are identified in Table 1.

Table 1. Relocations from Proposed Monitoring Well and Piezometer Locations

Monitoring Well/ Piezometer ID	Displacement	Reason for Relocation
MW525	10.7 ft east	Access for sample crew
MW528	12.7 ft southwest	Location adjusted to allow placement of well pads and bollards to accommodate MW527
PZ534	30.0 ft east	Switched location with EW234
EW234	30.7 ft west	Switched location with PZ534 to avoid overhead power line concern
EW235	10.0 ft north	Original location sited too close to Limited Area security fence
PZ535	14.8 ft west	Too close to ditch

Table 1. Relocations from Proposed Monitoring Well and Piezometer Locations (Continued)

Monitoring Well/ Piezometer ID	Displacement	Reason for Relocation
MW536	10.0 ft east	Too close to ditch
MW537	20.3 ft east	Too close to ditch/offset from MW536
PZ555	29.6 ft northwest	Overhead power line concern

Other MWs and PZs were relocated minimal distances (less than 10 ft) to accommodate drill rig access requirements. Figure 1 shows the location of the new wells and PZs installed for the NEP IRA Optimization Project. Figure 2 presents the Northeast Plume extraction well field with 2016 TCE Plume Map. Table 2 provides final coordinates and screen intervals for the new wells and PZs.

4. AS-BUILT DRAWINGS

A set of redlined drawings was kept during the course of construction for the purpose of documenting changes in the field. This information is valuable for maintenance of the system and for locating underground utilities. As-built drawings were produced based upon the redlined drawings generated during construction. The as-built drawings are located in the Appendix D.

5. SYNOPSIS OF THE CONSTRUCTION WORK AND CERTIFICATION THAT THE CONSTRUCTION WORK HAS BEEN COMPLETED

The NEP IRA Optimization Project was implemented to increase TCE mass removal, to enhance control of the Northeast Plume migration at the eastern edge of the PGDP industrial facility, and to reduce further migration off-site. The project included a Phase I installation of a transect of MWs and two PZs followed by a Phase II installation of additional MWs, PZs, and two new EWs (EW234 and EW235). Except where otherwise noted in Section 3 of this report, construction was completed in accordance with the approved project Remedial Action Work Plan. Also included were installation of HDPE piping to the existing C-765 treatment unit and the newly installed C-765-A treatment unit; construction of overhead feeders to provide electrical power; construction of underground communication lines; and installation of instrumentation and control hardware. The wells were installed in optimized locations within and adjacent to the PGDP industrial facility. Based on EW step test results, EW234 is anticipated to operate between 100 to 200 gpm, and EW235 is anticipated to operate between 75 and 150 gpm, with a total system flow rate of no more than 300 gpm for the optimized NEP Containment System, which is consistent with Section 2.2.1 of the O&M Plan (Step Test Data Package is included in Appendix E).[3] HDPE piping transfers extracted groundwater to separate treatment units for each EW. The original EWs (EW331 and EW332) have been taken off-line, but remain in stand-by mode.

[3] The design rate of the NEP Optimization EWs was 150 gpm each (for a total withdrawal of 300 gpm); however, the sustainable well yield of EW235 is approximately 100 gpm. The EW235 well pump was resized to address this limitation. Refer to Sections 1.2 and 2.2.1 of the approved Operations and Maintenance Plan (DOE/OR/07-1535&D3/R6) for additional details regarding resizing of the well pump.

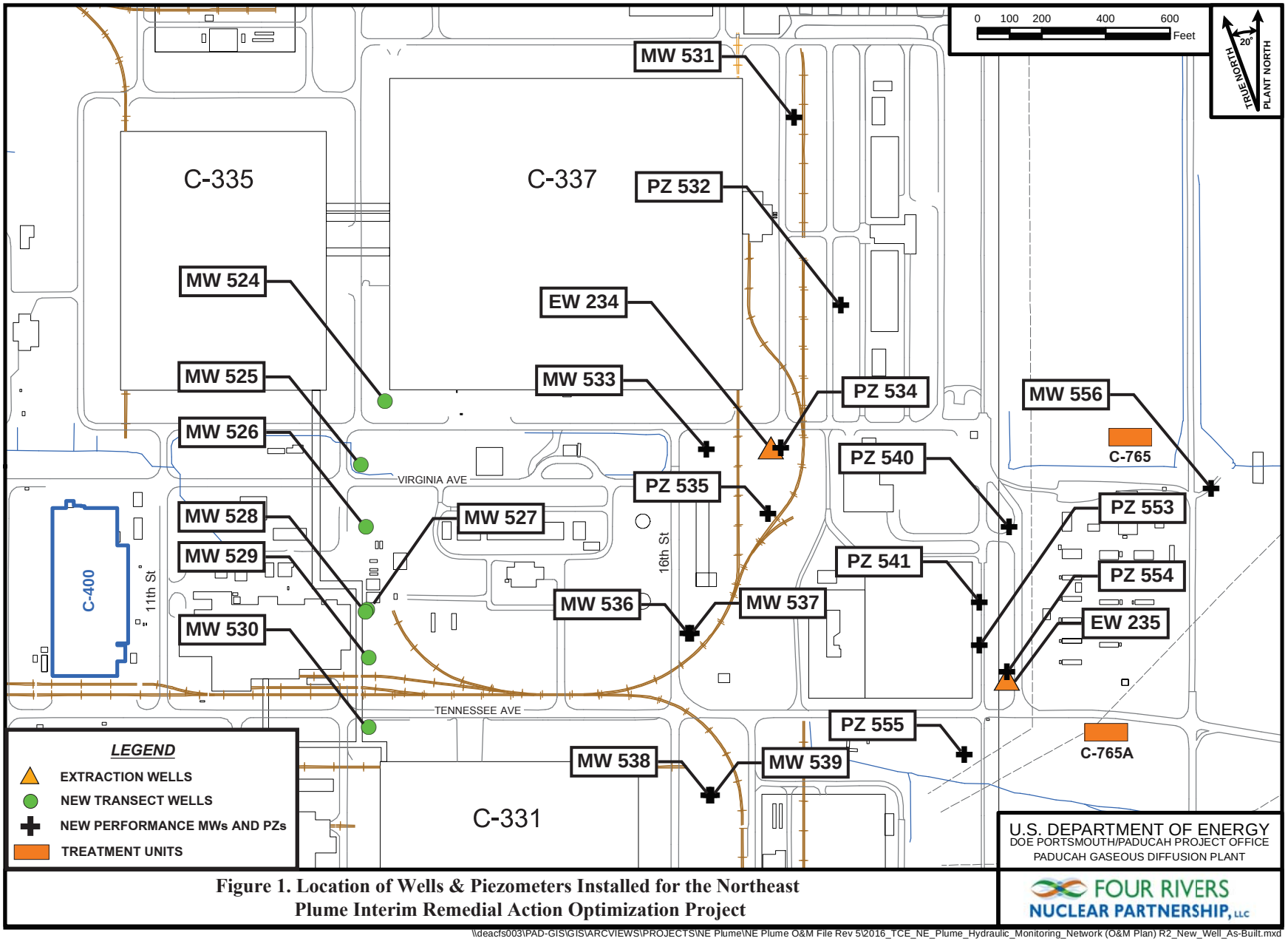

Figure 1. Location of Wells & Piezometers Installed for the Northeast Plume Interim Remedial Action Optimization Project

\\deacfs003\PAD-GIS\GIS\ARCVIEWS\PROJECTS\NE Plume\NE Plume O&M File Rev 5\2016_TCE_NE_Plume_Hydraulic_Monitoring_Network (O&M Plan) R2_New_Well_As-Built.mxd
9/14/2017

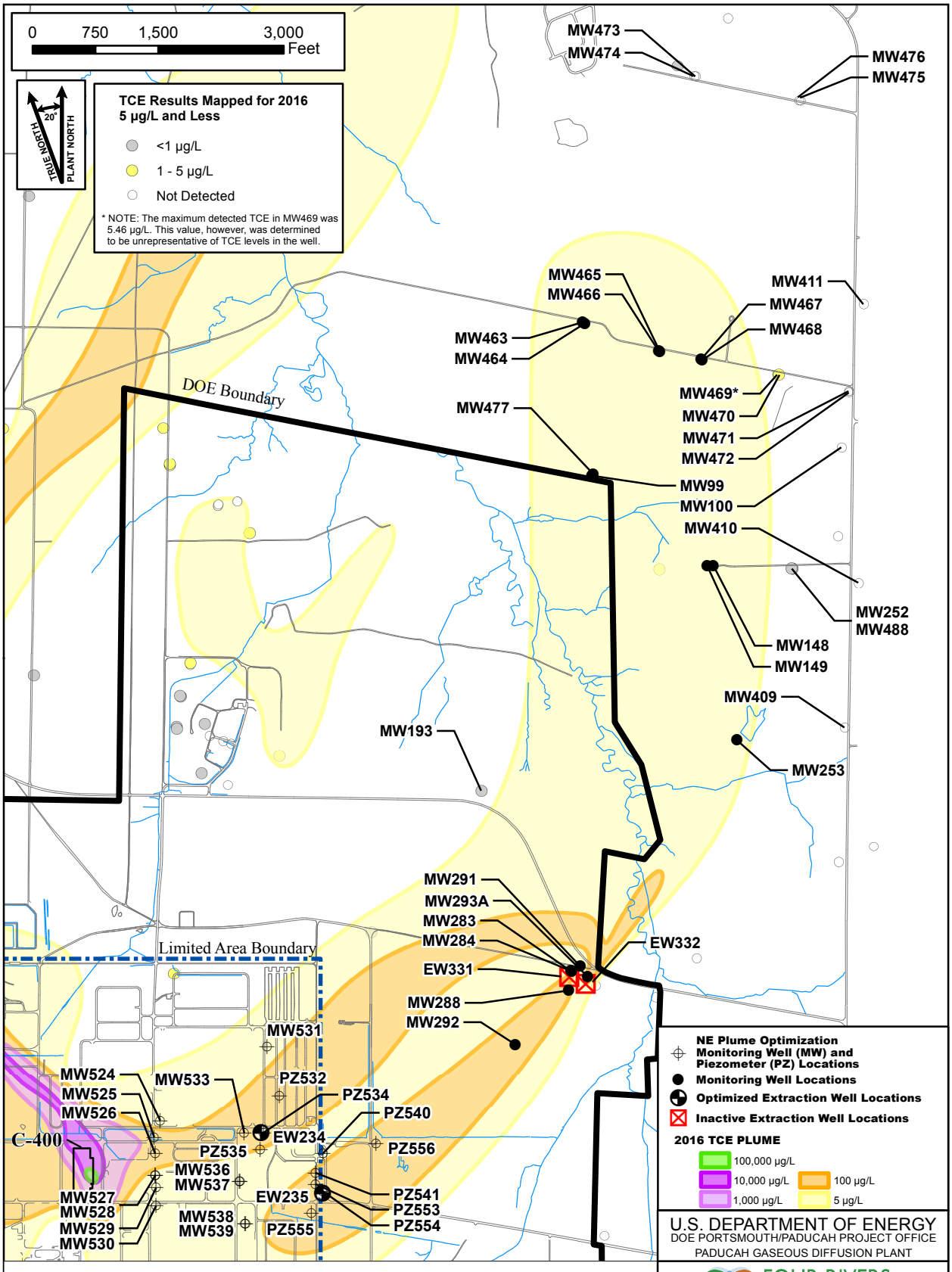

Figure 2. Northeast Plume Extraction Well Field with 2016 TCE Plume Map

Table 2. New Wells and Piezometers Installed for the Northeast Plume Interim Remedial Action Optimization Project

Well/ Piezometer	Plant Coordinates*		Screen Interval		Elevation Ground Grade	Top of Inside Casing	Total Depth of Boring
	Easting	Northing	Elevation (amsl)**	Regional Gravel Aquifer Interval***	Elevation (amsl)**	Elevation (amsl)**	Elevation (amsl)**
EW234	-2110.68	-1019.85	285.6-300.6	MRGA/LRGA	381.3	N/A****	278.3
EW235	-1375.35	-1740.89	282.8-297.8	MRGA/LRGA	382.8	N/A****	276.8
MW524	-3314.77	-874.95	298.7-308.7	MRGA	379.0	381.6	294.0
MW525	-3389.27	-1075.11	300.6-310.6	MRGA	380.9	383.5	297.9
MW526	-3373.91	-1266.96	301.8-311.8	MRGA	381.4	383.8	298.8
MW527	-3369.59	-1525.32	301.6-311.4	MRGA	381.7	384.0	298.7
MW528	-3375.71	-1531.84	291.4-301.4	LRGA	381.7	384.2	282.7
MW529	-3364.05	-1675.13	288.9-298.9	LRGA	380.9	383.3	282.9
MW530	-3364.71	-1893.38	285.1-295.1	LRGA	380.9	383.6	282.9
MW531	-2038.94	9.63	267.3-277.3	LRGA	380.6	383.6	262.6
PZ532	-1892.67	-576.08	285.7-295.7	LRGA	381.9	385.2	278.9
MW533	-2312.45	-1026.16	282.0-292.0	LRGA	381.1	384.2	275.1
PZ534	-2080.02	-1020.02	283.7-293.7	LRGA	381.1	383.9	284.3
PZ535	-2119.75	-1224.77	280.9-290.9	LRGA	382.2	385.3	274.2
MW536	-2370.02	-1598.95	287.7-297.7	LRGA	382.4	385.7	283.9
MW537	-2359.67	-1599.48	277.1-287.1	LRGA	383.0	386.0	274.5
MW538	-2304.68	-2102.73	294.4-304.4	MRGA	381.6	384.9	291.4
MW539	-2295.12	-2102.56	281.4-291.4	LRGA	381.6	384.7	273.6
PZ540	-1367.83	-1266.18	279.5-289.5	LRGA	384.1	387.5	275.1
PZ541	-1460.67	-1500.54	277.0-287.0	LRGA	381.1	384.1	272.1
PZ553	-1460.86	-1635.60	279.2-289.2	LRGA	381.4	384.6	273.4
PZ554	-1374.82	-1719.25	279.2-289.2	LRGA	383.1	386.1	273.6
PZ555	-1508.32	-1976.65	280.1-290.1	LRGA	382.7	385.7	273.7
MW556	-738.35	-1146.84	278.8-288.8	LRGA	379.2	382.5	270.7

*The coordinates for monitoring wells and piezometers are for the center outside casing.

**above mean sea level

*** MRGA = Middle Regional Gravel Aquifer; LRGA = Lower Regional Gravel Aquifer

****N/A = not applicable—Extraction wells had original casings cut off below grade and a pitless adaptor and 90° elbow were attached to extraction well casings and then connected to effluent piping to treatment system. The top of the 90° elbow is approximately 3 ft below ground grade elevation.

To ensure a seamless transition from project construction to continuous operation and verification that the construction work had been completed, a determination of readiness was established, and concurrence was obtained from the Contractor Project and Operations organizations. The following summarizes the postconstruction assessment checklist that serves as documentation that construction was complete, readiness was achieved, and operations could commence. The original signed document is maintained in the project file located at the Paducah Site.

Northeast Plume Optimization Assessment Checklist

I. Plans and Procedures (current revision)

- *Health and Safety Plan for the Paducah Plumes Operations, Paducah, Kentucky*, CP2-ER-0067
- *Waste Management Plan for the Paducah Plume Operations at the Paducah Gaseous Diffusion Plant, Paducah Kentucky*, CP2-ER-0012
- *Paducah Plume Operations Maintenance, Sampling and Analysis, and Calibration and Testing Plan*, CP2-ER-0046
- *Quality Assurance Program Description for the Fluor Federal Services, Inc., Paducah Deactivation Project, Paducah, Kentucky*, CP2-QA-1000
- *Control and Use of Measuring Test Equipment for the Northwest and Northeast Plume Operations*, CP4-ER-0020
- *Environmental Monitoring Data Management Implementation Plan at the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*, CP2-ES-0063
- *Startup and Normal Operation of the Northeast Plume Containment System*, CP4-ER-0005
- *Northwest/Northeast Plume Daily Operational Data Collection and Maintenance*, CP4-ER-0017
- *Normal (Short-term) Shutdown for the Northeast Plume Containment System*, CP4-ER-0018
- *Northwest and Northeast Pump and Treat Systems Federal Facility Agreement Semi-Annual Report Calculations*, CP4-ER-0028

II. Configuration Control Documents

- As-built drawings (post-start action, see Appendix D)
- Equipment listing (names and identification numbers) for all pumps, valves, sample ports, flow meters, pressure gages, leak detection devices, etc.
- Copy of all manufacturer specification sheets for each major piece of equipment
- Copy of all installation and operating instructions for each major piece of equipment

- Copy of all manufacturers' recommended calibration and maintenance requirements for each major piece of equipment

- Postconstruction report (poststart action)

III. System Tags and Pipe Labeling

- Installation of equipment and valve tags
- Installation of pipe labeling

IV. Acceptance and Functional Testing Results

- Batch testing report
- Acceptance of calibration/test reports
- Interlock test reports
- Process line system hydrostatic tests (for test results, see Appendix B)

V. Training Completion

- Required reading completion by Contractor NEP operations personnel

VI. DOE Informal Notification of Readiness

- Tour for DOE Project Manager

VII. Declaration of Readiness

The Contractor Operations and Maintenance Manager; Project Manager; and Project, Operation, and Maintenance Manager attested that the Northeast Plume Optimization extraction well system was ready for operation and maintenance by the Contractor Northeast Plume Operations personnel. Copies of the signed project Assessment Checklist, Assessment Plan, and Assessment Report are included in Appendix A.

SUMMARY OF PROJECT COST

The cost for the project was $5,850,000.[4]

[4] Accounting of expenditures is based on an estimate governed by figures known at the time the report was written, which includes, but is not limited to, costs associated with drilling operations; infrastructure installation and construction activities; design and fabrication of mobile treatment systems; preparation of regulatory documents; waste disposal; sampling and analysis; and associated labor costs.

APPENDIX A

ASSESSMENT CHECKLIST, ASSESSMENT PLAN, AND ASSESSMENT REPORT

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ASSESSMENT REPORT	
Title/Activity: Evaluation of Optimized Northeast Plume Containment System (NEPCS) construction & preparations to begin operations.	Assessment Number: MA-FY18-0006
Organization: LSRS Project Operations & Maintenance	Location(s): C-765, C-765-A Auxiliary Treatment Units & Extraction Wells 234 and 235.
Start Date: 10/2/2017	Completion Date: 10/11/2017
Assessment Team Members: Todd Powers, Brian Lowrance, Brad Montgomery	

Distribution List (minimum is Responsible Director, Waste Certification Official if NNSS Waste Certification Program related, and Responsible Functional Manager from assessed organization)

Myrna Redfield
Bruce Ford
J.D. Sohl
Craig Jones
Brad Montgomery
Brian Lowrance
Todd Powers

Executive Summary: The assessment team determined the NE Plume Optimization construction activities have been completed in accordance with the Regulatory Documentation for the work (Remedial Action Work Plan, Explanation of Significant Differences, and the Operation and Maintenance Plan. The team also determined the work control documents (procedures, health and safety plan, Job Hazard Analyses, etc.) and training of personnel are in place to allow for start up of the systems. Specific operations personnel (craft and front-line supervision) who will be operating the system have been involved in development and validation of procedures. Three procedures that are not required for start up are in development and nearing completion, with target completion prior to FFS to Four Rivers Nuclear Partnership. These procedures define preventative maintenance, data evaluation for the Federal Facilities Agreement semi-annual report, and calibration of Measuring & Test Equipment and Installed Process Instrumentation. A copy of the completed checklist for the assessment is attached.

Issue Types found:	Quantity Found
Finding	0
Observations	0
Process Improvements	0
Proficiency	0

Signatures

Assessment Team Leader: Todd Powers	Date: 10/12/17
Responsible Functional Manager: Brad Montgomery	Date: 10/12/17
Contractor Performance Assurance Program Manager: Duane Morrow for R W Roberson	Date: 10/16/17

Assessment Checklist					
Title/Activity: Northeast Plume Optimization – Verification of Readiness to Initiate Operations		Assessment Number: MA-FY18-0006			
Organization: Environmental Restoration		Location(s): Northeast Plume Containment System			
Item #	Line of Inquiry	Result	Sat	Unsat	N/A
1	Are procedures in place and available to support for the first day of fully operational status for the optimized operations? Have procedures been validated and approved for use?	Four procedures have been revised to reflect the optimized system and are required for the first day of fully operational status. • CP2-ER-0067/R1 - *Health and Safety Plan for the Paducah Plumes Operations Paducah, Kentucky* • CP4-ER-0017/R2 *Northwest/Northeast Plume Daily Operational Data Collection and Maintenance* • *Startup and Normal Operation of the Northeast Plume Containment System* (CP4-ER-0005/R1) • *Normal (Short-term) Shutdown for the Northeast Plume Containment System* (CP4-ER-0018/R1) Evidence included in attachment #1.	X		
2	Are involved personnel current in required training for their required duties?	FLS and Operating personnel's TPDs document they are current in required training for their duties. Organizational chart also included. Assessment team reviewed training history for the Operating employees, and determined current. Also reviewed the training delinquencies report developed by the EM Training Coordinator, indicating no delinquencies relevant to NE Plume Operation. Evidence included in attachment #2.	X		
3	Are involved personnel trained in operation of the new equipment and systems, and on the newly revised procedures?	Evidence of required reading of procedures, where FLS and operations personnel have been involved in the procedure development process, performed procedure validation, etc. is available. Evidence included in attachment #3.	X		

4	Are support groups (Engineering, Rad Con, Emergency Response, Safety, PSS, Fire Protection, etc.) aware new operation is being initiated with new facilities being put on line?	Email sent to support groups with a summary of optimized operation, map showing locations, and offered to provide a walk down to allow groups to see facilities. Email verification from support groups is available. No requests from support groups have been requested, however walk down(s) can still be scheduled after system is fully operational, as necessary. Evidence included in attachment #4.	X		
5	Is a current JHA in place, approved, and available for use?	(2) JHAs being used for current NE Plume Operations are applicable, approved, and available for use. JHAs for use are JHA-9698, JHA for FPDP Site Safety Orientation, General Employee Training, Office/Administrative Personnel, General tours & Inspections, "General Safety JHA", and JHA 10844, Maintenance, Operations and Testing for the Northwest and Northeast Plume and Water Treatment Operations. Evidence included in attachment #5.	X		
6	Are required permits and plans current, in place, and ready for use?	O&M Plan, ESD, & RAWP for system approved by EPA and KY. RWP not required (per email from RADCON), but RADCON will need to be involved if there is a breach of the system to perform surveillance and monitoring. Latest revision of HASP (CP2-ER-0067/R1, *Health and Safety Plan for the Paducah Plumes Operations Paducah, Kentucky)* reflects the optimized system. Evidence included in attachment #6.	X		
7	Has verification of construction/start-up testing of system been completed in accordance with O&M Plan, RAWP, and ESD? Has functionality of the system, as required from the O&M Plan (interlock/alarm testing, system achieves required treatment standards, necessary flows can be achieved, no leaks, etc.) been performed, completed, results verified by	The assessor verified that the following items have been performed, completed results verified by testing personnel and documented appropriately: Construction checklists completed. Batch testing results are available	X		

	testing personnel, and documented appropriately?	documenting the system performance meets requirements. Electrical inspection reports are completed Electrical Test Reports/hydrostatic reports completed Evidence included in attachment #7.			
8	Has Property been notified to classify the optimized system as "operational" in the FIMS database?	Yes, email from Property is available. Evidence included in attachment #8.	X		
9	Has operational sampling been coordinated with SMO?	Yes, SOW is assigned and analytical lab coordinated. Evidence included in attachment #9.	X		
10	Has (4) quarters of Transect Well data confirmed that operations of the new EWs can commence in accordance with the MOA, ESD, RAWP, and O&M Plan?	Yes. Transect well data was reviewed by the assessment is consistent with anticipated concentrations. Data is maintained in the OREIS system, and provided graphically with the anticipated concentrations established by the Federal Facility Agreement Parties in Attachment 10.	X		
11	Has C-614 and EWs been placed in stand-by?	Yes. Evidence included in attachment #11.	X		
12	Has pipe labeling, signs, postings, etc. been applied to the new system?	Assessor walked down the system and verified. See Attachment 12 for evidence.	X		
13	Have As-built drawings been completed?	Yes. Drawings have been as-built and stamped, as appropriate and verified complete by assessor. See Attachment 13 for evidence.	X		
14	Has M&TE/calibration information used during construction activities been documented appropriately?	Calibration documentation for M&TE utilized during construction was reviewed and documented appropriately. See Attachment 14 for documentation records.	X		
15	Are processes in place to ensure process instrumentation calibration and/or preventative maintenance has been provided to maintenance for inclusion in the appropriate programs (MTE, PM Database, etc.), as applicable?	Following procedures are being modified to address preventative maintenance, calibration of IPI, calculations for reporting of data, etc. • CP4-ER-0016/R0 - *Monthly, Quarterly, and Annual Maintenance at the C-612 Northwest Plume Groundwater System* • CP4-ER-0020/R0 - *Control and Use of Measuring and Testing*	X		

		Equipment for the Northwest and Northeast Plume Operations • CP4-ER-0028/R0 - *Northwest and Northeast Pump and Treat Systems Federal Facility Agreement Semi-Annual Report Calculations* • CP2-ER-0046/R1 - *Paducah Plume Operations Maintenance, Sampling and Analysis, and Calibration and Testing Plan*			
16	Has walk down with FPDP and/or DOE been completed? Due to potential scheduling conflicts, walk down(s) can be scheduled after system is declared fully operational.	Walkdown completed with representative of FPDP. See Attachment 16 for evidence.	X		

Completed by:

Todd Powers, LSRS Northeast Plume Project Manager — Date 10/12/17

Brian Lowrance, LSRS Operations & Maintenance Manager — Date 10-13-17

Brad Montgomery, LSRS Projects & Operations Manager — Date 10/12/17

Assessment Plan

Assessment #: MA-FY18-0006

Assigned Personnel: Brad Montgomery, Brian Lowrance, Todd Powers

Purpose: Evaluate Optimized Northeast Plume Containment System (NEPCS) construction & preparations to begin operations.

Scope: Scope of this assessment will include the evaluation of physical condition of the NEPCS, review of system testing and start up evaluations, procedures and work controls necessary to start operations, and preparations for operational data collection. The condition of procedures and work controls not needed for system start up, (e.g. those necessary for preventative maintenance, long-term data reporting and evaluation, etc. will be assessed to verify they are on schedule to be in place as needed.

Schedule: Assessment activities began with documentation review & facility inspections during the week of October 2, 2017, and will be completed by October 10, 2017.

Documentation to Review: 1) NEPCS Operating Procedures; 2) NEPCS maintenance procedure drafts; 3) NEPCS Operation & Maintenance Plans; 4) NEPCS Construction Testing Plans; 5) JHA and Health & Safety Plan; 6) TPDs and Training Records. Other documents may be reviewed as appropriate during the assessment.

Expected assessment techniques to be used: (e.g., observation, interviews, etc.). Assessment techniques include facility walk downs & inspections; review of start-up testing plans, operating procedures, Health and Safety Plans and JHA's; discussions with NE Plume Optimization Project construction lead and operating personnel; and communication with support groups verbally or via email.

Assessed Manager's Concurrence:

Signature

10-10-17

Date

APPENDIX B

HYDROSTATIC TEST

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TEST REPORT

Job Number	Building Number	Location
LSR-SC-055	Treatment Trailer C-765-A	48 parking lot

Equipment Identification/System Component Description

6" PVC Effluent Line From C-765-A Trailer To discharge Line

M&TE Description and Identification Number	Calibration Due Date
Transcat -0-300 S/N 8403 (MUC-69)	Feb 17 -2019

Test Description

25 LB Increments To Reach 200 psi

~~7:AM~~	25 psi	7AM - 705
	50	7:05 - 7:10
	75	7:10 - 715
	100	7:15 - 720
	125	7:20 - 725
	150	725 - 730
	175	7:35 - 7:40
	200	7:40 8:00 Am

Hydrostatic Test With Water

Held Final Pressure Test For 20 minutes

Prepared by:	Date
Tim Gramlich / [signature]	6-29-17
Test Start Approval by Customer	**Date**
[signature]	6-29-17

Test Witness By Customer ☐ Yes ☑ No

Customer Signature N/A Date: N/A

Test Results: ☑ Satisfactory ☐ Unsatisfactory

Murtco Representative: [signature] 6-29-17
Signature Date

Customer: [signature] 6-29-17
Signature Date

TEST REPORT

Job Number	Building Number	Location
LSR-SC055	Treatment Trailer 765-A	48 Parking lot

Equipment Identification/System Component Description

6" HDPE piping From 765-A Trailer To Extraction well 235

M&TE Description and Identification Number	Calibration Due Date
TRANSCAT-0-300 S/n 8403 (MUR69)	Feb 17 2018

Test Description

Filled Line with water To allow stabilization For Ground Temperature 6-22-17
purged Line of AIR For Testing 6-26-17
Hydroed Line To 200 psi And Add make-up water For Four Hours Before 1 Hour Test
STARTed Test AT 11:AM AT 190 psi
Ended Test AT 12:Pm AT 188 psi

Total Test Time - 5hrs

Test performed By Tim Gamble / J. Dahl
Test witnessed By ERIC miller / Eric Miller

Prepared by:	Date
Tim Gamble / J. Dahl	6-27-17
Test Start Approval by Customer	**Date**
Jill Seaton / Jeff Seaton	6-27-17

Test Witness By Customer ☑ Yes ☐ No

Customer Signature Jill Seaton Date: 6-28-17

Test Results: ☒ Satisfactory ☐ Unsatisfactory

Murtco Representative: J. Dahl (Signature) 6-28-17 (Date)

Customer: Jill Seaton (Signature) 6-29-17 (Date)

TEST REPORT

Job Number	Building Number	Location
LSR-SC055		EW234

Equipment Identification/System Component Description

6" HDPE piping from EW234 well To Tie in point outside plant

M&TE Description and Identification Number	Calibration Due Date
TRANSCAT-0-300 s/n 8403 mu469	Feb 17-2018

Test Description

Filled Line water To allow water stabilization For Ground ~~water~~ Temperature 6-29-17. purged Line of AIR For Testing Hydroed Line To 200 psi and Add make up water For Four Hours Before 1 Hour Test

STARTed TesT AT 11am AT 190psi

Ended Test AT 12pm AT 184psi

TotAl Test Time 5 HRs

Test Per Formed By D. Dahle

WITNESSED By Eric Dahle

Prepared by: Tom Gramstad / D. Dahle	Date 7-6-17
Test Start Approval by Customer JM	Date 7-6-17

Test Witness By Customer ☐ Yes ☒ No

Customer Signature Date:

Test Results: ☒ Satisfactory ☐ Unsatisfactory

Murtco Representative: D. Dahle (Signature) 7-6-17 (Date)

Customer: JM (Signature) 7-6-17 (Date)

TEST REPORT

Job Number	Building Number	Location
LSR-SC-055	Treatment Trailer C-765-A	48. Parking Lot

Equipment Identification/System Component Description
6" PVC Influent Line To 765-A Treatment Trailer

M&TE Description and Identification Number	Calibration Due Date
TRANSCAT-0-300 S/N 8403 (MUR-69)	Feb. 17 2018

Test Description
25 LB Increments To Reach 200 psi

Hydrostatic Testing WITH WATER

25 psi	6:51	To	7:01
50 psi	7:02	To	7:12
75 psi	7:13	To	7:33
100 psi	7:23	To	7:34
125 psi	7:35	To	7:45
150 psi	7:46	To	7:56
175 psi	8:17	To	8:27
200 psi	8:28	To	8:38

Prepared by: Tim Gamble L2 Qualified — Date: 6-22-17

Test Start Approval by Customer: Jeff Sexton — Date: 6-22-17

Test Witness By Customer ☐ Yes ☑ No

Customer Signature — Date:

Test Results: ☑ Satisfactory ☐ Unsatisfactory

Murtco Representative: John Shelby (Signature) — 6-22-17 (Date)

Customer: (Signature) — 6-22-17 (Date)

TEST REPORT

Job Number	Building Number	Location
LSR-SC-055	Treatment Trailor C-765-A	48-Parking lot

Equipment Identification/System Component Description

4" PVC Influent Line inside Vault at Extraction well #235

M&TE Description and Identification Number	Calibration Due Date
Transcat-0-300 S/N 8403 (MUK-69)	Feb-17-2018

Test Description

25 PSI To reach 200psi

25 psi	7:15 To 725
50 psi	7:25 To 735
75 psi	735 To 745
100 psi	745 To 755
125 psi	755 To 805
150 psi	805 To 815
175 psi	815 To 825
200 psi	825 To 8:~~30~~

Hold Test For 15 minutes AT 200psi

Prepared by: Tim Gamble J. Dahle — Date 7-19-17

Test Start Approval by Customer — Date 7-19-17

Test Witness By Customer ☐ Yes ☒ No

Customer Signature — Date: 7-19-17

Test Results: ☑ Satisfactory ☐ Unsatisfactory

Murtco Representative: J. Dahle (Signature) — 7-19-17 (Date)

Customer: (Signature) — 7-19-17 (Date)

TEST REPORT

Job Number	Building Number	Location
LSR-SC-055	TREATMENT TRAILOR C-765-4	48 PARKING LOT

Equipment Identification/System Component Description

4" PVC INFLUENT LINE INSIDE VAULT AT EXTRACTION WELL #234

M&TE Description and Identification Number	Calibration Due Date
TRANSCAT-D-300 S/N 8403 (MUR-69)	Feb 17-2018

Test Description

25 psi To Reach 200psi

25 psi 9:00 To 9:10
~~50~~ psi 9:10 To 9:20
75 psi 9:20 To 9:30
100 psi 9:30 To 9:40
125 psi 9:40 To 9:50
150 psi 9:50 To 10:00
175 psi 10:00 To 10:10
200 psi 10:10 To 10:20

Hold Test For 15 minutes AT 200psi

Prepared by:	Date
Tim Grubb / J. Gable	7-19-17
Test Start Approval by Customer	Date
[signature]	7-19-17

Test Witness By Customer ☐ Yes ☒ No

Customer Signature [signature] Date: 7-19-17

Test Results: ☑ Satisfactory ☐ Unsatisfactory

Murtco Representative: J. Gable (Signature) 7-19-17 (Date)

Customer: [signature] (Signature) 7-19-17 (Date)

TEST REPORT

Job Number	Building Number	Location
LSR-SC-055		EW-234

Equipment Identification/System Component Description

614 well - Removed Flowmeter & Installed spool piece
Removed Flow control & Installed Blind Flange
CUT & Capped 1" Drain Line AT 614 well
C-765 Trailer - Removed 6" PIPE outside Trailer & Butterfly valve and installed Blind Flange
WITH Bleeder To Bleed AIR From system For Hydro
EW-234 well - Installed Blind WITH BALL Valve For Location To Hydro system
637 Cooling Tower - Removed 10' section of pipe and installed 6" Blind Flange
WITH Bleeder valve To Bleed AIR From system For Testing

M&TE Description and Identification Number	Calibration Due Date
TRANSCAT-O-300 S/N 8403 MURCO	Feb 17-2018

Test Description 8-2-17 Filled Line WITH WATER & Bled AIR
8-3 ACHIEVED 200 PSI AT 10:AM AFTER Hydroing System For 2 Hours To get To 200psi
8-3-17 MAINTAINED 200 PSI For 4 Hours. 2:00 pm.
Dropped pressure To 190 PSI AT 2:00 pm To Begin 1 Hour Test. WITH A 5% Loss Allowed.
3:00 pm Test over WITH A Loss OF 0 PSI.
Test PASSED

Prepared by: Tim Gamble / [signature]	Date: 8-2-17
Test Start Approval by Customer Jeff Seaton / [signature]	Date: 8-2-17

Test Witness By Customer ☑ Yes ☐ No

Customer Signature [signature] Date: 8/3/17

Test Results: ☑ Satisfactory ☐ Unsatisfactory

Murtco Representative: [signature] (Signature) 8-3-17 (Date)

Customer: [signature] (Signature) 8-3-17 (Date)

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APPENDIX C

WELL RELOCATION APPROVAL E-MAILS

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From:	Corkran, Julie
To:	Dollins, Dave
Cc:	Begley, Brian (EEC); Montgomery, Brad; Garner, Nathan (CHS-PH); Brewer, Gaye (EEC); Clark, Bill (EEC); Powers, Todd; Jones, Craig; Ford, Bruce; Redfield,Myrna; Davis, Ken
Subject:	Re: Follow-up on DOE request to move proposed NE Plume optimization extraction well: check-in
Date:	Tuesday, November 22, 2016 5:22:48 PM

EPA approves the proposal to move the subject extraction well.

Sent from my iPhone

On Nov 22, 2016, at 2:54 PM, Dollins, Dave <Dave.Dollins@lex.doe.gov> wrote:

> Thanks Brian!
>
> **From:** Begley, Brian (EEC) [mailto:Brian.Begley@ky.gov]
> **Sent:** Tuesday, November 22, 2016 1:39 PM
> **To:** Dollins, Dave <Dave.Dollins@lex.doe.gov>; Corkran, Julie <Corkran.Julie@epa.gov>; Montgomery, Brad <Brad.Montgomery@FFSPaducah.com>; Garner, Nathan (CHS-PH) <Nathan.Garner@ky.gov>; Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Clark, Bill (EEC) <BillJ.Clark@ky.gov>
> **Cc:** Powers, Todd <Todd.Powers@FFSPaducah.com>; Jones, Craig <Craig.Jones@FFSPaducah.com>; Ford, Bruce <Bruce.Ford@FFSPaducah.com>; Redfield,Myrna <Myrna.Redfield@FFSPaducah.Com>; Montgomery, Brad <Brad.Montgomery@FFSPaducah.com>; Davis, Ken <Ken.Davis@FFSPaducah.com>
> **Subject:** RE: Follow-up on DOE request to move proposed NE Plume optimization extraction well: check-in
> Thanks Dave,
> Kentucky approves the 10-ft relocation of the EW.
>
>
> **Brian Begley, PG**
> **Registered Geologist Supervisor**
> **KY Federal Facilities Agreement Manager**
> Energy and Environment Cabinet
> Division of Waste Management
> Hazardous Waste Branch
> Paducah Gaseous Diffusion Plant Section
> 300 Sower Blvd., Frankfort, KY 40601
> **Brian.Begley@KY.GOV**
> office: (502) 782-6317
>
>
> **From:** Dollins, Dave [mailto:Dave.Dollins@lex.doe.gov]
> **Sent:** Tuesday, November 22, 2016 2:24 PM
> **To:** Begley, Brian (EEC); Corkran, Julie; Montgomery, Brad; Garner, Nathan (CHS-PH); Brewer, Gaye (EEC); Clark, Bill (EEC)
> **Cc:** Powers, Todd; Jones, Craig; Ford, Bruce; Redfield,Myrna; Montgomery, Brad; Davis, Ken
> **Subject:** RE: Follow-up on DOE request to move proposed NE Plume optimization extraction well: check-in
> **Importance:** High

Brian and Julie –
The request is to relocate EW235 10 ft. north to address a security concern. This relocation north would result in the two EWs being slightly closer together, but would not make an appreciable difference in the groundwater extraction well and/or plume containment.
Dave

From: Begley, Brian (EEC) [mailto:Brian.Begley@ky.gov]
Sent: Tuesday, November 22, 2016 12:50 PM
To: Dollins, Dave <Dave.Dollins@lex.doe.gov>; Corkran, Julie <Corkran.Julie@epa.gov>; Montgomery, Brad <Brad.Montgomery@FFSPaducah.com>; Garner, Nathan (CHS-PH) <Nathan.Garner@ky.gov>; Brewer, Gaye (EEC) <Gaye.Brewer@ky.gov>; Clark, Bill (EEC) <BillJ.Clark@ky.gov>
Cc: Powers, Todd <Todd.Powers@FFSPaducah.com>; Jones, Craig <Craig.Jones@FFSPaducah.com>; Ford, Bruce <Bruce.Ford@FFSPaducah.com>; Redfield,Myrna <Myrna.Redfield@FFSPaducah.Com>; Montgomery, Brad <Brad.Montgomery@FFSPaducah.com>
Subject: RE: Follow-up on DOE request to move proposed NE Plume optimization extraction well: check-in
Dave,
I told Julie that I left you a voice message on November 14th regarding the proposed 10ft change to the NE Plume extraction wells. I wanted to know if the wells would be 10ft closer together or farther apart with the proposed change.
-Brian

From: Dollins, Dave [mailto:Dave.Dollins@lex.doe.gov]
Sent: Tuesday, November 22, 2016 1:42 PM
To: Corkran, Julie; Montgomery, Brad; Begley, Brian (EEC); Garner, Nathan (CHS-PH); Brewer, Gaye (EEC); Clark, Bill (EEC)
Cc: Begley, Brian (EEC); Powers, Todd; Jones, Craig; Ford, Bruce; Redfield,Myrna; Montgomery, Brad
Subject: RE: Follow-up on DOE request to move proposed NE Plume optimization extraction well: check-in
Julie, I've been out several days sick, however, I'm not aware of the additional information that you are referring to. Can you all help us understand what more is required?
Thanks
Dave

From: Corkran, Julie [mailto:Corkran.Julie@epa.gov]
Sent: Monday, November 21, 2016 11:08 AM
To: Dollins, Dave <Dave.Dollins@lex.doe.gov>; Montgomery, Brad <Brad.Montgomery@FFSPaducah.com>; 'Brian Begley' <brian.begley@ky.gov>; nathan.garner@ky.gov; gaye.brewer@ky.gov; Clark, Bill (EEC) <BillJ.Clark@ky.gov>
Subject: Follow-up on DOE request to move proposed NE Plume optimization extraction well: check-in
Dave:
In speaking with Brian, I understand that he reached out to you for more specific information regarding the DOE proposal (mentioned during the last weekly GW call) to

move one of the two new EWs to address potential safety concerns during drilling. Have DOE/FLUOR had a chance to respond to Brian so that EPA and KY can provide a response to DOE's request?
Please advise.
Thanks,
Julie

Julie L. Corkran, Ph.D. | Senior Remedial Project Manager
USEPA Region 4 | Atlanta Federal Center 9T25
61 Forsyth Street SW | Atlanta GA 30303-8960
Office: 404.562.8547 | Fax: 404.562.8518 | corkran.julie@epa.gov

From:	Begley, Brian (EEC)
To:	Corkran, Julie; Dollins, Dave; Brewer, Gaye (EEC)
Cc:	Powers, Todd; Taylor, Tracy (PPPO/CONTR); Redfield,Myrna; Richards, Jon M.; Ahsanuzzaman, Noman; Davis, Eva; Garner, Nathan (CHS-PH); Stephanie Brock; Jones, Craig
Subject:	RE: Request for minor relocations of NE Optimization wells
Date:	Thursday, June 23, 2016 1:46:48 PM

All,
KY concurs with the relocations of NE Optimization project proposed below.

Brian Begley, PG

Registered Geologist Supervisor

Please Note New Phone & Address (as of 6-22-16)

Energy and Environment Cabinet
Division of Waste Management
Hazardous Waste Branch
Paducah Gaseous Diffusion Plant Section
300 Sower Blvd., Frankfort, KY 40601
Brian.Begley@KY.GOV
office: (502) 782-6317

From: Corkran, Julie [mailto:Corkran.Julie@epa.gov]
Sent: Thursday, June 23, 2016 2:43 PM
To: Dollins, Dave; Begley, Brian (EEC); Brewer, Gaye (EEC)
Cc: Powers, Todd; Taylor, Tracy (PPPO/CONTR); Redfield,Myrna; Richards, Jon M.; Ahsanuzzaman, Noman; Davis, Eva
Subject: RE: Request for minor relocations of NE Optimization wells

Noman and Jon have advised that they are in agreement with DOE's proposed alternate locations for the NE Plume P&T Optimization wells.
Julie

Julie L. Corkran, Ph.D. | Senior Remedial Project Manager
USEPA Region 4 | Atlanta Federal Center 9T25
61 Forsyth Street SW | Atlanta GA 30303-8960
Office: 404.562.8547 | Fax: 404.562.8518 | corkran.julie@epa.gov

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From: Corkran, Julie
Sent: Wednesday, June 22, 2016 5:32 PM
To: Dollins, Dave ; brian.begley@ky.gov; 'Gaye.Brewer@ky.gov' (Gaye.Brewer@ky.gov)
Cc: Powers, Todd ; Taylor, Tracy (PPPO/CONTR) ; Redfield,Myrna ; Richards, Jon M. ; Ahsanuzzaman, Noman ; Davis, Eva
Subject: Re: Request for minor relocations of NE Optimization wells

I am in an all-day VTC tomorrow and not available for this discussion.
I have copied Jon, Noman and Eva on this note in case they can call in and support DOE and KY discussions.
If no one from EPA is available, EPA defers to KY in order to keep the project on target.
If resolution cannot be reached tomorrow, I am available on Monday of next week for a call.
thanks,
Julie

From: Dollins, Dave <Dave.Dollins@lex.doe.gov>

Sent: Wednesday, June 22, 2016 4:25:04 PM
To: Corkran, Julie; brian.begley@ky.gov; 'Gaye.Brewer@ky.gov' (Gaye.Brewer@ky.gov)
Cc: Powers, Todd; Taylor, Tracy (PPPO/CONTR); Redfield,Myrna
Subject: Request for minor relocations of NE Optimization wells

Julie/Brian,

The Northeast Optimization Project team is requesting concurrence/approval for minor relocations within the well network. These adjustments are being requested due to safety concerns and/or ease of well installation identified during walk downs with the drilling subcontractor. We can discuss this request further tomorrow during the weekly GWOU call, if needed.

See the attached figure to assist in your review of this request.

The wells to be relocated and supporting rationale are provided below.

- Swap planned location of Piezometer well 534 (PZ-534) and Extraction Well 234 (EW-234) to eliminate electrical hazard associated with proximity of drill rig mast and high voltage overhead power line(s). .
- PZ555 – Relocate approximately 20 ft. northwest to eliminate electrical hazard associated with proximity of drill rig mast and high voltage overhead transmission line(s).
- PZ535 – Relocate approximately 10-15 ft. westward to ensure level ground is available at the drilling location.
- MW531 – Relocate approximately 10 ft. westward to ensure level ground is available at the drilling location.

The installed locations of the well network will be captured on as-built drawings and documented in the Post Construction Report.

Let me know if any additional information is required to address any questions/concerns. If these relocations are acceptable, then a response to this email documenting your concurrence/approval will be appreciated.

Thanks in advance

Dave

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APPENDIX D

AS-BUILT DRAWINGS (ON CD)

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APPENDIX D

AS-BUILT DRAWINGS (ON CD)

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APPENDIX E

STEP TEST SUMMARY

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Northeast Plume Optimization Project
Extraction Well Pumping Step-Drawdown Tests

Well construction details and aquifer depths

Well Construction/Aquifer Depth	EW234	EW235
Depth (ft below temporary reference point) of static water level at beginning of pumping step-drawdown test	50.45	51.63
Depth (ft bgs) of top of HU5 Gravel Interval (top of aquifer)	79.00	83.60
Depth (ft bgs) of top of well screen	80.70	85.00
Depth (ft bgs) of base of well screen	95.70	100.00
Depth (ft bgs) of base of HU5 Gravel Interval (base of aquifer)	96.80	102.90

Pumping Step-Drawdown Test

The EW234 step test was performed on June 19, 2017 (pumping from 07:35 to 11:37) and the EW235 step test was performed on June 20, 2017 (pumping from 11:47 to 15:47).

Pumping test measurements

Measurement	EW234			EW235		
	Average Pumping Rate (gpm)	Stage Drawdown (ft)	Final Depth of Water (ft)	Average Pumping Rate (gpm)	Stage Drawdown (ft)	Final Depth of Water (ft)
Static water level	0.00	NA	50.45	0.00	NA	51.63
1st pumping stage	49.61	1.10	51.55	50.29	6.33	57.96
2nd pumping stage	101.00	1.39	52.94	99.43	7.23	65.19
3rd pumping stage	149.83	1.38	54.32	147.62	8.23	73.42
4th pumping stage	198.18	1.63	55.95	196.00	14.04	87.46

NA = not applicable

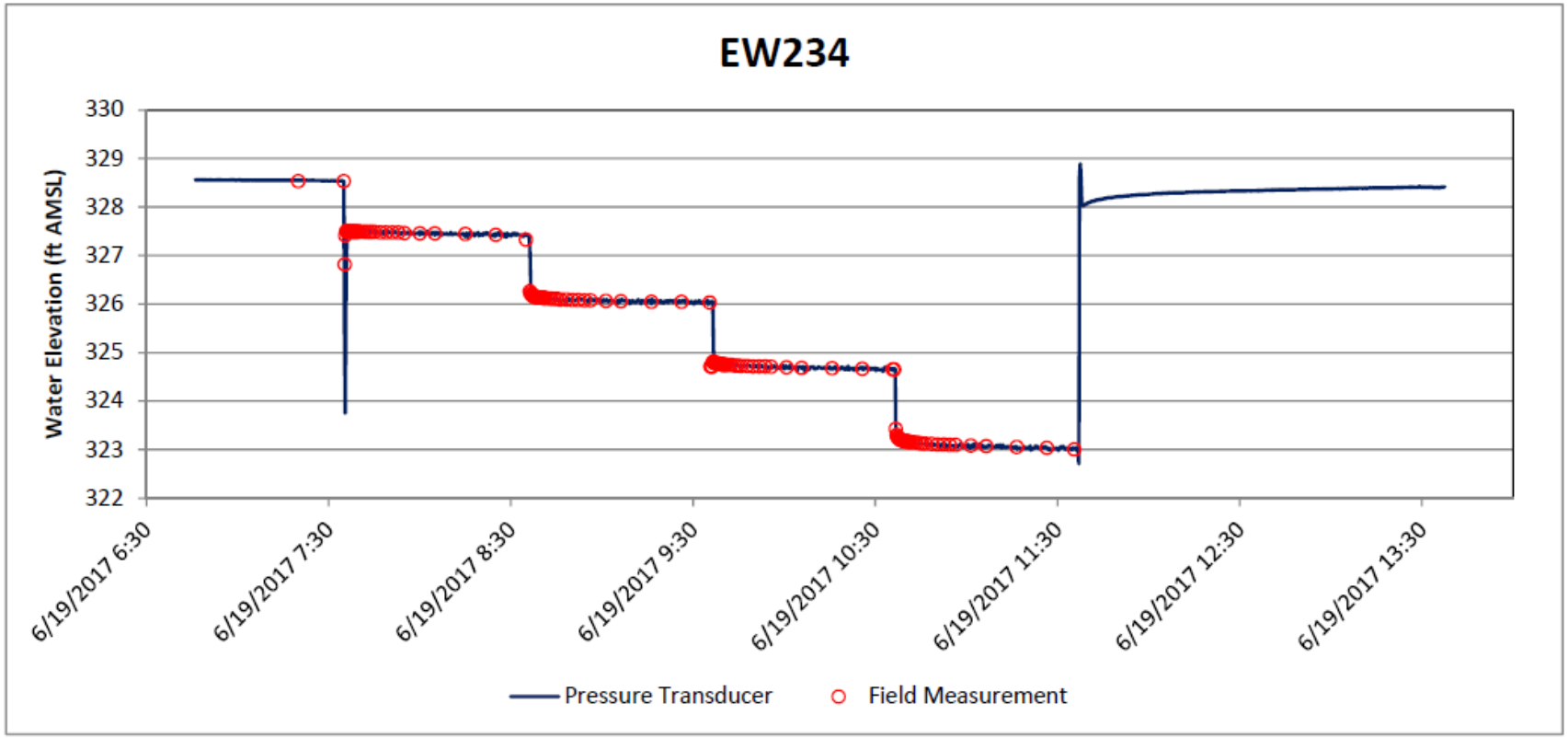
Pumping Step-Test Distances (ft from EW)

EW234 Step Test			EW235 Step Test	
Nearby Piezometer PZ534	Distal Piezometer PZ540		Nearby Piezometer PZ554	Distal Piezometer PZ540
30.66	782.62		21.56	474.76

U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

Northeast Plume Optimization Well and Piezometer Installations

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC



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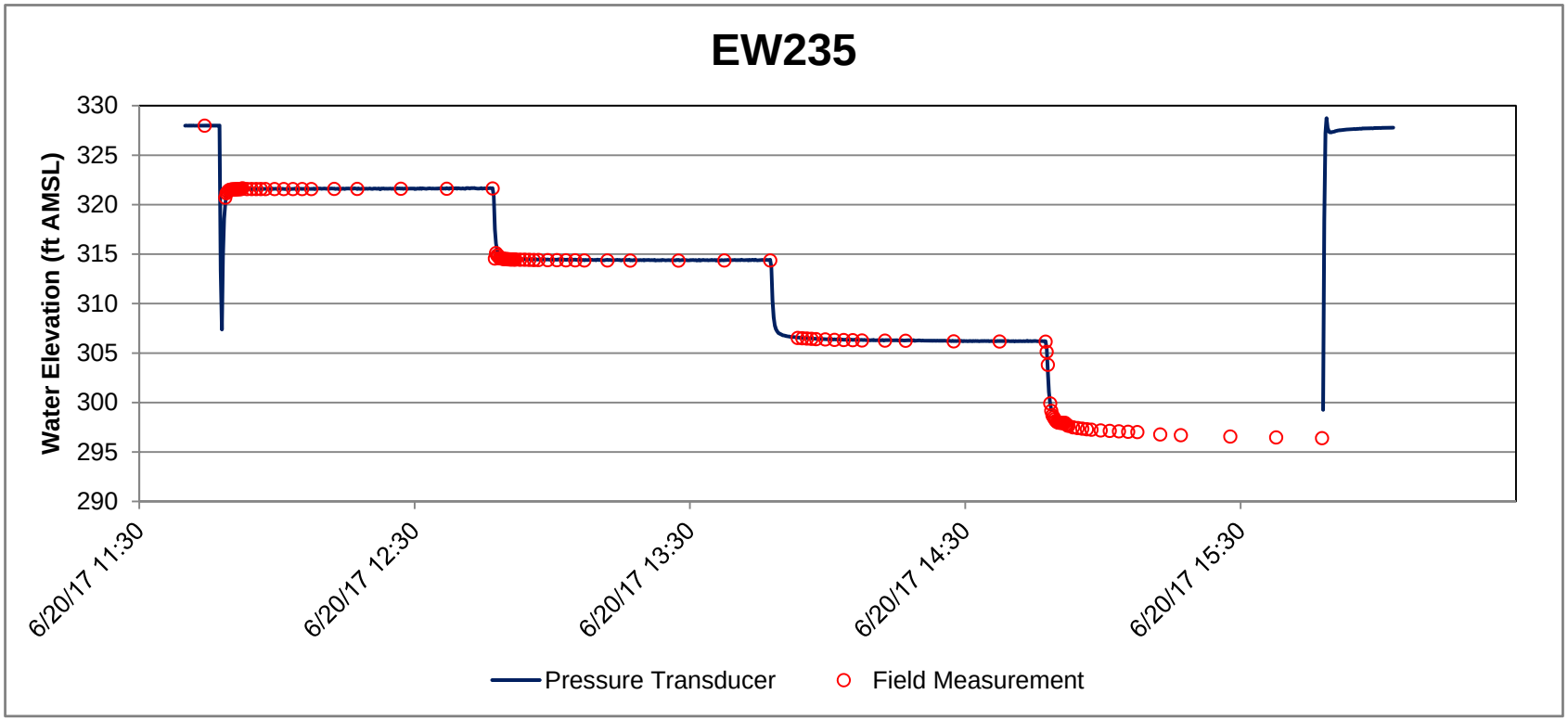
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

Plot of Water Level Measurements from EW234 Step Test

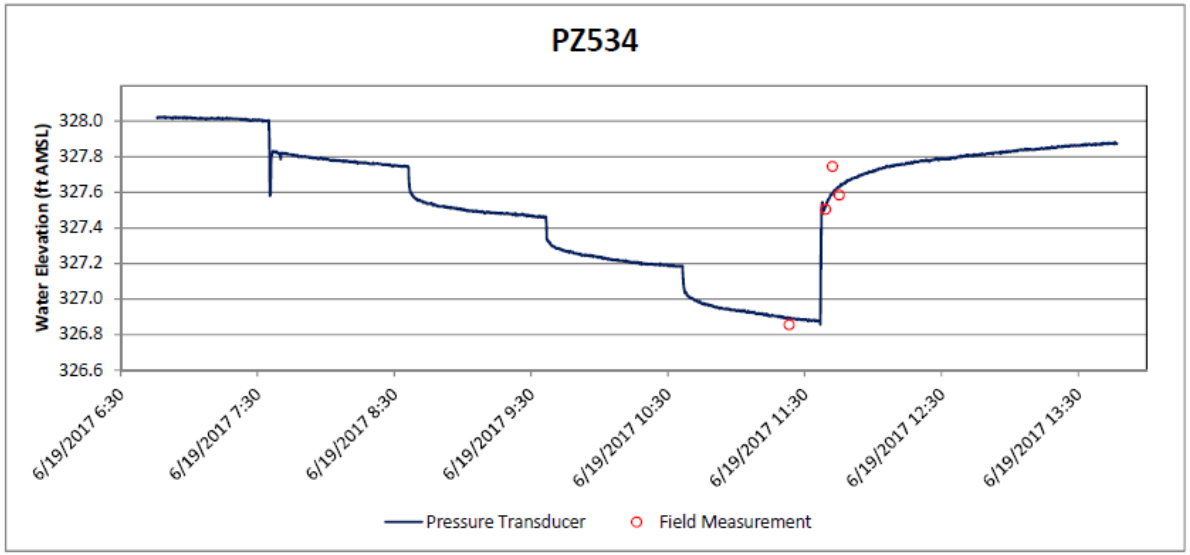
FOUR RIVERS NUCLEAR PARTNERSHIP, LLC

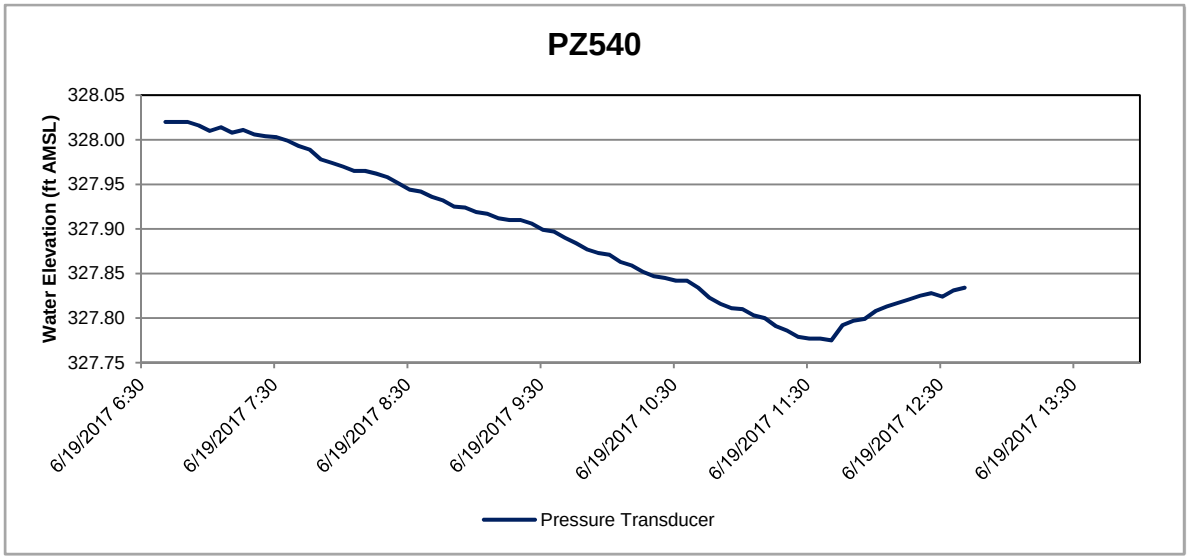


U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

Plot of Water Level Measurements from EW235 Step Test

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC





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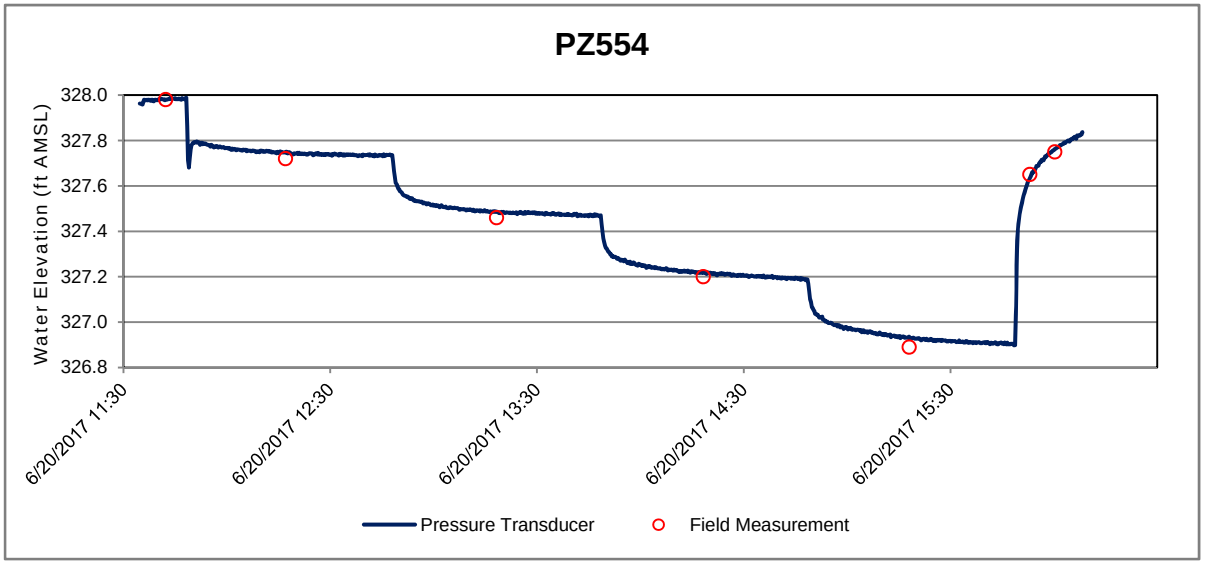
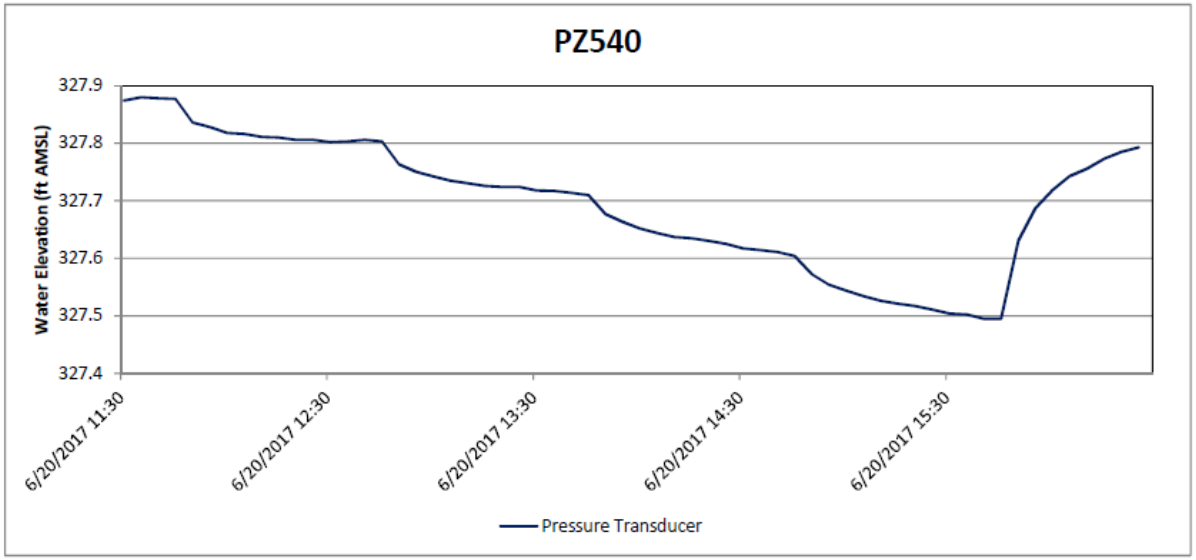
PADUCAH GASEOUS DIFFUSION PLANT

Water Level Trends of EW234 Step Test
on adjacent Piezometer PZ534 and Distant Background Piezometer PZ540

FOUR RIVERS NUCLEAR PARTNERSHIP, LLC





U.S. DEPARTMENT OF ENERGY
DOE PORTSMOUTH/PADUCAH PROJECT OFFICE
PADUCAH GASEOUS DIFFUSION PLANT

Water Level Trends of EW235 Step Test
on adjacent Piezometer PZ554 and Distant Background Piezometer PZ540

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