

G2 STEM EPA PERMIT REQUEST REPORT

HIGINBOTHAM #1

Conversion Well Permit Application
Salt Water Injection Facility
Fayette County, PA

Don Tron

FLUID MOVING SOLUTIONS, LLC

**United States Environmental Protection Agency Underground Injection
Control (UIC) Program Class II Permit Application Completeness
Review Checklist**

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**COMPLETED PERMIT APPLICATION FORM 7520-6, including signature of
authorized representative** #6

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- II. AREA OF REVIEW SIZE DETERMINATION – FIXED RADIUS OR EQUATION**
- III. MAPS**
 - a. TOPOGRAPHIC MAP EXTENDING ONE MILE BEYOND FACILITY PROPERTY BOUNDARY SHOWING**
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 - ii. AREA OF REVIEW BOUNDARY**
 - iii. OUTCROPS OF INJECTION AND CONFINING FORMATION, IF PRESENT**
 - iv. SURFACE WATER INTAKE AND DISCHARGE STRUCTURES, IF PRESENT**
 - v. HAZARDOUS WASTE TREATMENT, STORAGE OR DISPOSAL FACILITY, IF PRESENT**
 - b. MAP SHOWING WITHIN ¼ - MILE BEYOND FACILITY PROPERTY BOUNDARY OR AOR (WHICHEVER IS LARGER):**
 - i. NAME AND LOCATION OF PRODUCTION WELLS, INJECTION WELLS, ABANDONED WELLS, DRY HOLES, AND ALL WATER WELLS, NOTING ITS TYPE (PUBLIC WATER SYSTEM, DOMESTIC DRINKING WATER, STOCK, ETC.), IF PRESENT**
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 - a. TABULATION OF AOR WELLS, IF PRESENT**
 - b. WELL BORE DIAGRAMS, CBL, COMPLETION RECORDS OF AOR WELLS, IF AVAILABLE**
 - c. AOR CAP, IF APPLICABLE**
- V. LANDOWNER INFORMATION**
 - a. LIST OF LANDOWNERS AND ADDRESS WITHIN ¼ - MILE**
 - b. EVIDENCE OF NOTIFICATION TO LANDOWNER OF INTENT TO APPLY FOR PERMIT, IF APPLICABLE**

ATTACHMENT B. GEOLOGICAL AND GEOPHYSICAL INFORMATION #25-63

- I. GEOLOGICAL DATA**
 - a. LIST OF FORMATIONS FROM SURFACE TO THE BASE OF THE INJECTION WELL, IDENTIFYING ALL THE USDWS AND CONFINING AND INJECTION ZONE(S). LIST**

INCLUDES THE LITHOLOGICAL DESCRIPTION, GEOLOGICAL NAME, THICKNESS, DEPTH, AND TOTAL DISSOLVED SOLIDS (TDS) CONCENTRATIONS FROM THESE FORMATIONS, IF KNOWN

- b. SOURCE OF INFORMATION FOR THE GEOLOGICAL DATA AND FORMATION TDS
- c. POROSITY AND PERMEABILITY OF INJECTION FORMATION, IF AVAILABLE
- d. GEOLOGICAL CROSS-SECTIONS, IF AVAILABLE
- e. KNOWN FOR SUSPECTED FAULTS AND FRACTURE SYSTEMS WITHIN AOR, IF IDENTIFIED, PROVIDE PROXIMITY TO THE INJECTION ZONE AND AFFECT FAULT/FRACTURE SYSTEM MAY HAVE ON THE INJECTION ACTIVITIES
- f. HISTORY OF SEISMIC ACTIVITY IN THE AREA AND PROXIMITY TO CRYSTALLINE (IE. GRANITIC) BASEMENT, IF APPLICABLE

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- c. PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE INJECTION ZONE

ATTACHMENT C. WELL CONSTRUCTION/CONVERSION INFORMATION #64-67

I. WELL SCHEMATIC DIAGRAM

- a. DETAILED PROPOSED WELL SCHEMATIC DIAGRAM THAT INCLUDES:
 - i. IDENTIFICATION OF USDWS AND CONFINING AND INJECTION ZONES
 - ii. CASING AND CEMENTING DETAILS, INCLUDING DEMONSTRATED OR CALCULATED TOP OF CEMENT
 - iii. TUBING AND PACKER, IF APPLICABLE
 - iv. OPEN HOLE OR PERFORATED INTERVALS
 - v. SURFACE TRACE, IF HORIZONTAL OR DEVIATED WELL
 - vi. *IF CONVERSION TO INJECTION WELL:*
 - 1. WELL COMPLETION AND CEMENTING RECORDS
 - 2. PREVIOUSLY RUN LOG/TESTS

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- I. FLOW DIAGRAM OF FLUID FLOW THROUGH FACILITY
- II. CONTINGENCY PLAN(S) TO RESPOND TO WELL FAILURES
- III. DRAWING OF THE SURFACE CONSTRUCTION
- IV. LOCATION OF MONITORING PORTS (SHOW ON THE MAP(S) OF REFERENCE IN SECTION A. III ABOVE
- V. DESCRIPTION OF SAMPLING AND MONITORING DEVICES TO MONITOR THE NATURE OF THE INJECTION FLUIDS, INJECTION PRESSURE, ANNULUS PRESSURE (OF APPLICABLE), FLOWRATE, AND CUMULATIVE VOLUME
- VI. DESCRIPTION OF MANIFOLD MONITORING PROGRAM AND HOW THE PROGRAM IS COMPARABLE TO INDIVIDUAL WELL MONITORING
- VII. OPERATING DATA INFORMATION
 - a. AVERAGE AND MAXIMUM DAILY RATE AND VOLUME OF FLUIDS TO BE INJECTED
 - b. AVERAGE AND MAXIMUM INJECTION PRESSURE
 - c. SOURCE(S) OF INJECTION FLUID (INCLUDING FIELD AND FORMATION NAMES)
#

- d. PROPOSED ANNULAR FLUID
- e. ANALYSIS OF THE CHEMICAL AND PHYSICAL CHARACTERISTICS OF THE INJECTION FLUID. AT A MINIMUM THIS SHOULD INCLUDE PH, SPECIFIC GRAVITY, TDS, AND CONDUCTIVITY

ATTACHMENT E. PLUGGING AND ABANDONMENT (P&A) PLAN **#90-94**

- I. P&A PLAN OF THE WELL ON EPA FORM 7520-19
- II. P&A DIAGRAM THAT INCLUDES:
 - a. TYPE, AND NUMBER OF PLUGS TO BE USED
 - b. PLACEMENT OF EACH PLUG INCLUDING THE ELEVATION OF TOP AND BOTTOM #
 - c. TYPE, GRADE, AND QUANTITY OF CEMENT TO BE USED
 - d. METHOD OF PLACEMENT OF THE PLUGS
 - e. AT LEAST ONE COST ESTIMATES FROM AN INDEPENDENT FIRM IN THE BUSINESS OF PLUGGING AND ABANDONING WELLS FOR THIRD PARTY (EPA) TO COMPLETE PROPOSED P7A PLAN

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- I. EVIDENCE OF FINANCIAL RESOURCES, SUCH AS SURETY BOND OR FINANCIAL STATEMENT, NECESSARY TO CLOSE, PLUG, OR ABANDON WELL

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(COMMERCIAL WELLS ONLY; FORM 7520) **#97-100**

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- II. DESCRIPTION OF MANIFEST

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- I. SUPPORTING DOCUMENTATION FOR PROPOSED AE

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- I. LIST OF EXISTING EPA PERMITS

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- I. DESCRIPTION OF THE NATURE OF BUSINESS

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- I. THE WILD AND SCENIC RIVERS ACT**
 - a. LIST OF NATIONAL WILD AND SCENIC RIVERS THAT MAY BE IMPACTED BY THE ACTIVITIES ASSOCIATED WITH PROPOSED PROJECT**
- II. THE NATIONAL HISTORIC PRESERVATION ACT OF 1966**
 - a. LIST OF PROPERTIES LISTED OR ELEGIBLE FOR LISTING IN THE NATIONALS REGISTER OF HISTORIC PALCES. IF AVAILABLE, HISTORIC AND CULTURAL RESOURCE SURVEY(S) THAT HAVE BEEN CONDUCTED**
- III. THE ENDANGERED SPECIES ACT**
 - a. LIST OF ENDANGERED OR THREATENED SPECIES THAT MY BE AFFECTED BY THE ACTIVITIES ASSOCIATED WITH PROPOSED PROJECT. IF AVAILABLE, PREVIOUS ENDANGERED OR THREATENED SPECIES SURVEYS THAT HAVE BEEN CONDUCTED, IF APPLICABLE**
- IV. THE COASTAL ZONE MANAGEMENT ACT**
 - a. LIST OF COASTAL ZONES THAT MAY BE AFFECTED BY THE ACTIVITIES ASSOCIATED WITH PROPOSED PROJECT, IF APPLICABLE**



United States Environmental Protection Agency
Underground Injection Control
Permit Application for a Class II Well
(Collected under the authority of the Safe Drinking Water Act. Sections 1421, 1422, and 40 CFR Part 144)

For Official Use Only

Date Received

Permit Number

Read Attached Instructions Before Starting

I. Owner Name, Address, Phone Number and/or Email G2 STEM LLC Fred Gumbinner, Managing Partner 4826 Piney Branch Road Suite 200 Fairfax, VA 22030	II. Operator Name, Address, Phone Number and/or Email G2 STEM LLC 4826 Piney Branch Road Suite 200 Fairfax, VA 22030
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III. Commercial Facility <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	IV. Ownership <input checked="" type="checkbox"/> Private <input type="checkbox"/> Federal <input type="checkbox"/> State/Tribal/Municipal	V. Permit Action Requested <input checked="" type="checkbox"/> New Permit <input type="checkbox"/> Permit Renewal <input type="checkbox"/> Modification <input type="checkbox"/> Add Well to Area Permit <input type="checkbox"/> Other	VI. SIC Code(s) 1311	VII. Indian Country <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
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VIII. Type of Permit (For multiple wells, use additional pages) to provide the information requested for each additional well

<input checked="" type="checkbox"/> A. Individual <input type="checkbox"/> B. Area	Number of Wells 1	Well Field and/or Project Names Higinbotham #1 SWD
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IX. Class and Type of Well (see reverse)

A. Class II	B. Type (enter code(s)) D	C. If type code is "X," explain.
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X. Well Status <input type="checkbox"/> A. Operating Date Injection Started	<input checked="" type="checkbox"/> B. Conversion Date Well Constructed 03/09/1987	<input type="checkbox"/> C. Proposed	XI. Well Information API Number: 051-20470 Permit (or EPA ID) Number: Full Well Name: Higinbotham #1
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XII. Location of Well or, for Multiple Wells, Approximate Center of Field or Project

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location
 1/4 of 1/4 of Section Township Range
 14600' ft. from (N/S) South Line of quarter section
 5925' ft. from (E/W) West Line of quarter section.

Latitude: S39.5230
Longitude: W79.5000

XIII. Attachments

In addition to this form, complete Attachments A-U (as appropriate for the specific well class) on separate sheets. Submit complete information, as required in the instructions and list all attachments, maps or other figures, by the applicable letter.

XIV. Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments 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 and imprisonment. (Ref. 40 CFR § 144.32)

Name and Official Title (Please Type or Print) Fred R. Gumbinner, Managing Partner	Signature <i>Fred Gumbinner</i>	Date Signed 6/27/22
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ATTACHMENT A. MAPS AND AREA of REVIEW

- I. Well Location(s) and Permitted Area Description (if area permit)**
 - a. See Attachment A, Addendum 7.

- II. Area of Review Size Determination – fixed radius or equation**
 - a. See Attachment A, Addendum 1

- III. Maps**
 - a. See Attachment A, Addendum 1, 2 & 3 to include:
 - i. Topographical Map extending one-mile beyond facility property boundary showing:
 1. Injection well, well pad, and project area
 - a. See Attachment A, Addendum 1
 2. Area of review boundary
 - a. See Attachment A, Addendum 1,2, &3
 3. Outcrops of injection and confining formation, *if present*
 - a. None Present
 4. Surface water intake and discharge structures, *if present*
 - a. None Present
 5. Hazardous waste treatment, storage or disposal facility, *if present*
 - a. None Present
 - ii. Map showing within ¼-mile beyond facility property boundary or AOR (whichever is larger):
 1. Name and location of production wells, injection wells, abandoned wells, dry holes, and all water wells, noting its type (public water system, domestic drinking water, stock, etc.), *if present*
 - a. Attachment A, Addendum 5, None Present
 - b. All residents within ¼-mile AOR receives water from Mountain Water Association
 2. Springs and surface bodies of water, *if present*
 - a. None Present
 3. Mines (surface and subsurface) and quarries, *if present*
 - a. None Present
 4. Residences, schools, hospitals, and roads, *if present*
 - a. See Attachment A, Addendum 1,2 & 3

- IV. Area of Review (AOR) Wells and Corrective Action Plan (CAR)**
 - a. See Attachment A, Addendum 1
 - i. Tabulation of AOR wells, *if present*
 1. Attachment A, Addendum 1
 - ii. Well bore diagrams, CBL, completion records of AOR wells, *if available*
 1. Completion Report 051-00076 Manufacturers Light and Heat Co, Dominick Diamond G915 well
 - a. See Addendum 10

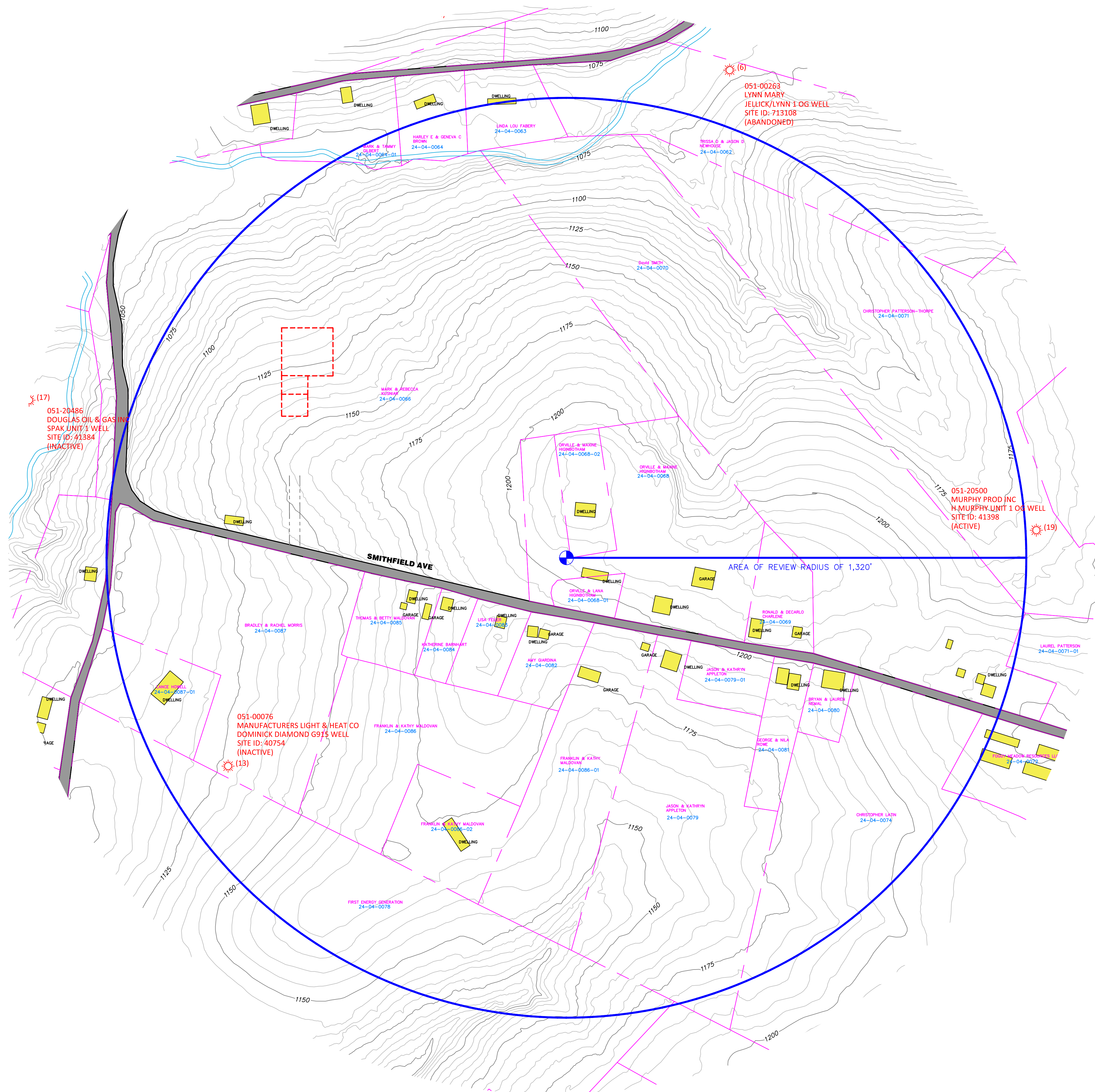
2. Plugging Certificate 051-00076 Manufacturers Light and Heat Co, Dominick Diamond G915 Well
 - a. See Addendum 11
 3. Completion Report 051-20470 Douglas Oil & Gas, Higinbotham #1
 - a. See Addendum 6
- iii. AOR CAP, *if applicable*
1. **Not Applicable**

V. Landowner Information

- a. List of landowners and address within ¼-mile
 - i. See Attachment A, Addendum 1 & 4
- b. Evidence of notification to landowner of intent to apply for permit, *if applicable*
 - i. See Attachment A, Addendum 9

Attachment A, Addendum List

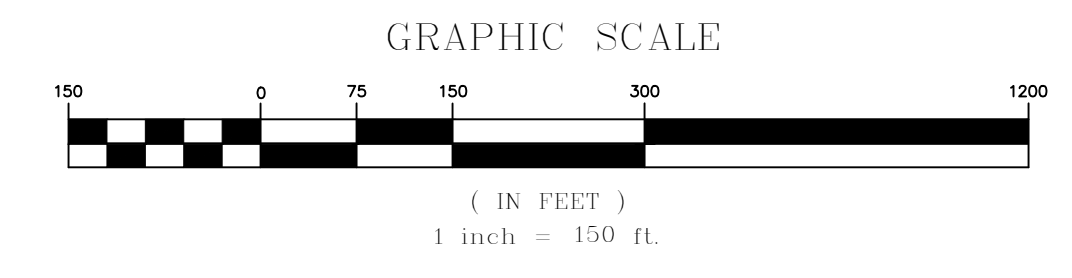
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|---------------|--|
| Addendum 1- | Topographical Map, ¼-mile radius |
| Addendum 2 - | Topographical Map, ¼-mile Radius with Land Owners |
| Addendum 3 - | Topographical Map, 1-mile Radius |
| Addendum 4 - | Landowner List, ¼-mile |
| Addendum 5 - | Well List, ¼-mile |
| Addendum 6 - | Completion Report 051-20470 Higinbotham #1 |
| Addendum 7 - | Topographical Map Large Radius |
| Addendum 8 - | Topographical Map |
| Addendum 9 - | Evidence of Notification to Landowners |
| Addendum 10 - | Completion Report 051-00076 Dominick Diamond G915 |
| Addendum 11 - | Plugging Certificate 051-00076 Dominick Diamond G915 |
| Addendum 12 - | PA UIC Fact Sheet |



LEGEND

- EXISTING ROADS
- PROPERTY LINES
- EXISTING CONTOURS
- EXISTING STREAMS
- AOR BOUNDARY
- OFFLOADING AREA
- ACCESS ROAD
- GAS AND OIL WELL
- PROPOSED INJECTION WELL
- EXISTING STRUCTURE
- DEEP MINE (INACTIVE)

- NOTES:**
- (1) No fault lines are present within the herein plat.
 - (2) All Oil and Water wells were identified using Pennsylvania public records from PADEP Efacts and Pennsylvania Groundwater Information System.
 - (3) All residences located within - receive water from the Mountain Water Assosiation.



Seal

Date

No.	Sheet Revisions	Date

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File No. C2-HIGINBOTHAM

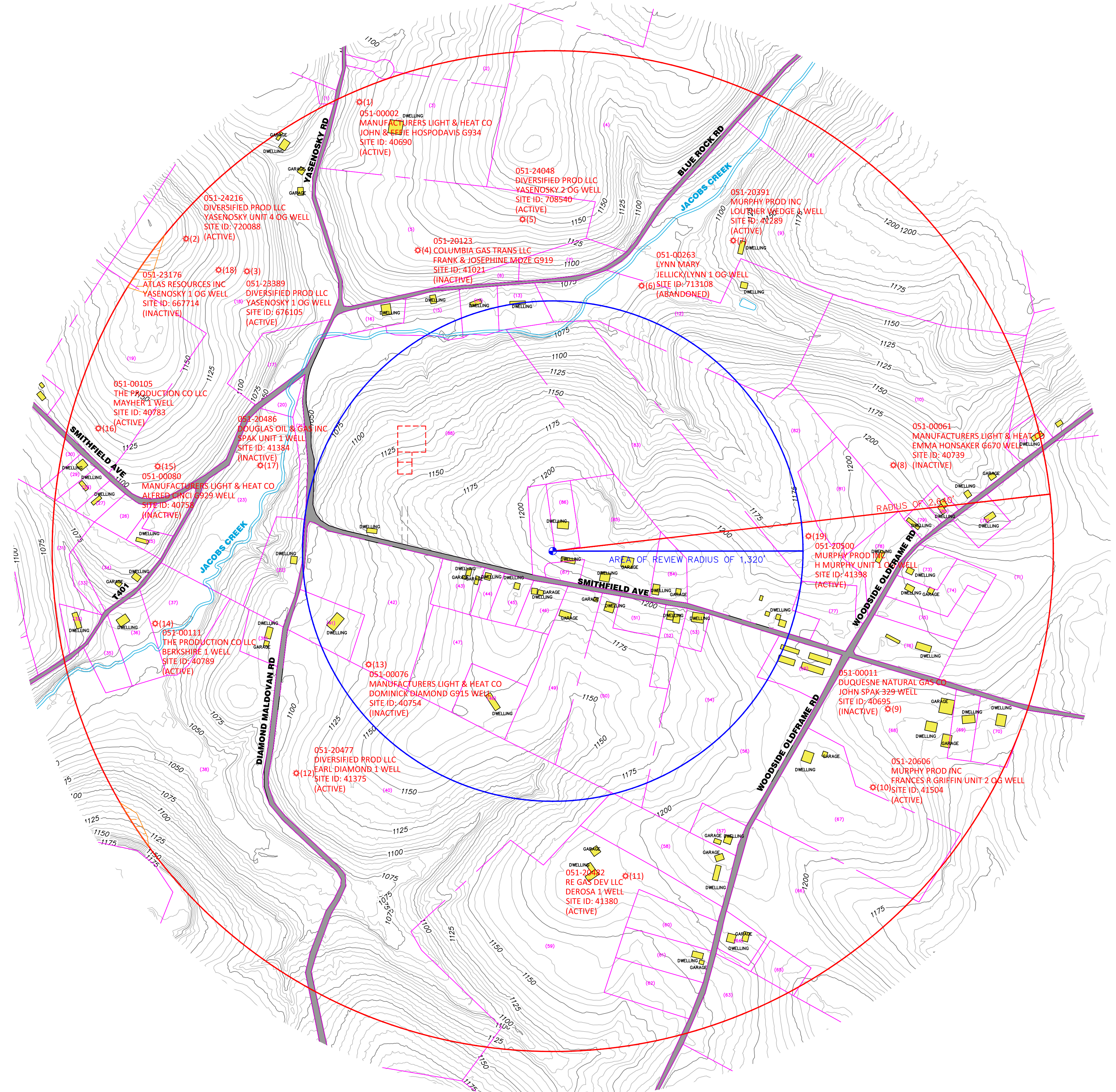
ENGINEERING ARCHITECTURE AND DESIGN SERVICES

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**CLASS II PERMIT APPLICATION/
MAP #1 AREA OF REVIEW (AOR)/
FACILITY PROPERTY BOUNDARY
FOR
G2 STEM, LLC HIGINBOTHAM WELL**

PROPERTY OWNERS

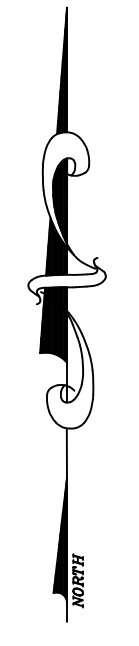
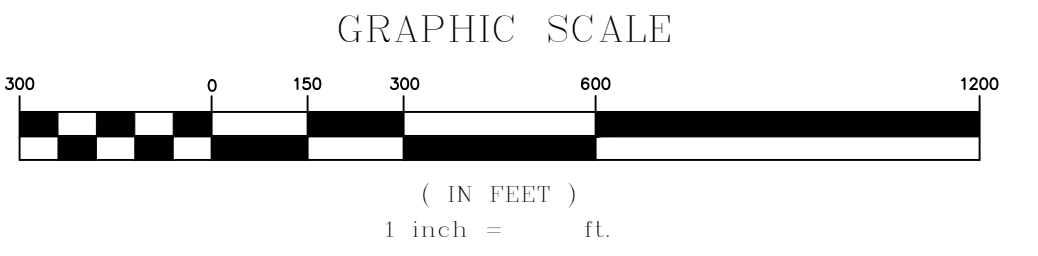
- 1 Robert Shaffer Jr
- 2 Michael A & Joy E Patterson
- 3 Stephen J & Lisa M Patterson
- 4 Sportsmen's Club
- 5,31,32,33 Christopher Jr & Corey Diamond
- 6,14 Harley E Sr & Geneva C Brown
- 7 Not Available
- 8 Charles Hospodavis
- 9,74,75 R & J Rentals
- 10 Thomas D Mills Jr
- 11 Zachary J Wood
- 12 Trissa D & Jason D Newhouse
- 13 Lina Lou Fabery
- 15 Mark & Tammy Gilbert
- 16 Michael Eugene & Dawn Lee King
- 17,20 Philip Wolff
- 18,19 Christopher W & Linda J Diamond
- 21 Mark E & Rebecca Kusniar
- 22 William D Demaske
- 23,28 Mark A Show
- 24,25 Gary R & Sheila K Clark
- 26 Rosella J Brain
- 27 Karen A Yanak
- 29 Alex J Skupnick
- 30 Christopher W & Linda J Diamond
- 34,37 Jonathan Petal Piper
- 35,36 Gregory S & Brenda L Wingrove
- 38,40 First Energy Generation
- 41 Lance Howell
- 42 Bradley A & Rachel D Morris
- 43 Thomas W & Betty Maldovan
- 44 Katherine L Barnhart
- 45 Lisa E Feiler
- 46 Amy A Giardina
- 47,48,49 Franklin D & Kathy M Maldovan
- 50,51 Jason & Kathryn Appleton
- 52 George B & Nila J Rowe
- 53 Bryan R & Lauren M Nermal
- 54,56 Christopher J Latin Sr
- 55 Foggy Meadows Resources LLC
- 57 Daniel L & Marsha Lynn Hearndon
- 58 Matthew Jacobs Et Al
- 59,60 Brad & Julie M Paoli
- 61,62 Harry D & Florence L Dice
- 63 Joseph Demaske
- 64 Joseph V & Thomas S Trupkovich
- 65 Tyler R & Aunica D Kinsner
- 66,68,69 Vincent L & Patricia Demaske
- 70 Terry & Goldie Hagedorn
- 71 Eric L Sherry & Rachel E Hagedorn-Sherry
- 72 David M & Geraldine Shannon
- 73 Michael A & Angela Glebis
- 74 William J & Lynda J Riffle
- 76 Arthur B & Pamela Jarrett
- 77 Laurel Anne Patterson
- 78 Shelly R & Brian D Grimm
- 79,80 Kimberly L & Steven W Holt
- 81 Cody D Grimm
- 82 Christopher J Patterson-Thorp
- 83 David E Smith
- 84 Ronald A & Charlene Decarlo
- 85,86,87 Orville & Maxine Higbotham
- 88 Mark E & Rebecca A Kusniar



LEGEND

- EXISTING ROADS
- PROPERTY LINES
- EXISTING CONTOURS
- EXISTING STREAMS
- AOR BOUNDARY
- 1/4 MILE BOUNDARY
- OFFLOADING AREA
- ACCESS ROAD
- GAS AND OIL WELL
- PROPOSED INJECTION WELL
- EXISTING STRUCTURE
- DEEP MINE (INACTIVE)

- NOTES:**
- (1) No fault lines are present within the herein plat.
 - (2) All Oil and Water wells were identified using Pennsylvania public records from PADEP Efacts and Pennsylvania Groundwater Information System.
 - (3) All residences located within - receive water from the Mountain Water Association.



Seal

	Date
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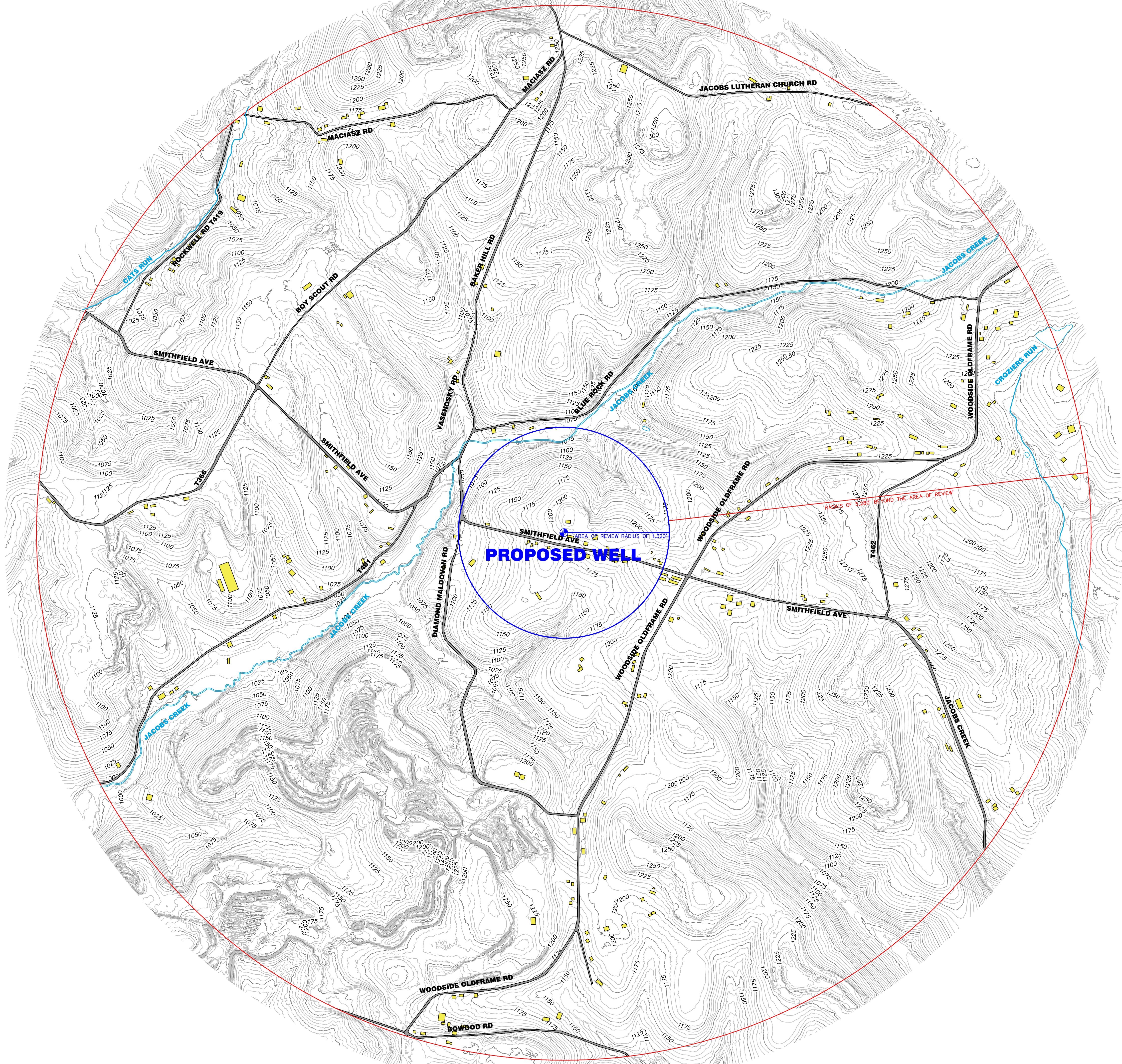
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**CLASS II PERMIT APPLICATION
MAP #2- 1/4 MILE BEYOND THE
AREA OF REVIEW (AOR)
FOR
G2 STEM, LLC HIGHBOTHAM WELL**

	Date
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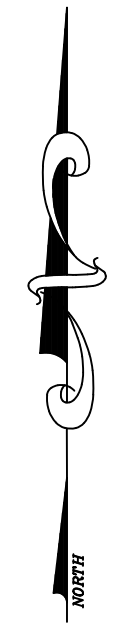


LEGEND

	EXISTING ROADS
	PROPERTY LINES
	EXISTING CONTOURS
	EXISTING STREAMS
	AOR BOUNDARY
	ONE MILE BOUNDARY
	OFFLOADING AREA
	PROPOSED INJECTION WELL
	EXISTING STRUCTURE

NOTES:

- (1) No fault lines/formation outcrops or confining formation outcrops are present within 1 mile of well.
- (2) No surface water intake and discharge structures are present within 1 mile of well.
- (3) No hazardous waste treatment, storage or disposal facilities are present within 1 mile of well.



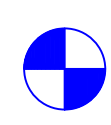
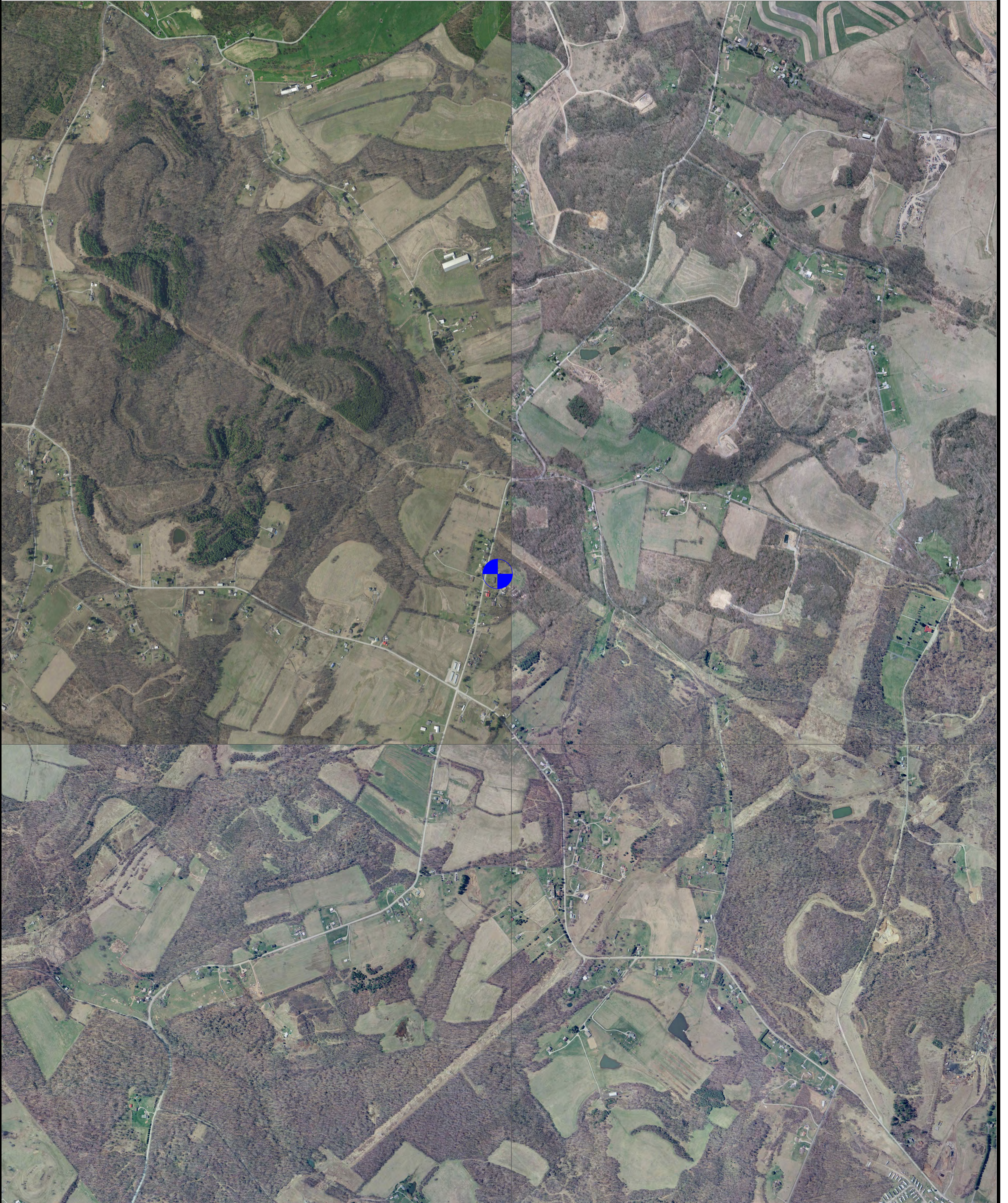
**CLASS II PERMIT APPLICATION
MAP #3- ONE MILE BEYOND
AREA OF REVIEW (AOR)
FOR
G2 STEM, LLC HIGINBOTHAM WELL**



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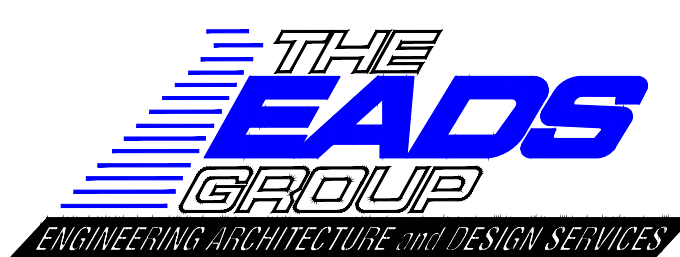


PROPOSED INJECTION WELL

LEGEND



**CLASS II PERMIT APPLICATION
MAP #3- ONE MILE BEYOND
AREA OF REVIEW (AOR)
FOR
G2 STEM, LLC HIGINBOTHAM WELL**



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File No.	

No.	Sheet Revisions	Date

Seal
Date

Addendum 4			
Map ID	Name	Tax ID	Address
1	Robert Shaffer Jr	24-04-0055	1095 B Georges Fairchance Rd, Smithfield, PA 15478
2	Michael A & Joy E Patterson	24-04-0056-02	204 Yasenosky Rd, Smithfield, PA 15478
3	Stephen J & Lisa M Patterson	24-04-0056-01	170 Yasenosky Rd, Smithfield, PA 15478
4	Sportsmen's Club	24-04-0059	229 Castle Rd, West Mifflin, PA 15122
5	Christopher Jr & Corey Diamond	24-04-0054-01	304 Morgantown St, Uniontown, PA 15401
6	Harley E Sr & Geneva C Brown	24-04-0064	130 Blue Rock Rd, Smithfield, PA 15478
7	Not Available	24-04-0060	
8	Charles Hospodavis	24-05-0058	558 East 600 Noth, Valparaiso, IN 46383
9	R & J Rentals	24-04-0061	149 River Ave, Masontown, PA 15461
10	Thomas D Mills Jr	24-05-0037	585 Woodside Oldfarm Rd, Smithfield, PA 15478
11	Zachary J Wood	24-05-0039-01	603 Woodside Oldfarm Rd, Smithfield, PA 15478
12	Trissa D & Jason D Newhouse	24-04-0062	156 Blue Rock Rd, Smithfield, PA 15478
13	Lina Lou Fabery	24-04-0063	214 Bliss Ave, PO Box 774, Nemaocolin, PA 15351
14	Harley E Sr & Geneva C Brown	24-04-0064	130 Blue Rock Rd, Smithfield, PA 15478
15	Mark & Tammy Gilbert	24-04-0064-01	PO Box 61, Smithfield, PA 15478
16	Michael Eugene & Dawn Lee King	24-04-0065	116 Blue Rock Rd, Smithfield, PA 15478
17	Philip Wolff	24-04-0053	113 Yasenosky Rd, Smithfield, PA 15478
18	Christopher W & Linda J Diamond	24-04-0054	275 Jacobs Creek Rd, Smithfield, PA 15478
19	Christopher W & Linda J Diamond	24-04-0051	275 Jacobs Creek Rd, Smithfield, PA 15478
20	Philip Wolff	24-04-0053	113 Yasenosky Rd, Smithfield, PA 15478
21	Mark E & Rebecca A Kusniar	24-04-0066	150 Dixon Blvd, Uniontown, PA 15401
22	William D Demaske	24-04-0087-02	100 Maldovan Rd, Smithfield, PA 15478
23	Mark A Show	24-04-0088	PO Box 125, Leckrone, PA 15454
24	Gary R & Sheila K Clark	24-04-0101	707 Smithfield Masontown Rd, Smithfield, PA 15478
25	Gary R & Sheila K Clark	24-04-0101-01	707 Smithfield Masontown Rd, Smithfield, PA 15478
26	Rosella J Brain	24-04-0102	216 Gray Ave, Masontown, PA 15461
27	Karen A Yanak	24-04-0103	PO Box 392, Smithfield, PA 15478
28	Mark A Show	24-04-0104	PO Box 125, Leckrone, PA 15454
29	Alex J Skupnick	24-04-0105	719 Smithfield Masontown Rd, Smithfield, PA 15478
30	Christopher W & Linda J Diamond	24-04-0051	275 Jacobs Creek Rd, Smithfield, PA 15478
31	Christopher Jr & Corey Diamond	24-04-0099	329 Jacobs Creek Rd, Smithfield, PA 15478
32	Christopher Jr & Corey Diamond	24-04-0099-01	329 Jacobs Creek Rd, Smithfield, PA 15478

33	Christopher Jr & Corey Diamond	24-04-0099-02	329 Jacobs Creek Rd, Smithfield, PA 15478
34	Jonathan Petal Piper	24-04-0089	327 Jacobs Creek Rd, Smithfield, PA 15478
35	Gregory S & Brenda L Wingrove	24-04-0089-01	334 Jacobs Creek Rd, Smithfield, PA 15478
36	Gregory S & Brenda L Wingrove	24-04-0089-02	334 Jacobs Creek Rd, Smithfield, PA 15478
37	Jonathan Petal Piper	24-04-0089	327 Jacobs Creek Rd, Smithfield, PA 15478
38	First Energy Generation	24-04-0078	76 S Main St, Akron, OH 44076
39	Michael S & Judy L Joplin	24-04-0078-01	204 Diamond Maldovan Rd, Smithfield, PA 15478
40	First Energy Generation	24-04-0078	76 S Main St, Akron, OH 44076
41	Lance Howell	24-04-0087-01	151 Diamond Maldovan Rd, Smithfield, PA 15478
42	Bradley A & Rachel D Morris	24-04-0087	216 Bowens Mill Rd, Bonaire, GA 31005
43	Thomas W & Betty Maldovan	24-04-0085	633 Smithfield Masontown Rd, Smithfield, PA 15478
44	Katherine L Barnhart	24-04-0084	629 Smithfield Masontown Rd, Smithfield, PA 15478
45	Lisa E Feiler	24-04-0083	621 Smithfield Masontown Rd, Smithfield, PA 15478
46	Amy A Giardina	24-04-0082	613 Smithfield Masontown Rd, Smithfield, PA 15478
47	Franklin D & Kathy M Maldovan	24-04-0086	611 Smithfield Masontown Rd, Smithfield, PA 15478
48	Franklin D & Kathy M Maldovan	24-04-0086-02	611 Smithfield Masontown Rd, Smithfield, PA 15478
49	Franklin D & Kathy M Maldovan	24-04-0086-01	611 Smithfield Masontown Rd, Smithfield, PA 15478
50	Jason & Kathryn Appleton	24-04-0079	1519 Sheridan Ave, Brownsville, PA 15417
51	Jason & Kathryn Appleton	24-04-0079-01	1519 Sheridan Ave, Brownsville, PA 15417
52	George B & Nila J Rowe	24-04-0081	585 Smithfield Masontown Rd, Smithfield, PA 15478
53	Bryan R & Lauren M Nermal	24-04-0080	579 Smithfield Masontown Rd, Smithfield, PA 15478
54	Christopher J Latin Sr	24-04-0074	108 Clover Ln, Stahlstown, PA 15687
55	Foggy Meadow Resources LLC	24-04-0072	30 Pond Rd, Smithfield, PA 15478
56	Christopher J Latin Sr	24-04-0074	108 Clover Ln, Stahlstown, PA 15687
57	Daniel L & Marsha Lynn Hearndon	24-04-0075	485 Woodside Oldframe Rd, Smithfield, PA 15478
58	Matthew Jacobs Et Al	24-04-0077-02	455 Woodside Oldframe Rd, Smithfield, PA 15478
59	Brad & Julie M Paoli	24-04-0077-03	321 Pin Oak Ln, Smithfield, PA 15478
60	Brad & Julie M Paoli	24-04-0077-01	321 Pin Oak Ln, Smithfield, PA 15478
61	Harry D & Florence L Dice	24-04-0077-05	439 Woodside Oldframe Rd, Smithfield, PA 15478
62	Harry D & Florence L Dice	24-04-0077-04	439 Woodside Oldframe Rd, Smithfield, PA 15478
63	Joseph Demaske	24-13-0001	428 Woodside Oldframe Rd, Smithfield, PA 15478
64	Joseph V & Thomas S Trupkovich	24-04-0118	PO box 327, Smithfield, PA 15478
65	Tyler R & Aunica D Kisner	24-04-0119	454 Woodside Oldframe Rd, Smithfield, PA 15478
66	Vincent L & Patricia Demaske	24-04-0076	541 Smithfield Masontown Rd, Smithfield, PA 15478

67	Terry & Goldie Hagedorn	24-04-0076-01	Woodside Oldframe Rd, Smithfield, PA 15478
68	Vincent L & Patricia Demaske	24-04-0076	541 Smithfield Masontown Rd, Smithfield, PA 15478
69	Vincent L & Patricia Demaske	24-05-0061	529 Smithfield Masontown Rd, Smithfield, PA 15478
70	Eric L Sherry & Rachel E Hagedorn-Sherry	24-05-0062	529 Smithfield Masontown Rd, Smithfield, PA 15478
71	David M & Geraldine Shannon	24-05-0027	484 Smithfield Masontown Rd, Smithfield, PA 15478
72	Michael A & Angela Glebis	24-05-0027-03	578 Woodside Oldframe Rd, Smithfield, PA 15478
73	William J & Lynda J Riffle	24-05-0031	564 Old Frame Rd, Smithfield, PA 15478
74	R & J Rentals	24-05-0032-01	149 River Ave, Masontown, PA 15461
75	R & J Rentals	24-05-0032	149 River Ave, Masontown, PA 15461
76	Arthur B & Panela Jarrett	24-05-0033	PO Box 329, Smithfield, PA 15478
77	Laurel Anne Patterson	24-04-0071-01	551 Woodside Oldframe Rd, Smithfield, PA 15478
78	Shelly R & Brian D Grimm	24-05-0060	555 Woodside Oldframe Rd, Smithfield, PA 15478
79	Kimberly L & Steven W Holt	24-05-0035	577 Woodside Oldframe Rd, Smithfield, PA 15478
80	Kimberly L & Steven W Holt	24-05-0036	577 Woodside Oldframe Rd, Smithfield, PA 15478
81	Cody D Grimm	24-04-0071-02	555 Woodside Oldframe Rd, Smithfield, PA 15478
82	Christopher J Patterson-Thorpe	24-04-0071	128 Thorpe Rd, Smithfield, PA 15478
83	David E Smith	24-04-0070	596 Smithfield Masontown Rd, Smithfield, PA 15478
84	Ronald A & Charlene Decarlo	24-04-0069	586 Smithfield Masontown Rd, Smithfield, PA 15478
85	Orville & Maxine Higinbotham	24-04-0068	594 Smithfield Rd, Smithfield, PA 15478
86	Orville & Maxine Higinbotham	24-04-0068-02	594 Smithfield Rd, Smithfield, PA 15478
87	Orville & Maxine Higinbotham	24-04-0068-01	594 Smithfield Rd, Smithfield, PA 15478
88	Mark E & Rebecca A Kusniar	24-04-0066	150 Dixon Blvd, Uniontown, PA 15401

ADDENDUM 5						
Map ID	Client Name	Site Name	Site ID	Other ID	Site Status	Status if inactive
1	Manufacturers Light and Heat Co	John & Effie Hospodavis G934	40690	051-00002	Active	
2	Diversified Prod LLC	Yasenosky Unit 4 OG Well	720088	051-24216	Active	
3	Diversified Prod LLC	Yasenosky 1 OG Well	676105	051-23389	Active	
4	Columbia Gas Trans LLC	Frank & Josephine Moze G919	41021	051-20123	Inactive	Plugged OG Well
5	Diversified Prod LLC	Yasenosky 2 OG Well	708540	051-24048	Active	
6	Lynn Mary	Jellick/Lynn 1 OG Well	713108	051-00263	abandoned	
7	Murphy Prod Inc	Louther Wedge 1 Well	41289	051-20391	Active	
8	Manufacturers Light and Heat Co	Emma Honsaker G670 Well	40739	051-00061	Inactive	Plugged OG Well
9	Duquesne Natural Gas Co	John Spak 329 Well	40695	051-00011	Inactive	Plugged OG Well
10	Murphy Prod Inc	Frances R Griffin Unit 2 OG Well	41504	051-20606	Active	
11	RE Gas Dev LLC	Derosa 1 Well	41380	051-20482	Active	
12	Diversified Prod LLC	Earl Diamond 1 Well	41375	051-20477	Active	
13	Manufacturers Light and Heat Co	Dominick Diamond G915 Well	40754	051-00076	Inactive	Plugged OG Well
14	The Production Co LLC	Berkshire 1 Well	40789	051-00111	Active	
15	Manufacturers Light and Heat Co	Alfred CINCI G929 Well	40758	051-00080	Inactive	Plugged OG Well
16	The Production Co LLC	Mayher 1 Well	40783	051-00105	Active	
17	Douglas Oil & Gas Inc	Spak Unit 1 Well	41384	051-20486	Inactive	Plugged OG Well
18	Atlas Resources Inc	Yasenosky 1 OG Well	667714	051-23176	Inactive	Proposed
19	Murphy Prod Inc	H Murphy Unit 1 OG Well	41398	051-20500	Active	

14,600' S 39°52'30"
5,925' W 79°50'00"

(A)

SMITHFIELD
20470

ER-OG-4: Rev. 6/84

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF OIL AND GAS REGULATION
PITTSBURGH, PENNSYLVANIA 15206-2988

Office Use Only

Code: C

WELL RECORD

PERMIT NO. 37-051-20470-00 PROJECT NO. TYPE OF WELL GAS

Highhouse Field - Dev. Woodside Pool. WEL OPERATOR Douglas Oil & Gas, Inc. TELEPHONE NO. (412) 362-8808

ADDRESS 5741 Centre Avenue, Pittsburgh, PA ZIP 15206

FARM NAME Orville Higinbotham FARM NO. #1 SERIAL NO. ACRES 8.17

TOWNSHIP Nicholson COUNTY Fayette

DRILLING COMMENCED 2/28/87 DRILLING COMPLETED 3/3/87

ELEVATION 1200' GL 1210' KB QUADRANGLE Smithfield Section 7 (A) 7 1/2' 15'

CASING AND TUBING RECORD

PIPE SIZE	AMOUNT IN WELL	MATERIAL BEHIND PIPE		PACKER			DATE RUN
		CEMENT (SKS.)	GEL (SKS.)	TYPE	SIZE	DEPTH	
12"	40'	Filled in with well cuttings					2/28/87
8 5/8"	1310'	170 SKS Howcolite 60 SKS Class A		Guide Shoe Basket	8 5/8"		3/2/87
4 1/2"	3516'	90 SKS Howcolite 135 SKS 25/75 Poz		Guide Shoe Flapper Insert	4 1/2"		3/4/87
		T.D.	D.D.	D.P.I.	Class	O G	Lease
		3525		3417	D	1	1

PERFORATION RECORD

STIMULATION RECORD

DATE	INTERVAL PERFORATED FROM	TO		DATE	INTERVAL TREATED	AMOUNT FLUID	AMOUNT SAND	INJECTION RATE
3/9/87	3407'	3417'	11 shots	3/09/87	Balltown	14,000 gal	34,000#	28BPM

NATURAL OPEN FLOW

NATURAL ROCK PRESSURE

HRS.

500 MCF

N.A.

AFTER TREATMENT OPEN FLOW

AFTER TREATMENT ROCK PRESSURE

72 HRS.

4.8 MCF 4,800 MCF

1375#

REMARKS:

* 8 5/8" Csg.: Circulated cement to surface

Drilling Contractor: Ipsco Rig #10

Cementing: Halliburton

Open Hole Logging: Dresser-Atlas

Cased Hole Logging: Dresser-Atlas

Stimulation: Halliburton

Handwritten:
M. J. Cooper
7-9-87
Bradford

(FORM TO BE RETURNED TO REVERSE SIDE)

OCT 2 11 1987

PA GEOLGICAL SURVEY
PITTSBURGH, PA

Handwritten:
RECEIVED

FORMATIONS						
NAME	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (FRESH OR SALT WATER)	SOURCE OF DATA
Coal Spoils	0	20'				Driller
Sand	20'	331'			70' 1" Stream	
Sand & Shale	331'	362'				
Red Rock	362'	456'				
Shale	456'	900'				
Sandy Shale	900'	975'				
Shale	975'	1075'	S/G 1000'		945' 1" Stream	
Red Rock	1075'	1100'				
Shale	1100'	1150'				
Red Rock	1150'	1225'				
Shale	1225'	1250'				
Red Rock	1250'	1275'				
Lime	1275'	1340'				
Sand	1340'	1550'	S/G 1450			
Shale	1550'	1780'				
Sandy Shale	1780'	2235'				
Shale	2235'	2310'				
Sand & Shale	2310'	3400'	S/G 2610			
Sand	3400'	3440'	Gas 3416			
Shale	3440'	T.D.				
	D.T.D.	<u>3525'</u>				
Log Formation Tops						
Loyalhanna	1342'	1393'				
Big Injun	1393'	1535'				
Squaw	1571'	1688'				
Second Gas	1776'	1789'				
Murrysville	1817'	1850'				
Gantz	1891'	1933'				
Nineveh	1993'	2028'				
Gordon Stray	2085'	2091'				
Gordon	2143'	2149'				
Fifth Stray	2339'	2376'				
Fifth	2380'	2427'				
Lower Fifth	2444'	2466'				
Lower Bayard	2509'	2541'				
Speechley	3134'	3142'				
Balltown	3405'	3420'				
	L.T.D.	3520'				
T.D.: 3525'		Bradford				

DATE April 29 1987

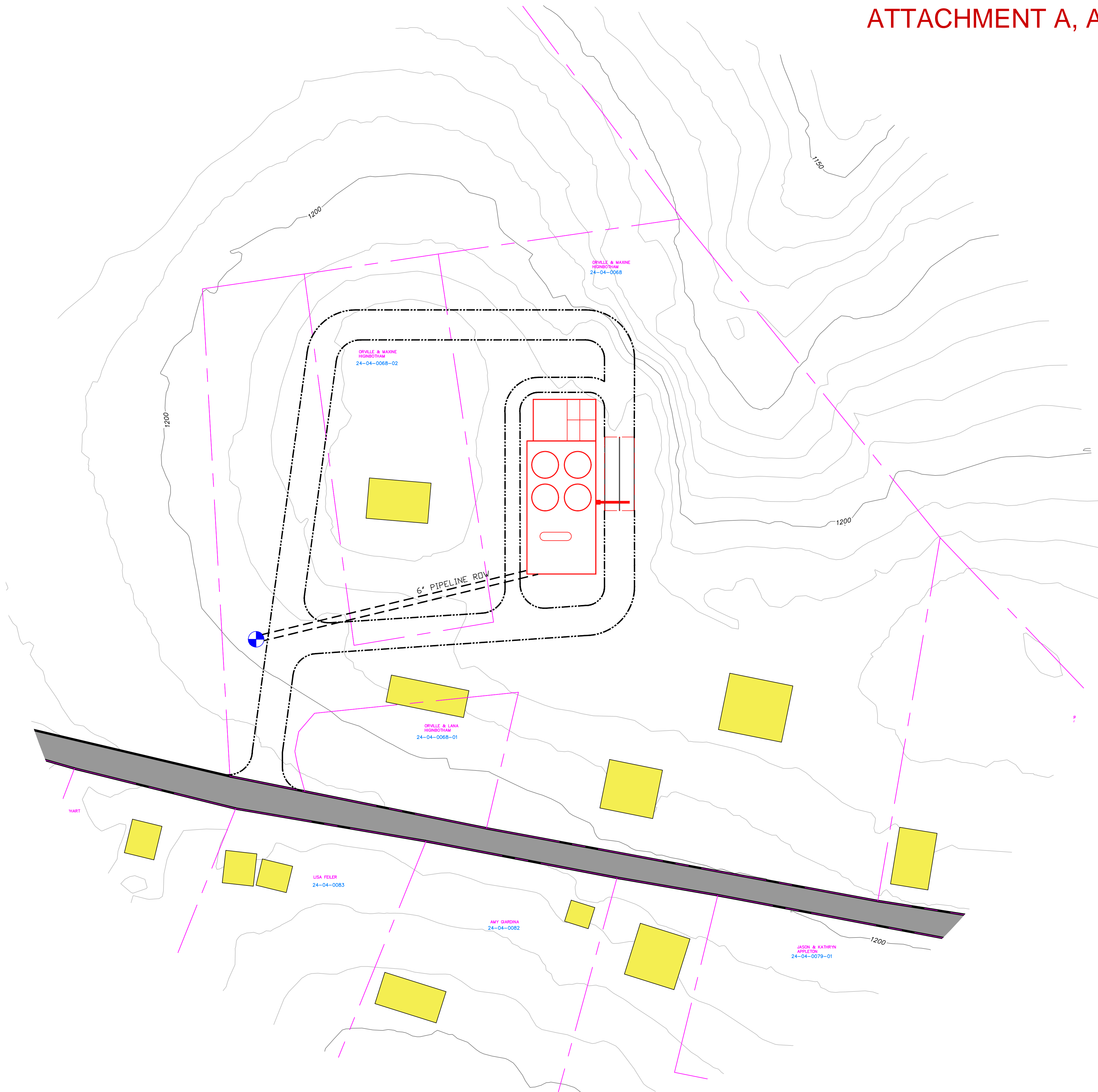
APPROVED BY Thomas J. Appaly
TITLE Exploration Geologist







RECEIVED

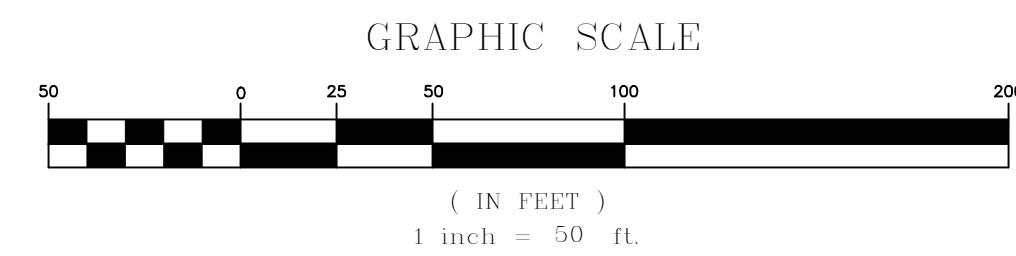
REGISTERED

STATE OF OHIO
DEPARTMENT OF REVENUE

ATTACHMENT A, ADDENDUM 8



- LEGEND**
-  EXISTING ROADS
 -  PROPERTY LINES
 -  OFFLOADING AREA
 -  ACCESS ROAD
 -  EXISTING STRUCTURE
 -  PROPOSED INJECTION WELL



Seal

Date

No.	Sheet Revisions	Date

Scale
1"=50'

Date
05/31/2022


Drawn By
LRH

Checked By
JPS

Project No.
023022-310

File No.
G2_HIGINBOTHAM

CLARION OFFICE
15392 ROUTE 322
CLARION, PA 16214
(814) 764-5050 FAX
MAIL: clarion@theadsgroup.com



ENGINEERING ARCHITECTURE AND DESIGN SERVICES

FACILITY PROPERTY BOUNDARY FOR G2 STEM, LLC HIGINBOTHAM WELL

NICHOLSON TOWNSHIP, FAYETTE COUNTY, PA

ADDENDUM

1

Dear Sir or Madame,

This purpose of this letter is to provide constructive notice of the efforts of G2 Stem, LLC, a Virginia Limited Liability Company, to obtain and convert the Orville Higinbotham Well No.1 (API# 37-051-20470), which is currently owned and operated by Diversified Production LLC, to a Class IID Underground Injection Control (“UIC”) Well. Injection wells are also known as “saltwater disposal wells” and/or “brine disposal wells” and are constructed for the disposal of salt water (brines) and other fluids associated with oil and gas exploration and production. Currently there are approximately 30,000 Class IID wells in the United States and around, however, only around 300 of these wells are located in the Marcellus and Utica Shale Play area. This transition and operation will be closely monitored and regulated by both the Pennsylvania Department of Environmental Protection (“PA DEP”) and the United States Environmental Protection Agency (“US EPA”) and will also be regulated under the Safe Drinking Water Act.

Attached to this letter you will find some additional information on UIC wells and why they are a vital part of the continued operation and development of oil and gas activity in the Appalachian Basin. If you would like more information on UIC wells, please feel free to contact me at your convenience.

Sincerely,

Sean R. Parsons
Landman
Honor Resources Company
Authorized Agent for G2 Stem, LLC
(304) 531-0162

ATTACHMENT A, ADDENDUM 10

051-~~90075~~ 8-3-13

WELL RECORD 00076

Name Greensboro Gas Co. Co. Fayette Twp. Nicholson No 1-915 Quad Mason town S.E. $\frac{1}{4}$

Owner Dominick Diamond Contr. Devine Bros., Waynesburg, Pa. Location by sketch Y-8-814

Dates; started 3/3/40 completed 5/10/40 Product Gas

Elev. top of well 1130 ft How obtained Spirit level

Location by description See print Y-8-814

S-710 051-00076

400' S of 39°50'00"
(4) 6,850' W by 79°50'00" 7½
Smithfield, Pa.
No info

Distance and direction from nearest oil or gas well -

Certified correct by *Harry H. Fowler* Position Land Dept Office Manager

Description of formations	Thick-ness	From	To	Description of formations	Thick-ness	From	To
Slate, Lime, Sand & Shells	375	0	375	Slate & Shells	25	1427	1452
Big Dunkard Sand	25	375	420	Squaw Sand	138	1452	1590
Sand, Slate & Shells	100	420	520	Slate & Shells	248	1590	1838
Coal	2	520	522	50' Sand	67	1838	1905
Slate, Lime & Sand	298	522	820	Slate, Shells & Sand	163	1905	2068
Salt Sand	94	820	914	Gordon Stray	12	2068	2080
Slate, Shells & Lime	306	914	1220	Slate, Shells & Rock	184	2080	2254
Big Injun	227	1220	1427	lth Sand	9	2254	2263

ATTACHMENT A, ADDENDUM 11

Smithfield 7.5' Quad
051-00076

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION

400'S 39° 50' 00"
8350'W 79° 50' 00"
(4)

CERTIFICATE OF PLUGGING WELL THROUGH WORKABLE COAL SEAMS

Highhouse Field

Earl F. and Iva Jane Diamond
Coal Operator or Owner
R.D. #2, Smithfield, Pennsylvania
Address

Coal Operator or Owner
Address

Coal Operator or Owner
Address

The Manufacturers Light and Heat Company
Name of Well Operator
800 Union Trust Building
Pittsburgh, Pennsylvania
Address

June 3, 1965
Date

Nicholson Township
Fayette County

Farm Dominick Diamond
Well (Farm) No. 1 Serial No. G-915
None
Coal Representative Observing

Division Representative Supervising

We, the undersigned representatives of the well operator certify that we participated in the plugging of the above well, and that the work was started April 29 1965, and that the well was plugged as follows:

Filling Material and Plugs	From	To	Casing and Tubing		
			Size	Pulled	Left
Aquagel	2530'	2316'	10-3/4"	-	209'-5"
Cement	2316'	2296'	8-5/8"	514'	366'-7"
Aquagel	2296'	1936'	7"	599'	837'-1"
Slate	1936'	1460'	4-1/2"	1949'	596'-10"
Cement	1460'	1460'			
Slate	1460'	1460'			
Stone	1460'	467'			
2" vent.	467'	460'			
Gravel	460'	Surface			
Cement	460'	455'			
Stone and dirt	455'	390'			
	390'	Surface			
			Description of Monument		
			10" casing		

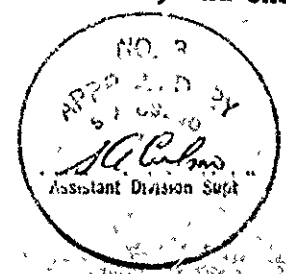
and that the work of plugging and filling said well was completed on the 26 th day of May, 1965.

Qualified Participants Wayne W. Wright
Harold J. Hanners

Permit No. 051-00076
76-P-FAY

Well Operator The Manufacturers Light and Heat Co.
Walter J. ...

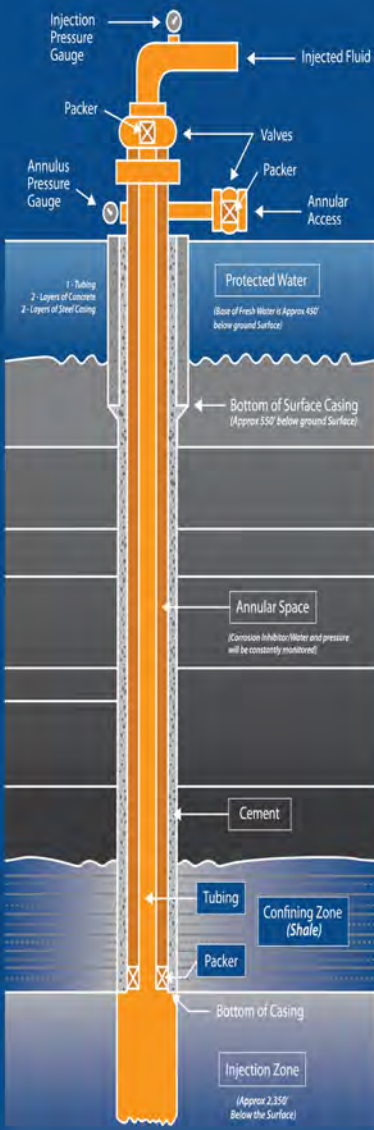
One copy of this certificate to be mailed to each coal operator or owner, and one to the Division, by registered mail, upon completion of plugging.



Class IID Underground Injection Control (UIC) Wells

What Should Pennsylvanians know?

CLASS II INJECTION WELL

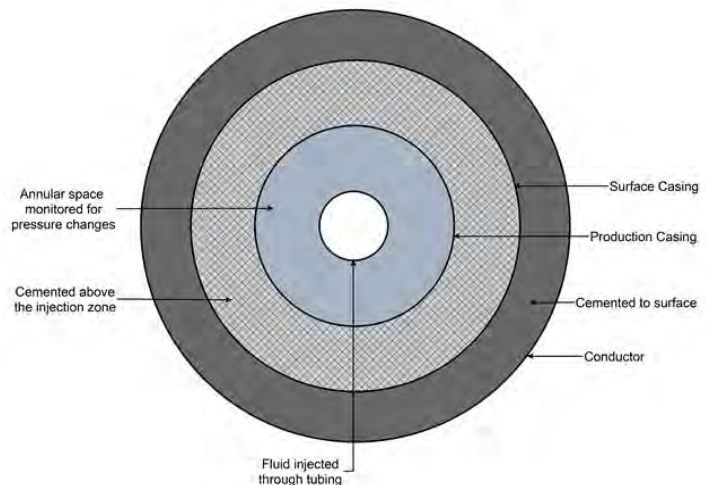


HIGHLAND FIELD SERVICES, LLC

What is a Class IID UIC Injection Well?

- It is a well that is designed, constructed, permitted and operated in accordance with US EPA (United States Environmental Protection Agency) regulations (Pursuant to the Safe Drinking Water Act). Injection wells are also known as “saltwater disposal wells” and “brine disposal wells.”
- Injection wells are deep wells that are constructed for the disposal of fluids well below any fresh water aquifers.
- UIC Class IID wells are used in conjunction with water treatment methods to manage oil and gas produced and development wastewaters.
- Class IID wells are used for the disposal of salt water (brines) and other fluids associated with oil and gas exploration and production.
- Class IID well depths typically range between approximately 2,000 feet to 8,000 feet deep.
- In some cases, depleted oil or gas production wells are converted to injection wells.
- Strict well monitoring protocols are required by EPA for operating these wells. Injection pressures and fluid volumes are some of the routine monitoring requirements during well use.

Plan View of UIC Class II Well



What is being injected? What type of Rock formation is used for waste disposal?

- Brines and other fluids associated with oil and gas production.
- State and Federal regulations do not allow any fluids classified as hazardous waste to be disposed in Class IID wells.
- Injection zones are typically certain sandstone units with a demonstrated porosity to accept fluids.
- Formations chosen for injection zones are covered by low permeable beds or cap rock, like shales, that confine liquids injected into the porous beds.
- Host rock formations selected for injection have very high naturally occurring saline fluids, concentrations that exceed 10,000 mg/L Total Dissolved Solids (TDS), which exceed drinking water standards for TDS.

How are Fresh Water Aquifers Protected?

- Class IID wells require at least four layers of protective steel casing and cement through the fresh water aquifer zones, which isolate waste fluids from drinking water aquifers.
- Injection zones are always below a layer of low permeable bedrock units (cap rock), intended to keep the fluids trapped deep in the porous formations below.
- Routine monitoring and compliance reporting is required. Both the US EPA, and the Pennsylvania Department of Environmental Protection (PADEP) have the enforcement authority to assure corrective action is implemented if warranted.

Why do Oil and Gas Companies use Injection Wells? Why do some use Injection Wells as opposed to recycling and reuse?

- The US EPA and state regulatory authorities identify underground injection as the most environmentally sound method for disposal of water generated from oil and gas well drilling, completions and production.
- Treatment plant operators have certain criteria for treatment of incoming water.
- Not all waste water meets the requirements and is more suitable for injection well disposal.
- Recycling is only effective while rig activity is high and the reuse water can be returned to a well site for a new completions activity.
- Injection wells are an economical method of disposal for waste water resulting from oil and gas production and have proven to be a safe alternative for managing drilling and production wastes for decades.



ATTACHMENT B. GEOLOGICAL and GEOPHYSICAL INFORMATION

I. Geological Data

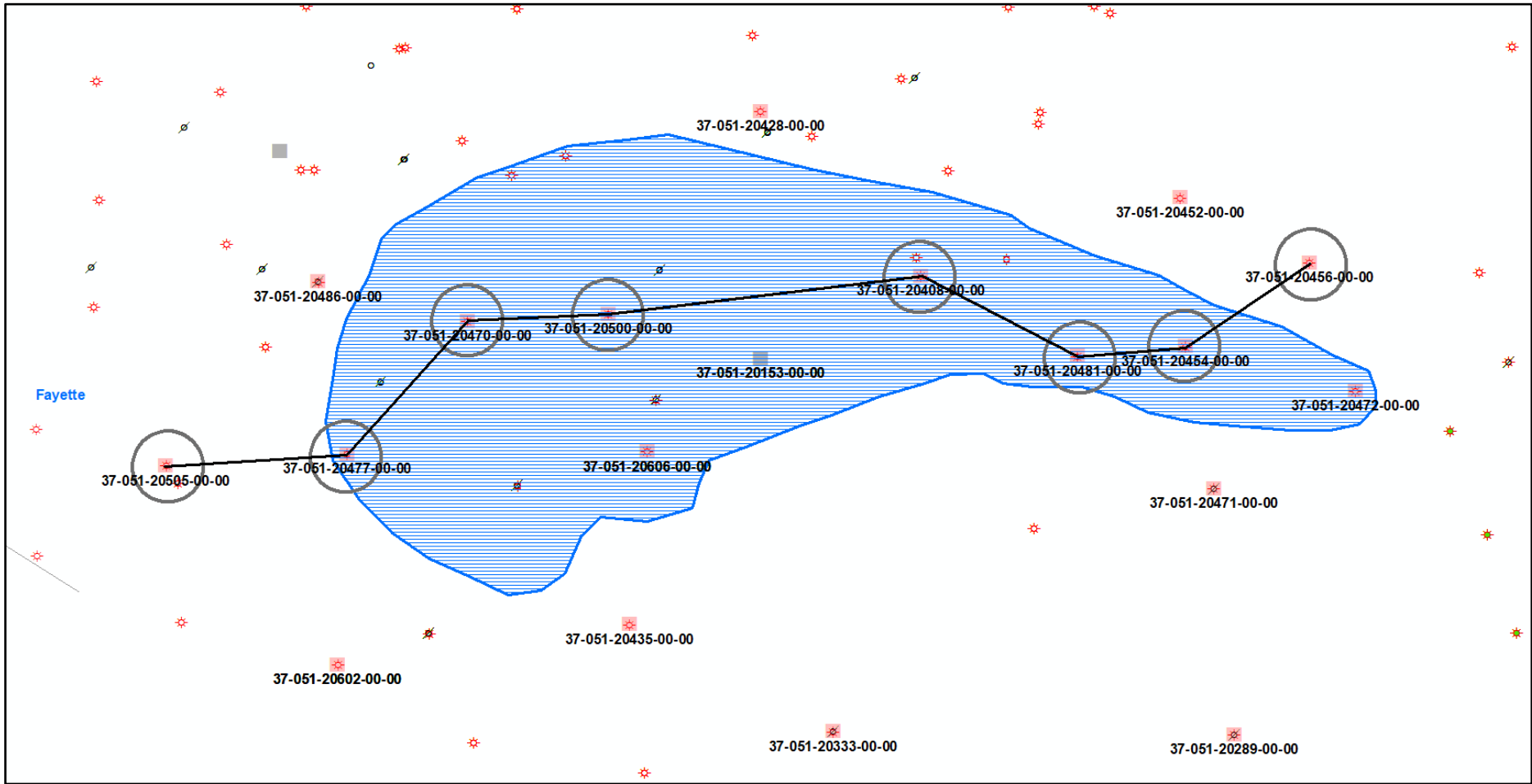
- a. See Attachment B, Addendum to include:
 - i. List of formations from surface to the base of the injection well, identifying all the USDWs and confining and injection zone(s). List includes the lithological description, geological name, thickness, depth, and total dissolved solids (TDS) concentrations from these formations, *if known*
 1. Formations are shown on Addendum 1 & 3
 2. TDS concentrations are not known.
 - ii. Source of information for the geological data and formation TDS
 1. See Attachment B, Addendum 2
 - iii. Porosity and permeability of injection formation, *if available*
 1. Not Available
 - iv. Geological cross-sections, *if available*
 1. Submitted on Attachment
 - v. Known or suspected faults and fracture systems within AOR. If identified, provide proximity to the injection zone and affect fault/fracture system may have on the injection activities
 1. No known or suspected faults or fracture systems.
 2. See Frac Log Addendum 4
 - vi. History of seismic activity in the area and proximity to crystalline (i.e. granitic) basement, *if applicable*
 1. Not Applicable as no known history of seismic activity in the area

II. Formation Testing Plan

- a. Fluid pressure
 - i. Unknown
- b. Estimated Fracture Pressure
 - i. Injection test breakdown Pressure (1340-1753 psi), ISIP 3000psi
- c. Physical and chemical characteristics of the injection zone
 - i. Fine-grained calcareous sandstone

Attachment A, Addendum List

- Addendum 1- Higinbotham Balltown Cross Section Map
- Addendum 2 - Balltown Gross Isopach
- Addendum 3 - Higinbotham #1 Log Report
- Addendum 4 - Higinbotham Frac Log
- Addendum 5 - Injectivity Test Report, Higinbotham #1



Balltown West area, Fayette Co, PA

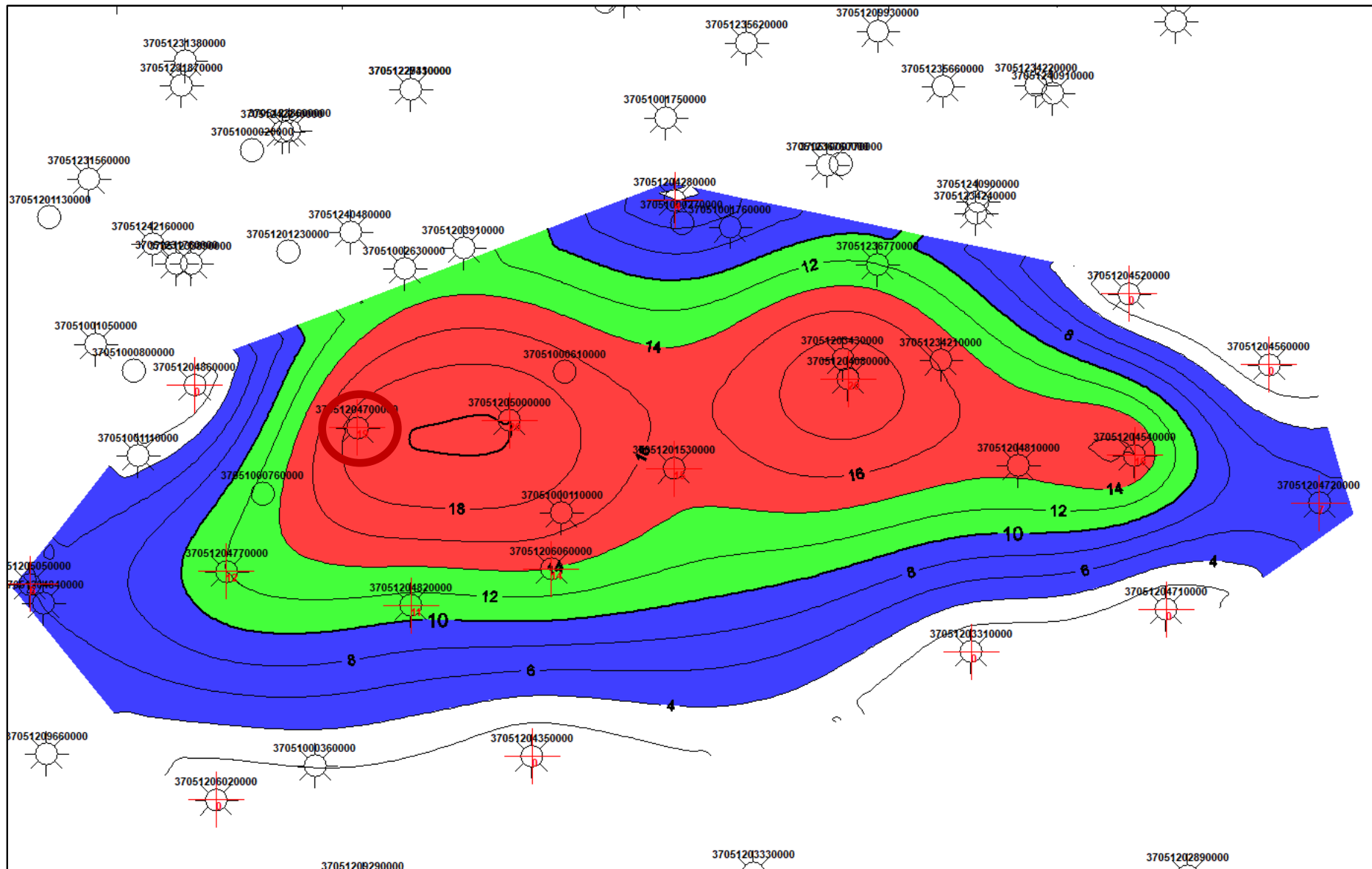
West to East cross-section location map

051-20505 051-20477 051-20470 051-20500 051-20408 051-20481 051-20454 051-20456

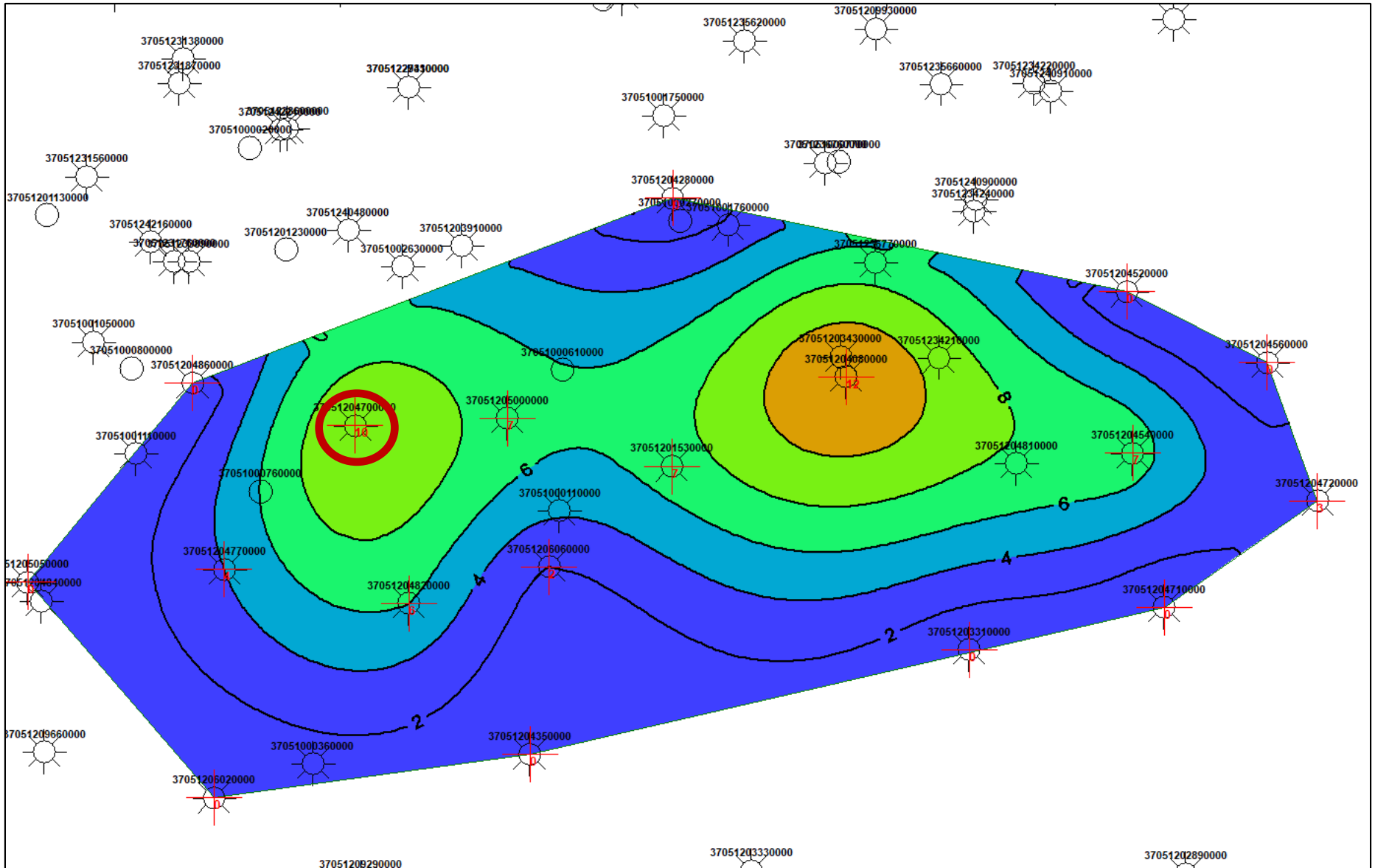


Balltown West area, Fayette Co, PA

West to East cross-section



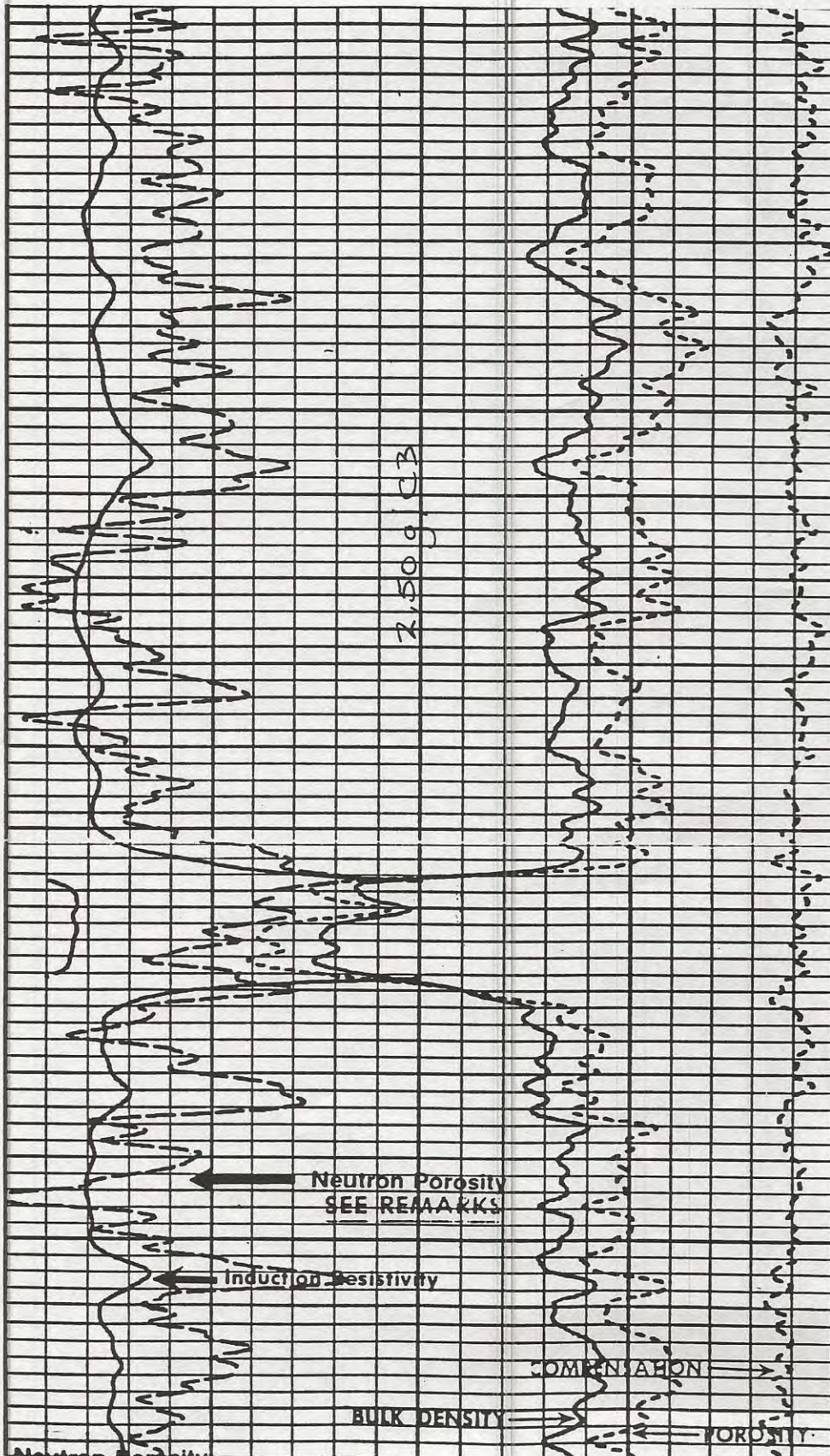
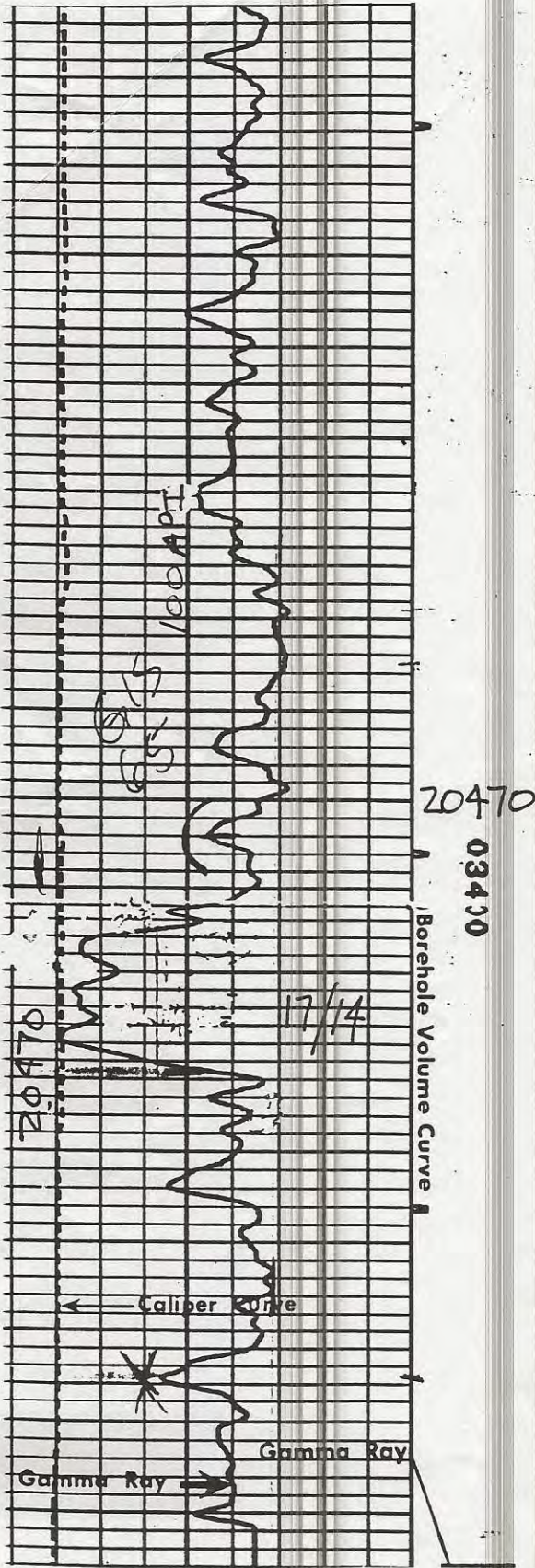
Balltown Gross Isopach



Balltown Net Sand <2.45 RhoB

20470

HIGINBOTHAM #1



CASTLE EXPLORATION COMPANY, INC.

DOUGLAS HIGINBOTHAM #1

FAY-20470

TIL 12/87?

MCF BY MONTH BY YEAR

	<u>1987</u>	<u>1988</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
January		4,836	5,349	17,273	10,895	8,903	6,260	3,017
February		4,749	19,136	19,021	12,617	6,837	4,853	4,262
March		3,512	11,231	12,781	9,593	6,791	4,753	3,244
April		3,851	15,660	8,732	8,646	8,288	5,918	3,048
May		3,615	11,146	12,048	10,975	****	4,670	3,267
June		300	10,243	13,941	8,170	7,852	4,418	3,850
July		0	9,240	8,649	8,212	5,924	4,841	
August		0	5,650	6,981	9,735	6,174	4,029	
September		1,120	8,391	8,453	6,542	6,325	4,830	
October		1,871	10,252	9,314	8,141	6,980	3,746	
November		4,536	12,332	15,192	9,533	5,311	3,800	
December	<u>1,180</u>	<u>7,216</u>	<u>19,351</u>	<u>10,904</u>	<u>6,724</u>	<u>5,537</u>	<u>4,415</u>	
Total	1,180	35,606	137,981	143,289	109,783	74,922	56,533	20,688

CUMULATIVE: 579,982 MCF

**** Data not available

1995
57,000

1996
54,000

1997
52,800

1998
51,480

Cumulative
850,359 mcf.

Type Job Acid treat.
 Fluid 3% HCl
 Fluid Source Hovco & Customer
 API Gravity — °Viscosity — CPS @ — °F
 Sand: Grade 20-40 Lb. 525 Sack Bulk
 Sand: Grade 12-20 Lb. 1000 Sack Bulk
 Surfactant: Type Soap Gal. — in Bbl. Gal. —
 Acid: Type mea. Gal. 500 % 7 1/2
 Fluid Loss Add.: Type WAL-8 Gal. 1200
 Perfpac Balls: Type — No. —
 Blocking Agent: Type — Gal. Lb. —
 Gelling Agent: Type — Gal. Lb. —
 Breaker: Type — Gal. Lb. —

Trucks (No. and Type) 6226, 6229, 7530, 5921, 7870
 Hyd. HP Available 4725 Used 4107
 Pumps On Tubing — Casing 11
 AVERAGE RATES—BPM
 Treating 45.6 Displ. — Overall —
 PRESSURES—PSI
 Breakdown 2600-2400 Maximum 2950
 Minimum 2950 Displacement 4200
 Instant Shut-In 3600 5 Min. 3350
 VOLUMES:
 Load: Bbl. Gal. 500-4200-700 Breakdown: Bbl. Gal. —
 Treatment: Bbl. Gal. 44500+500 Displ.: Bbl. Gal. 11740
 Total: Bbl. Gal. Less Displ. (11700)

TREATING LOG

TIME	Operation or Amt. and Type Fluid Pumped	RATE	PUMPS	PRESSURE—PSI		REMARKS
				TUBING	CASING	
10:30 AM	Safety Meeting	—	—			
10:41 AM	Test Lines	—	11		5100	
11:05 AM	Start Pumping mea.	5.0	11		200	
11:07 AM	Start Pumping 4200 Gal. Pad.	35.0	11		200	
11:11 AM	Start Sand	35.0	11		200	
11:17 AM	mea. on Bottom	45.6	11		2900	
11:20 AM	Pressure				3250	
11:23 AM	"				3550	
11:26 AM	"				3650	
11:29 AM	finish sand & start flush				3675	
11:30 AM	finish flush & start flush				3800	
11:35 AM					3950	
11:38 AM					4100	
11:40 AM	finish flush	45.6	11		4200	
11:50 AM	close in well					
					3050	

FORM 1387 R2

Halliburton Operator L.R. Smith

Company Representative A. G. Fye

CUSTOMER'S COPY

Copies Requested —

Supply Corp. Lease
 K-10110-10
 Well No. 1012
 Date 2-9-66



Submitted via email

December 31, 2020

David Rectenwald,
Source Water & UIC Section
Water Division
U.S. EPA Region III
40084 Mystic Park Road
Titusville, PA 16354

Subject: Injectivity Test Report
Diversified Gas & Oil Corporation Higinbotham #1 Well
API# 37-051-20470
Fayette County, Pennsylvania

Dear Mr. Rectenwald:

Attached is the Injectivity Test Report prepared by Tetra Tech, Inc. (Tetra Tech) for the Diversified Gas & Oil Corporation Higinbotham #1 Well located in Fayette County, Pennsylvania. The test was conducted on the Balltown Sandstone Formation in accordance with the EPA November 9, 2020 approval letter to conduct the test.

Thank you very much for your assistance with regard to the injectivity test. Please feel to contact me with any questions at 724-766-5987, dale.skoff@tetratech.com.

Sincerely,
Tetra Tech, Inc.

A handwritten signature in black ink that reads 'Dale E. Skoff'.

Dale E. Skoff, P.G.
Sr. Project Manager

cc: Paul Hart – Diversified Gas & Oil Corporation

INJECTIVITY TEST REPORT

**Diversified Gas & Oil Corporation
Higinbotham #1
(API# 37-051-20470)**

**Nicholson Township
Fayette County, Pennsylvania**

Diversified Gas & Oil Corporation

December 2020

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FIGURES

- Figure 1 – Proposed Injection Test Well
- Figure 2 – Well Construction Diagram
- Figure 3 – Bottomhole pressure and temperature versus elapsed time for Higinbotham #1 well injection test – November 2020
- Figure 4 – Injection rate versus elapsed time for Higinbotham #1 well injection test – November 2020
- Figure 5 – Semilog plot of pressure versus elapsed time for falloff portion of test for Higinbotham #1 well injection test – November 2020
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APPENDICES

- Appendix A – Higinbotham #1 Well Completion Report
- Appendix B – Higinbotham #1 Injection Pressure and Rate Field Measurements

1.0 INTRODUCTION AND BACKGROUND

This report summarizes the testing procedures and results for the injectivity test performed in November 2020 at the Diversified Gas & Oil Corporation (DGO) Higinbotham #1 gas well (API #37-051-20470) located in Nicholson Township, Fayette County, Pennsylvania (Figure 1). The test well is a depleted Balltown Sandstone gas well. The purpose of the injectivity test was to evaluate potential of converting the Higinbotham #1 to brine disposal as a UIC Class IID well. Diversified retained Tetra Tech, Inc. (Tetra Tech) to investigate the hydraulic feasibility of utilizing the Higinbotham #1 for brine disposal. Tetra Tech designed and implemented a testing program to determine hydraulic parameters including information about injection interval characteristics such as hydraulic conductivity, transmissivity, bottom-hole injection pressure, reservoir static pressure, potential sustainable injection rates and geologic boundaries (if any).

The Higinbotham #1 was drilled by Douglas Oil and Gas, Inc. in 1987. The well was subsequently transferred to Diversified in 2016. Figure 2 is a well construction diagram for the test well. As indicated, the well has 1310 feet of 8 5/8 inch surface casing cemented to surface and 3516 feet of 4 1/2 inch production casing, with the estimated top of cement for the production casing at 2230 ft. The well is perforated in the Balltown Sandstone interval from 3407 to 3417 feet. According to the well completion report (Appendix A), the well was also frac'd with 14,000 gallons of fluid and 34,000 pounds of sand. The well had a reported after treatment open flow of 4,800 mcf/d and a cumulative production of approximately 850 million cubic feet which is very high for an Upper Devonian well implying substantial porosity/permeability and extent of reservoir.

In preparation for the injectivity test, tubing and packer were placed in the well, with the bottom of the packer placed at a depth of approximately 3387 feet., which is approximately 20 ft above the top of the perforated Balltown Sandstone injection interval.. Also prior to injection, two bottom-hole pressure (BHP) memory gauges were placed approximately two feet beneath the packer. (Two BHP gauges were placed for redundancy.) The gauges were programmed to collect time and pressure measurements every second. Prior to and during the injection phase of the test, there was no pressure gauge on the wellhead; however, injection pressure measurements were being presented on the pump control box monitor in the Black River Pumping Services trailer.

A review of the neutron-density log for the test well indicates that porosity for the Balltown injection interval averages approximately 13 percent with the maximum porosity of approximately 15 percent. Instantaneous Shut-In Pressure (ISIP) or formation breakdown pressure values were not available for the well. The well head pressure prior to initiation of the test was 42 psi.

2.0 INJECTIVITY TESTING CONDITIONS AND IMPLEMENTATION

2.1 INJECTIVITY TEST CONDITIONS

On November 3, 2020, Tetra Tech, on behalf of Diversified, provided EPA with an injectivity test request for performing the injectivity test at the Higinbotham #1. In a letter dated November 9, 2020, EPA approved conducting the injectivity test under the following conditions:

1. **Injection Zone** – The well will be utilized to perform testing of the Balltown Sandstone formation, which will be re-perforated at approximately 3407 – 3417 feet. Injection into the authorized formation will be conducted through tubing and packer set inside the 4-1/2" long string casing above the Balltown Sandstone Formation at a depth of approximately 3387 feet.
2. **Duration of Test** – The duration of the injectivity test shall not exceed a maximum of thirty (30) consecutive days.
3. **Total Volume Limitation** – During the testing period, the total volume of fluid to be injected shall not exceed a maximum of 5000 barrels.
4. **Maximum Injection Pressure** – The maximum injection pressure (MIP) for the test into the Balltown Sandstone Formation shall be determined after conducting a Step-Rate Test to accurately measure the fracture pressure of the Balltown formation. The Step-Rate (SRT) shall be conducted in accordance with the EPA Region 8 Step-Rate Testing Procedure dated January 12, 1999. Once established, 80% of the fracture pressure (FP) and a specific gravity of 1.147, shall be used to establish a fracture gradient (FG) using the following formula:

$$FG = [(0.80 \times FP) + 1692] / 3407$$
 The Maximum Allowable Injection Pressure (MIP) shall then be calculated using the following formula:

$$MIP = (FG - 0.497) 3407$$
 If, during testing after the Step Rate Test, it is observed that the MIP pressure causes formation breakdown or fracture propagation to occur, Diversified will stop the test and contact EPA immediately to discuss alternative testing procedures.
5. **Injection Fluid** – Injection fluid shall consist of produced water (brine), with a specific gravity of 1.147.
6. **Injection Zone** – The well will be utilized to perform testing of the Balltown Sandstone formation, which will be perforated at approximately 3407 – 3417 feet. Injection into the authorized formation will be conducted through tubing and packer set inside the 4-1/2" long string casing above the Balltown Sandstone Formation at a depth of approximately 3387 feet.
7. **Monitoring** – Injection volume and pressure shall be monitored and recorded on a continuous basis. Annulus pressure, between the long string casing and

tubing/packer, shall also be monitored continuously during the injectivity test. Should any pressure anomalies occur in the annulus, injection will cease and the packer or tubing replaced/reset and injection reinitiated along with monitoring pressure in the annular space. In addition, EPA encouraged Diversified to continue to monitor formation pressure decline after injection has concluded to further enhance data analyses.

The EPA approval letter also required submittal of an injectivity test report to EPA.

2.2 INJECTIVITY TEST IMPLEMENTATION

The project team conducting the field work consisted of Diversified operations staff (overall test management, well access and brine mobilization), Mr. Chad Perkins, Consulting Petroleum Engineer with Cape Consulting, was responsible for coordinating efforts of subcontractors and overall field management of the injectivity test and logistics, Black River Pumping Services (pumping and injection pressure and annular pressure gauge monitoring) and Tetra Tech (test oversight and data evaluation). Mr. Dave Rectenwald of the USEPA Region 3 was also onsite for the initial portion of the test. The brine utilized for the injection was produced water obtained from Diversified's nearby conventional and unconventional (Marcellus Shale) producing gas wells.

The following data were measured and recorded by Black River staff under guidance from Tetra Tech staff during the injection test (Appendix B):

- Injection rate and time
- Cumulative volume
- Wellhead pressure
- Annulus pressure

It is noted there was no surface readout associated with the bottom hole pressure gauges, which were retrieved after the pressure falloff period for downloading the data.

Prior to conducting the test the Balltown Formation was re-perforated across the same interval perforated in the original completion in 1987: 3407 to 3417 ft. Brine injection was conducted on November 23 and 24, 2020. Immediately prior to injecting brine, 330 gallons of acid were placed in the well to help clean out the perforations.

As indicated above, EPA provided approval to identify the formation breakdown pressure as part of the Step-Rate Test (SRT) with the goal to utilize 80% of the breakdown pressure as the MIP for the Constant Rate Test (CRT). For the first hour of the SRT the injection rate was increased from 0.5 to 4.0 bpm with minimal pressure increase. The rate was then increased to 5 bpm in an attempt to increase pressure to identify the formation breakdown pressure. After 8 hours and 37 minutes into the test there was a minor pressure drop (approximately 50 psi) while injecting at the 5 bpm rate and a surface pressure of 1753 psi. The total cumulative injection rate at that point was approximately 2140 bbls.

After the drop in pressure, injection operations were temporarily shut down to consider whether the pressure drop may have been due to formation breakdown. Injection was paused for approximately 40 minutes before recommencing. As agreed with Mr. Rectenwald, the 1753 psi seemed low for breakdown pressure for an Upper Devonian Sandstone at that depth. Potentially the drop in pressure could be related to opening a pre-existing fracture (from the original frac job) or possibly pressure drop from the opening of a previously blocked perforation(s).

To be conservative, the decision was made to make 80% of 1753 psi, equivalent to 1402 psi, the MIP for the duration of the test (unless formation breakdown was observed at or below this level). Injection continued from that point forward with 1402 psi as the MIP during which the rate was adjusted to try to identify an optimum injection rate while staying below the assigned MIP. During this period the injection rate started at 4.5 bpm and was decreased to the 2.5 to 2.6 bpm range based on increasing pressures at the higher rates. The 2.5 to 2.6 bpm rate was maintained for the final 8 hours of the test during which the final 1500 bbls were injected. At the end of pumping the final well head pressure reading was 1380 psi. The well head pressure dropped to 0 psi within approximately 16 minutes after cessation of pumping. It is noted that the annular pressure varied between 0 and 7 psi during the test, indicating good mechanical integrity during the test. The BHP gauges were removed on November 30, 2020, which was approximately 130 hours after injection ceased and roughly five times the injection period.

3.0 BOTTOM HOLE PRESSURE DATA ANALYSIS

The plot of bottom-hole pressure and temperature versus time are shown in Figure 3. Figure 4 shows the injection rate versus time for the Higinbotham #1 test. Note in both Figures 3 and 4 a drop in pressure and injection rate during the early portion of the SRT. The pressure and injection rate drop relates to the relatively slight pressure drop while injecting (approximately 50 psi) was observed, after which injection was paused for approximately 40 minutes before recommencing. The final injection rate of 2.6 bpm was held constant for approximately the last 5 hours of the injection period of test.

Analysis of the injection test data was performed using Aqtesolv™ (Version 4.5.002) (HydroSolve, 2007) software. Aqtesolv is a widely-used software program for the interpretation of aquifer tests for confined, leaky and unconfined formations. For the analysis of the Higinbotham #1 injection test, the Theis (1935) solution for a confined formation was used.

Figure 5 shows the semilog plot of pressure versus elapsed time for the falloff portion of the Higinbotham #1 injection test. The dashed line (that portion of the line with constant slope) on Figure 5 indicates the radial flow portion of the falloff curve. Figure 6 shows the log-log plot of the pressure and derivative curve versus elapsed time for the falloff portion of the injection test. Where the slope of the derivative curve becomes zero (i.e., is horizontal) is indicative of radial flow. Figures 5 and 6 indicate that radial flow during the falloff period was achieved approximately in the time period of 0.5 to 5 hours after the falloff portion of the test began. Figure 7 shows the observed bottomhole pressure and the best-fit curve from Aqtesolv. Data from the last rate (2.6 BPM) and the early portion of the falloff period (i.e., the first approximately 5 hours of the falloff portion) were used to match the best-fit curve in Aqtesolv. Test data and interpretation results are shown in Table 1. The estimated permeability based on the best-fit curve matching is 100 md and the storage coefficient is 1.3×10^{-4} . This value of storage is reasonable for a confined formation.

Table 1. Test Data and Interpretation Results for Higinbotham #1 Well November 2020 Test.

Parameter	Value
Total Transmissivity (kh/μ)	1,000 md-ft/cp
Viscosity (μ)	1.0 cp
Interval Thickness (h)	10 ft
Estimated Permeability (k)	100 md
Porosity (average from neutron-density log)	13%
Storage Coefficient	1.3×10^{-4}
Specific Gravity (SG)	1.147

4.0 SUMMARY

The following are key findings based on injectivity testing performed on the Balltown Sandstone interval in the Diversified Higinbotham #1:

- During the injection portion of the test, the injection rate varied, but was maintained at approximately 2.5 to 2.6 bpm for the last 8 hours of injection. Injection rates varied from 0.5 to 5.0 bpm during the test. .
- A total of 4,950 bbls were injected during the test over a period of approximately 26 hours, resulting in an average injection rate of approximately 3.2 bpm.
- After 8 hours and 37 minutes into the test there was a minor pressure drop (approximately 50 psi) while injecting at the 5 bpm rate and a surface pressure of 1753 psi. The total cumulative injected volume at that time was approximately 2140 bbls. Based on experience with Upper Devonian formations in the Fayette County area and a review of the BHP data indicate that this slight pressure drop at the surface injection pressure of 1753 psi did not represent formation breakdown.
- The maximum bottom-hole pressure measured during the test was approximately 3000 psi.
- Falloff pressure data analysis indicates an estimated permeability of 100 md.
- No indications of significant geologic boundaries were identified during the test.


In summary, an evaluation of injectivity test data for the November 2020 test on the Diversified Higinbotham #1 indicates that the well has significant potential for brine disposal through injection into the Balltown Sandstone interval. This is consistent with the porous characteristics of the injection interval based on log analysis, very low static reservoir pressure and the high cumulative production of gas over the life of the well. It is not possible to accurately predict long-term injection well performance based on a relatively short duration test; however, the test results suggest that the well could potentially sustain an injection rate of approximately 2 bpm (approximately 3000 bpd) with pressures remaining under the likely UIC Class IID permit limits for maximum injection pressure, assuming the MIP would be designated at or above the maximum injection pressure identified during the test (i.e., 1402 psi). It is recommended that the MIP from a permitting standpoint be at least 1753 psi which was the highest pressure achieved during the test, and as discussed above is not believed to be related to formation breakdown.

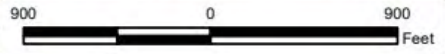
Figures

Notes:
 1) Topographic map provided by ESRI's ArcGIS Online USA Topo Maps map service (© 2013 National Geographic Society, I-cubed).
 2) Quadrangle(s) displayed: Smithfield.



Legend

 Diversified Oil & Gas, Higinbotham #1



DIVERSIFIED OIL & GAS HIGINBOTHAM #1
 FAYETTE COUNTY, PENNSYLVANIA

DRAWN BY: T. TEAFORD 12/22/2020
 CHECKED BY: D. SKOFF 12/22/2020
 APPROVED BY: D. SKOFF 12/22/2020

CONTRACT NUMBER: 212C-PB-01705

FIGURE NUMBER	REV
1	0

Figure 2
Construction Diagram - Proposed Injection Well
 Diversified Gas & Oil Corp.
Higinbotham #1
 Nicholson Township
 Fayette County, PA
 API# 37-051-20470

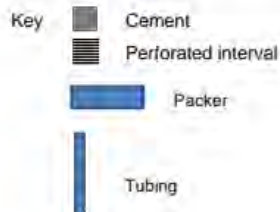
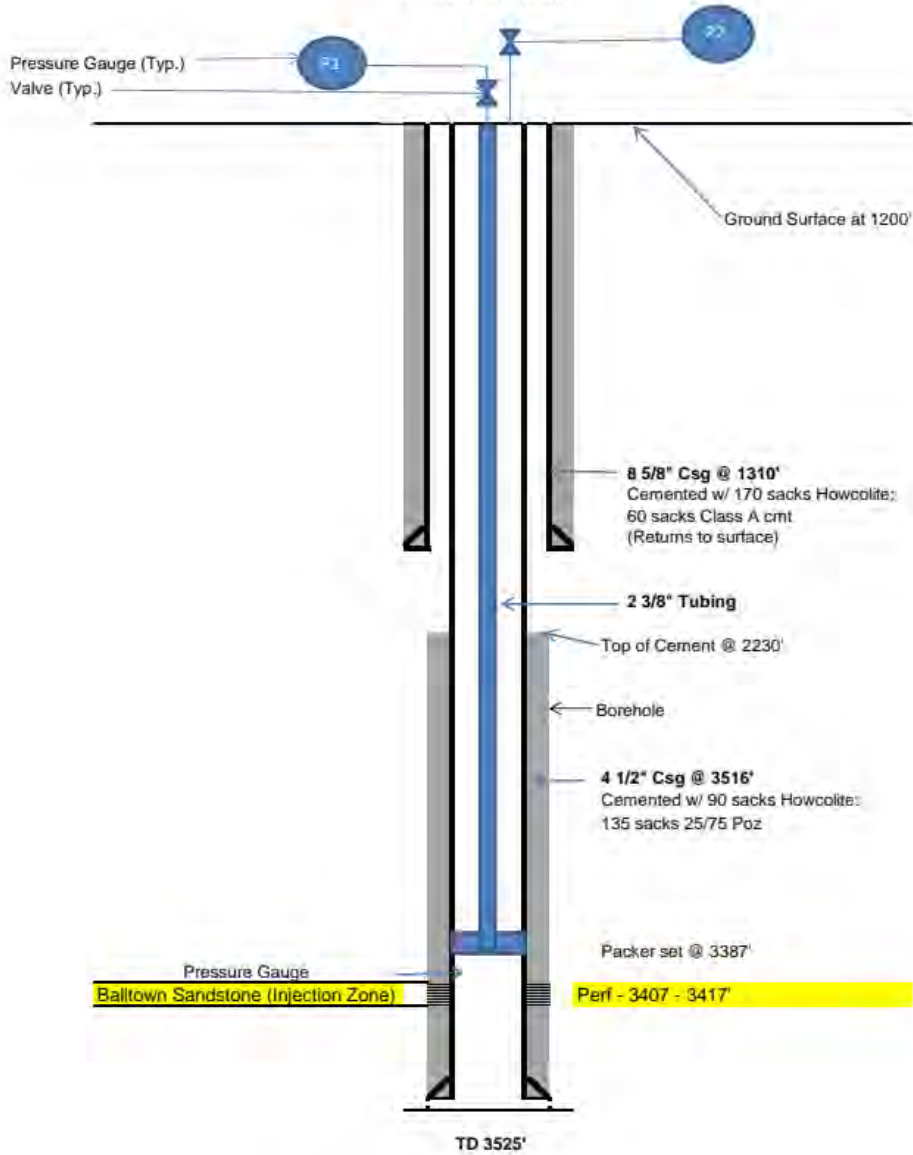


Diagram Not to Scale

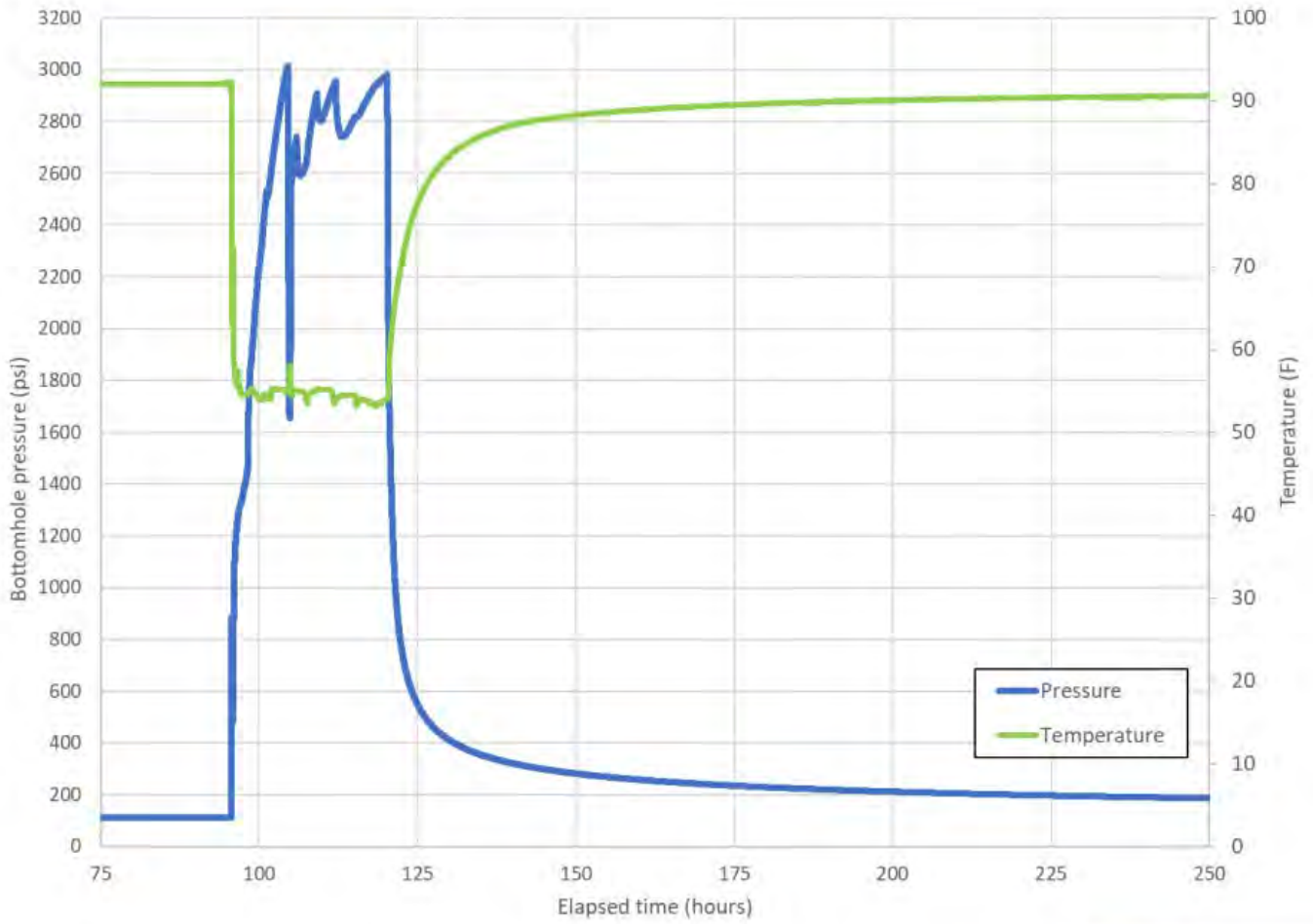


Figure 3. Bottomhole pressure and temperature versus elapsed time for Higinbotham #1 well injection test – November 2020.



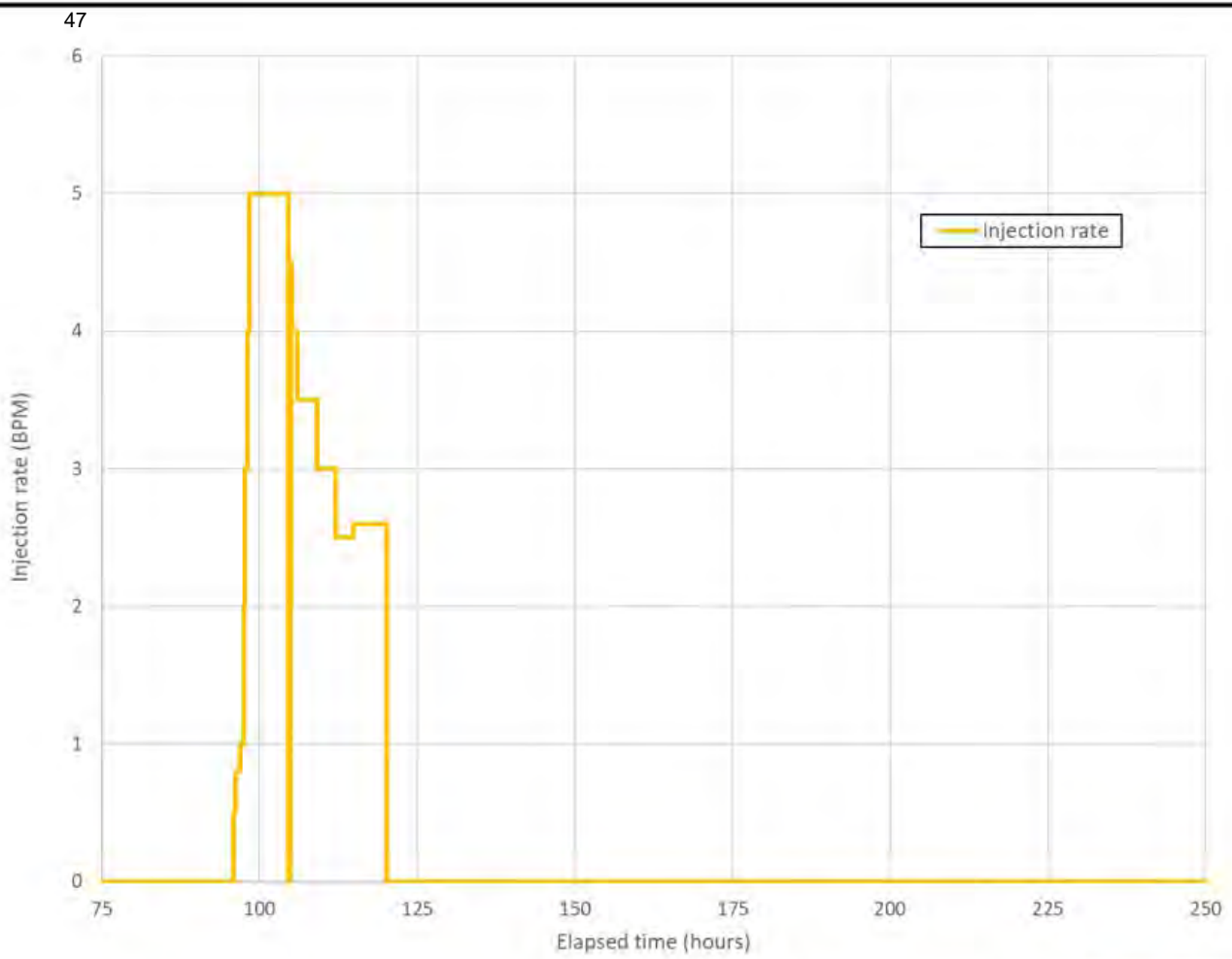


Figure 4. Injection rate versus elapsed time for Higinbotham #1 well injection test – November 2020.

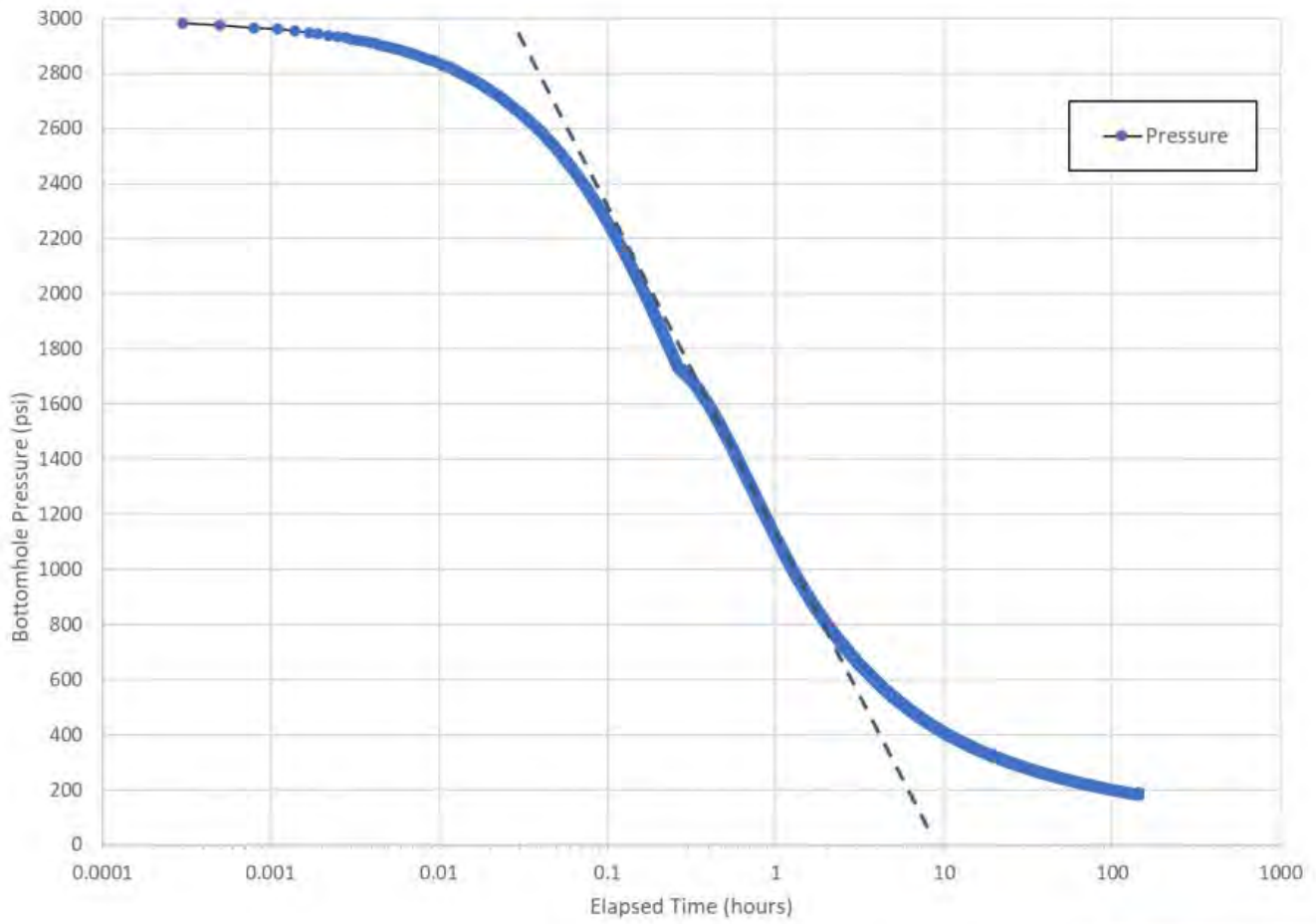


Figure 5. Semilog plot of pressure versus elapsed time for falloff portion of test for Higinbotham #1 well injection test – November 2020.

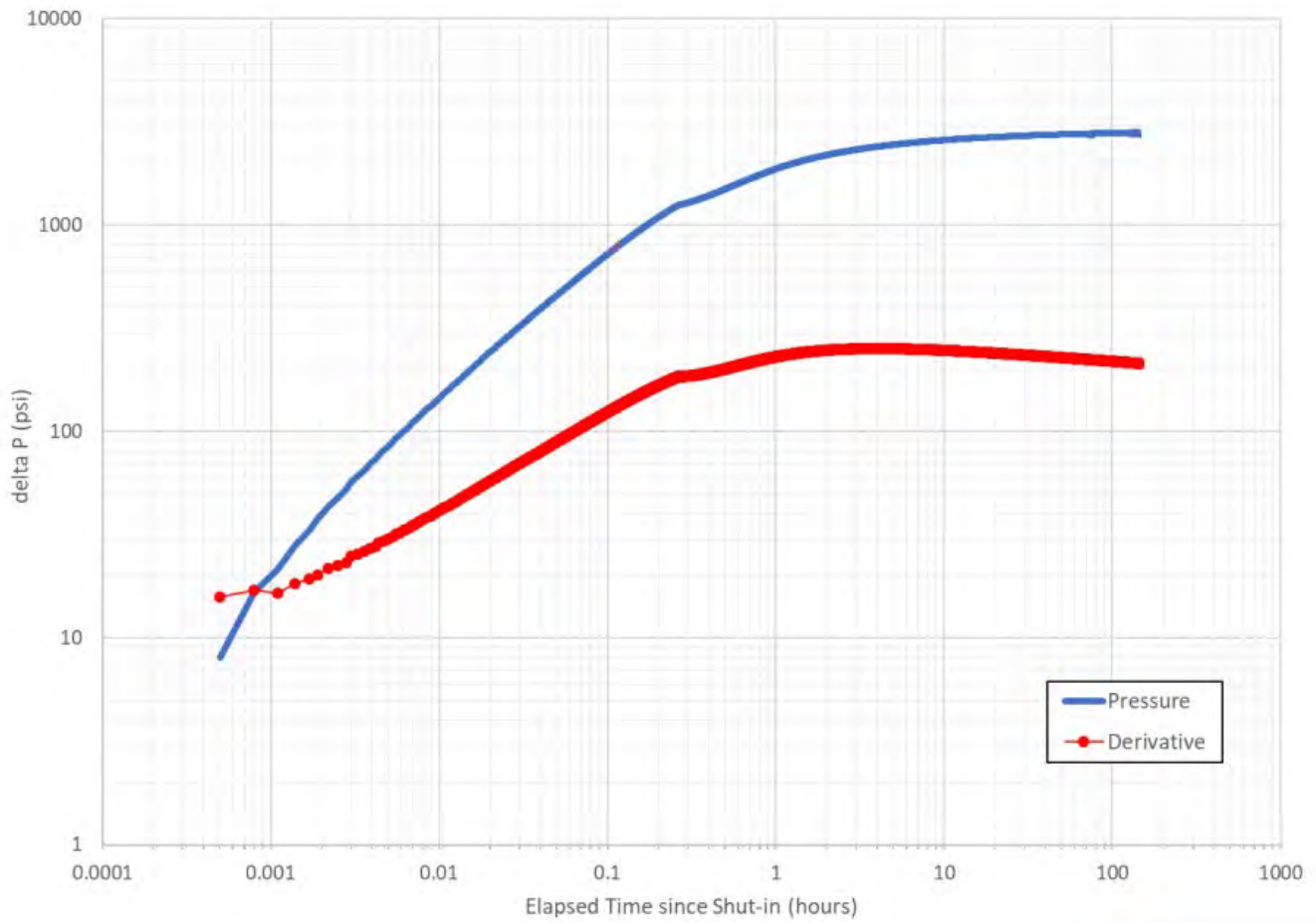


Figure 6. Log-log plot of pressure and derivative curve for falloff portion of test for Higinbotham #1 well injection test – November 2020.

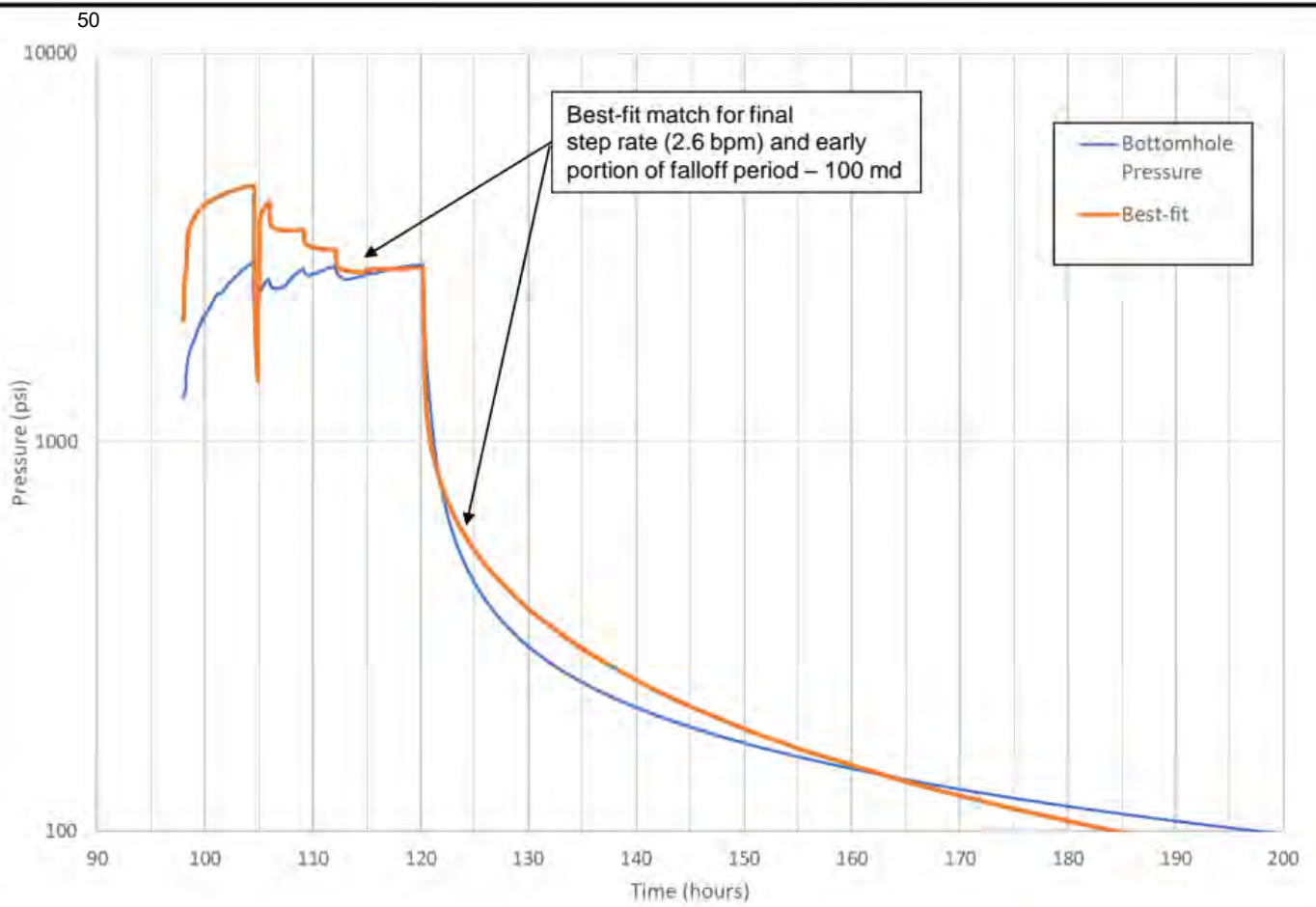


Figure 7. Observed bottomhole pressure and best-fit curve for Higinbotham #1 well injection test – November 2020.

Appendix A – Higinbotham #1 Well Completion Report

NE⁵²

14,600'S 39°52'30"
5,925'W 79°50'00"

L
Smithfield
20470
Office Use Only

ER-OG-4: Rev. 6/84

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL RESOURCES
BUREAU OF OIL AND GAS REGULATION
PITTSBURGH, PENNSYLVANIA 15206-2988

Code: C

WELL RECORD

PERMIT NO. 37-051-20470-00
PROJECT NO. [] TYPE OF WELL GAS
Highhouse Field - Dev. Woodside Pool.
WELL OPERATOR Douglas Oil & Gas, Inc. TELEPHONE NO. (412) 362-8808

ADDRESS 5741 Centre Avenue, Pittsburgh, PA ZIP 15206
FARM NAME Orville Higinbotham FARM NO. #1 SERIAL NO. ACRES 8.17

TOWNSHIP Nicholson COUNTY Fayette
DRILLING COMMENCED 2/28/87 DRILLING COMPLETED 3/3/87
ELEVATION 1200' GL 1210' KB QUADRANGLE Smithfield Section (A) 7 1/2' 15'

CASING AND TUBING RECORD

PIPE SIZE	AMOUNT IN WELL	MATERIAL BEHIND PIPE		PACKER			DATE RUN
		CEMENT (SKS.)	GEL (SKS.)	TYPE	SIZE	DEPTH	
12"	40'	Filled in with well cuttings					2/28/87
8 5/8"	1310'	170 SKS Howcolite		Guide Shoe Basket	8 5/8"		3/2/87
4 1/2"	3516	60 SKS Class A		Guide Shoe	4 1/2"		3/4/87
		90 SKS Howcolite		Flapper Insert			
		135 SKS 25/75 Poz					
		T.D.	D.D.	D.P.I.	Class	O G	Lease
		3525		3417	D	1	1

PERFORATION RECORD

STIMULATION RECORD

DATE	INTERVAL PERFORATED FROM	TO	DATE	INTERVAL TREATED	AMOUNT FLUID	AMOUNT SAND	INJECTION RATE
3/9/87	3407'	3417'	3/09/87	Balltown	14,000 gal	34,000#	28BPM

NATURAL OPEN FLOW 500 MCF AFTER TREATMENT OPEN FLOW 4.8 MCF 4,800 MCF
NATURAL ROCK PRESSURE N.A. AFTER TREATMENT ROCK PRESSURE 1375#
HRS. 72 HRS.

REMARKS:

* 8 5/8" Csg.: Circulated cement to surface

Drilling Contractor: Ipsco Rig #10
Cementing: Halliburton
Open Hole Logging: Dresser-Atlas
Cased Hole Logging: Dresser-Atlas
Stimulation: Halliburton

My Cooper
7-9-87
Bradford

RECEIVED (FORM TO BE PLACED ON REVERSE SIDE)

OCT 2 1987

PA GEOLOGICAL SURVEY
(Oil & Gas Geology Division)

FORMATIONS						
NAME	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (FRESH OR SALT WATER)	SOURCE OF DATA
Coal Spoils	0	20'				Driller
Sand	20'	331'			70' 1" Stream	
Sand & Shale	331'	362'				
Red Rock	362'	456'				
Shale	456'	900'				
Sandy Shale	900'	975'				
Shale	975'	1075'	S/G 1000		945' 1" Stream	
Red Rock	1075'	1100'				
Shale	1100'	1150'				
Red Rock	1150'	1225'				
Shale	1225'	1250'				
Red Rock	1250'	1275'				
Lime	1275'	1340'				
Sand	1340'	1550'	S/G 1450			
Shale	1550'	1780'				
Sandy Shale	1780'	2235'				
Shale	2235'	2310'				
Sand & Shale	2310'	3400'	S/G 2610			
Sand	3400'	3440'	Gas 3416			
Shale	3440'	T.D.				
	D.T.D.	<u>3525'</u>				
Log Formation Tops						
Loyalhanna	1342'	1393'				
Big Injun	1393'	1535'				
Squaw	1571'	1688'				
Second Gas	1776'	1789'				
Murrysville	1817'	1850'				
Gantz	1891'	1933'				
Nineveh	1993'	2028'				
Gordon Stray	2085'	2091'				
Gordon	2143'	2149'				
Fifth Stray	2339'	2376'				
Fifth	2380'	2427'				
Lower Fifth	2444'	2466'				
Lower Bayard	2509'	2541'				
Speechley	3134'	3142'				
Balltown	3405'	3420'				
	L.T.D.	3520'				
T.D.: 3525' Bradford						

DATE April 29 1987

APPROVED BY Thomas J. Appley

TITLE Exploration Geologist

RECEIVED

REGISTERED

STATE OF OHIO
DEPARTMENT OF REVENUE

Appendix B – Higinbotham #1 Injection Pressure and Rate Field Measurements

STEP-RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1 (Fayette County, PA)

Injection Formation: Balltown SS
Interval Depth (ft bgs):

Logger: *Dab Staff*

Date: *11/23/20*

Log Sheet: ___ of ___

Step No.	Time (hr:min)	Cumulative Time (hr:min)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
				Design (bbl/min)	Actual (bbl/min)				
1	10:53 Am		14	0.5	0.5	42 PSI	5 PSI	Logging by Black River Staff	
	11:08	15 min	22	0.5	0.5	36 PSI	4 PSI		
	11:23	30 min	30	0.5	0.5	35 PSI	6 PSI		
2	11:24	31 min	31	0.8	0.8	34 PSI	3 PSI		
	11:39	46 min	42	0.8	0.8	33 PSI	5 PSI		
	11:54	1:01 hr	54	0.8	0.8	31 PSI	4 PSI		
3	11:55	1:02 hr	56	1.0	1.0	30 PSI	4 PSI		
	12:10	1:17 hr	70	1.0	1.0	30 PSI	4 PSI		
	12:25	1:32 hr	89	1.00	1.2	31 PSI	3 PSI		
4	12:27	1:34	93	2.00	2.00	31 PSI	4 PSI		
	12:42	1:49	122	2.0	2.0	31 PSI	3 PSI		
5	12:43	1:50	124	3.0	3.0	31 PSI	4 PSI		
	12:58	2:10	170	3.0	3.0	31 PSI	3 PSI		
6	12:59	2:11	174	4.0	4.0	48 PSI	5 PSI		
	1:14	2:26	232	4.0	4.0	85 PSI	5 PSI		
7	1:15	2:27	240	5.0	5.0	348 PSI	5 PSI		
	1:30	2:42	313	5.0	5.0	527 PSI	5 PSI		
	1:45	2:57	387	5.0	5.0	615 PSI	3 PSI		
	1:50	3:02	412	5.0	5.0	650 PSI	5 PSI		
	1:55	3:07	437	5.0	5.0	672 PSI	5 PSI		
	2:00	3:12	462	5.0	5.0	685 PSI	6 PSI		
	2:05	3:17	489	5.0	5.0	715 PSI	6 PSI		
	2:10	3:22	515	5.0	5.0	740 PSI	4 PSI		
	2:15	3:27	541	5.0	5.0	750 PSI	6 PSI		
	2:20	3:32	561	5.0	5.0	796 PSI	5 PSI		
	2:25	3:37	598	5.0	5.0	815 PSI	5 PSI		
	2:30	3:42	617	5.0	5.0	830 PSI	5 PSI		
	2:35	3:47	639	5.0	5.0	860 PSI	5 PSI		
	2:40	3:52	663	5.0	5.0	875 PSI	5 PSI		
	2:45	3:57	688	5.0	5.0	915 PSI	5 PSI		

STEP-RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1 (Fayette County, PA)

Injection Formation: Balltown SS
Interval Depth (ft bgs):

Logger:

Date:

11/23/2020

Log Sheet:

___ of ___

Step No.	Time (hr:min)	Cumulative Time (hr:min)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
				Design (bbl/min)	Actual (bbl/min)				
	2:50	4:02	717	5.0	5.0	960	7 PSI		
	2:55	4:07	737	5.0	5.0	970	5 PSI		
	3:00	4:12	769	5.0	5.0	982	5 PSI		
	3:05	4:17	795	5.0	5.0	1000	5 PSI		
	2:10	4:22	822	5.0	5.0	1019	5 PSI		
	3:15	4:27	849	5.0	5.0	1030	5 PSI		
	3:20	4:32	874	5.0	5.0	1060	5 PSI		
	3:25	4:37	899	5.0	5.0	1070	5 PSI		
	3:30	4:42	921	5.0	5.0	1080	5 PSI		
	3:35	4:47	949	5.0	5.0	1105	6 PSI		
	3:40	4:52	972	5.0	5.0	1130	7 PSI		
	3:45	4:57	997	5.0	5.0	1160	5 PSI		
	3:50	5:02	1025	5.0	5.0	1176	6 PSI		
	3:55	5:07	1056	5.0	5.0	1200	4 PSI		
	4:00	5:12	1073	5.0	5.0	1220	6 PSI		
	4:05	5:17	1100 1104	5.0	5.0	1240	7 PSI		
	4:10	5:22	1127	5.0	5.0	1275	5 PSI		
	4:15	5:27	1155	5.0	5.0	1270	5 PSI		
	4:20	5:32	1180	5.0	5.0	1270	6 PSI		
	4:25	5:37	1222	5.0	5.0	1290	5 PSI		
	4:30	5:42	1277 1257	5.0	5.0	1300	6 PSI		
	4:35	5:47	1270	5.0	5.0	1300	5 PSI		
	4:40	5:52	1285	5.0	5.0	1320	5 PSI		
	4:45	5:57	1305	5.0	5.0	1325	5 PSI		
	4:50	6:02	1330	5.0	5.0	1332	6 PSI		
	4:55	6:07	1359	5.0	5.0	1360	7 PSI		
	5:00	6:12	1386	5.0	5.0	1372	5 PSI		
	5:05	6:17	1411	5.0	5.0	1385	5 PSI		
	5:10	6:22	1435	5.0	5.0	1395	5 PSI		
	5:15	6:27	1461	5.0	5.0	1415	4 PSI		

STEP-RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1 (Fayette County, PA)

Injection Formation: Balltown SS
Interval Depth (ft bgs):

Logger:

Date:

11/23/2020

Log Sheet:

___ of ___

Step No.	Time (hr:min)	Cumulative Time (hr:min)	Cumulative Volume (bbbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
				Design (bbl/min)	Actual (bbl/min)				
	5:20	6:32	1487	5.0	5.0	1430	4 psi		
	5:25	6:37	1508	5.0	5.0	1440	3 psi		
	5:30	6:42	1537	5.0	5.0	1450	4 psi		
	5:35	6:47	1562	5.0	5.0	1440	6 psi		
	5:40	6:52	1587	5.0	5.0	1480	6 psi		
	5:45	6:57	1612	5.0	5.0	1500	5 psi		
	5:50	7:02	1640	5.0	5.0	1510	4 psi		
	5:55	7:07	1670	5.0	5.0	1514	4 psi		
	6:00	7:12	1700	5.0	5.0	1529	3 psi		
	6:05	7:17	1730	5.0	5.0	1545	2 psi		
	6:10	7:22	1756	5.0	5.0	1559	1 psi		
	6:15	7:27	1786	5.0	5.0	1564	5 psi		
	6:20	7:32	1810	5.0	5.0	1586	4 psi		
	6:25	7:37	1834	5.0	5.0	1600	4 psi		
	6:30	7:42	1862	5.0	5.0	1614	2 psi		
	6:35	7:47	1888	5.0	5.0	1627	4 psi		
	6:40	7:52	1914	5.0	5.0	1643	2 psi		
	6:45	7:57	1940	5.0	5.0	1659	3 psi		
	6:50	8:02	1967	5.0	5.0	1670	4 psi		
	6:55	8:07	1992	5.0	5.0	1684	2 psi		
	7:00	8:12	2018	5.0	5.0	1707	1 psi		
	7:05	8:17	2044	5.0	5.0	1729	2 psi		
	7:10	8:22	2069	5.0	5.0	1745	1 psi		
	7:15	8:27	2090	5.0	5.0	1750	2 psi		
	7:20	8:32	2115	5.0	5.0	1752	4 psi		
	7:25	8:37	2140	5.0	5.0	1753	2 psi		
	7:30	8:42	2160	5.0	5.0	1702	1 psi		Pumping temp cease based on press drop
	7:55	9:07	2170	2.0	2.0	84	1 psi		Pumping resumes
	8:00	9:12	2184	4.0	4.0	787	1 psi		
	8:05	9:17	2212	4.5	4.5	1260	1 psi		

STEP-RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1 (Fayette County, PA)			Injection Formation: Balltown SS Interval Depth (ft bgs):			Logger:		Date:		Log Sheet: ____ of ____	
Step No.	Time (hr:min)	Cumulative Time (hr:min)	Cumulative Volume (bbis)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks		
				Design (bbl/min)	Actual (bbl/min)						
	8:10	9:22	2230	4.0	4.0	1184	2psi				
	8:15	9:27	2250	4.0	4.0	1215	1psi				
	8:20	9:32	2273	4.0	4.0	1245	1psi				
	8:25	9:37	2295	4.0	4.0	1264	1psi				
	8:30	9:42	2317	4.0	4.0	1286	1psi				
	8:35	9:47	2339	4.0	4.0	1304	1psi				
	8:40	9:52	2362	4.0	4.0	1320	1psi				
	8:45	9:57	2384	4.0	4.0	1335	1psi				
	8:50	10:02	2404	4.0	4.0	1348	1psi				
	8:55	10:07	2426	4.0	4.0	1360	1psi				
	9:00	10:12	2444	3.5	3.5	1243	1psi				
	9:05	10:17	2459	3.5	3.5	1197	1psi				
	9:10	10:22	2476	3.5	3.5	1180	1psi				
	9:15	10:27	2489	3.5	3.5	1165	1psi				
	9:20	10:32	2503	3.5	3.5	1150	1psi				
	9:25	10:37	2519	3.5	3.5	1145	1psi				
	9:30	10:42	2533	3.5	3.5	1150	1psi				
	9:35	10:47	2547	3.5	3.5	1153	1psi				
	9:40	10:52	2561	3.5	3.5	1152	1psi				
	9:45	10:57	2580	3.5	3.5	1157	1psi				
	9:50	11:02	2596	3.5	3.5	1154	1psi				
	9:55	11:07	2606	3.5	3.5	1160	1psi				
	10:00	11:12	2622	3.5	3.5	1165	1psi				
	10:05	11:17	2637	3.5	3.5	1170	1psi				
	10:10	11:22	2650	3.5	3.5	1175	1psi				
	10:15	11:27	2667	3.5	3.5	1180	1psi				
	10:20	11:32	2679	3.5	3.5	1188	1psi				
	10:25	11:37	2694	3.5	3.5	1175	1psi				
	10:30	11:42	2709	3.5	3.5	1124	1psi				
	10:35	11:47	2723	3.5	3.5	1135	1psi				

CONSTANT RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1
(Fayette County, PA)

Injection Formation: Balltown SS
Interval Depth (ft bgs):

Logger:

Date:

Log Sheet: _____ of _____

Time (hr:min)	Cumulative Time (hr:min)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
			Design (bbl/min)	Actual (bbl/min)				
10:40	11:52	2737	3.5	3.5	1158	1psi		
10:45	11:57	2752	3.5	3.5	1178	1psi		
10:50	12:02	2767	3.5	3.5	1190	1psi		
10:55	12:07	2781	3.5	3.5	1201	1psi		
11:00	12:12	2797	3.5	3.5	1220	1psi		
11:05	12:17	2812	3.5	3.5	1233	1psi		
11:10	12:22	2825	3.5	3.5	1246	1psi		
11:15	12:27	2842	3.5	3.5	1258	1psi		
11:20	12:32	2855	3.5	3.5	1269	1psi		
11:25	12:37	2872	3.5	3.5	1285	1psi		
11:30	12:42	2888	3.5	3.5	1295	1psi		
11:35	12:47	2900	3.5	3.5	1310	1psi		
11:40	12:52	2913	3.5	3.5	1320	1psi		
11:45	12:57	2929	3.5	3.5	1335	1psi		
11:50	1:02	2942	3.5	3.5	1346	1psi		
11:55	1:07	2957	3.5	3.5	1355	1psi		
12:00	1:12	2976	3.5	3.5	1364	1psi		
12:05	1:17	2992	3.5	3.5	1375	1psi		
12:10	1:22	3011	3.0	3.0	1250	1psi		
12:15	1:27	3024	3.0	3.0	1240	1psi		
12:20	1:32	3037	3.0	3.0	1235	1psi		
12:25	1:37	3045	3.0	3.0	1230	1psi		
12:30	1:40	3060	3.0	3.0	1220	1psi		
12:35	1:47	3077	3.0	3.0	1225	1psi		
12:40	1:52	3090	3.0	3.0	1221	1psi		
12:45	1:57	3104	3.0	3.0	1222	1psi		
12:50	2:02	3119	3.0	3.0	1217	1psi		
12:55	2:07	3134	3.0	3.0	1221	1psi		
1:00	2:12	3147	3.0	3.0	1227	1psi		
1:05	2:17	3163	3.0	3.0	1230			

From here to end of log add 12 hrs
to cumulative time to correct

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CONSTANT RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1
 (Fayette County, PA)

Injection Formation: Balltown SS
 Interval Depth (ft bgs):

Logger:

Date:

Log Sheet: _____ of _____

Time (hr. min.)	Cumulative Time (hr. min.)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
			Design (bbl/min)	Actual (bbl/min)				
1:10	2:22	3199	3.0	3.0	1235	1psi		
1:15	2:27	3197	3.0	3.0	1240	1psi		
1:20	2:32	3208	3.0	3.0	1245	1psi		
1:25	2:37	3221	3.0	3.0	1251	1psi		
1:30	2:42	3235	3.0	3.0	1260	2psi		
1:35	2:47	3251	3.0	3.0	1264	2psi		
1:40	2:52	3264	3.0	3.0	1270	1psi		
1:45	2:57	3279	3.0	3.0	1273	2psi		
1:50	3:02	3294	3.0	3.0	1279	1psi		
1:55	3:07	3309	3.0	3.0	1283	0psi		
2:00	3:12	3324	3.0	3.0	1289	1psi		
2:05	3:17	3338	3.0	3.0	1298	0psi		
2:10	3:22	3354	3.0	3.0	1310	1psi		
2:15	3:27	3368	3.0	3.0	1318	1psi		
2:20	3:32	3383	3.0	3.0	1325	1psi		
2:25	3:37	3396	3.0	3.0	1335	1psi		
2:30	3:42	3411	3.0	3.0	1347	2psi		
2:35	3:47	3426	3.0	3.0	1350	1psi		
2:40	3:52	3438	3.0	3.0	1355	1psi		
2:45	3:57	3456	3.0	3.0	1363	1psi		
2:50	4:02	3471	3.0	3.0	1369	1psi		
2:55	4:07	3485	3.0	3.0	1375	2psi		
3:00	4:12	3498	3.0	3.0	1379	1psi		
3:05	4:17	3517	2.5	2.5	1267	1psi		
3:10	4:22	3528	2.5	2.5	1232	1psi		
3:15	4:27	3544	2.5	2.5	1200	2psi		
3:20	4:32	3559	2.5	2.5	1172	1psi		
3:25	4:37	3572	2.5	2.5	1160	0psi		
3:30	4:42	3588	2.5	2.5	1149	1psi		
3:35	4:47	3594	2.5	2.5	1135	2psi		

CONSTANT RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1
(Fayette County, PA)

Injection Formation: Balltown SS
Interval Depth (ft bgs):

Logger:

Date:

Log Sheet: _____ of _____

Time (hr.min.)	Cumulative Time (hr:min)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
			Design (bbl/min)	Actual (bbl/min)				
3:40	4:52	3616	2.5	2.5	1129	1 psi		
3:45	4:57	3631	2.5	2.5	1120	1 psi		
3:50	5:02	3652	2.5	2.5	1118	1 psi		
3:55	5:07	3661	2.5	2.5	1115	1 psi		
4:00	5:12	3674	2.5	2.5	1111	1 psi		
4:05	5:17	3692	2.5	2.5	1108	1 psi		
4:10	5:22	3704	2.5	2.5	1110	1 psi		
4:15	5:27	3723	2.5	2.5	1108	1 psi		
4:20	5:32	3734	2.5	2.5	1109	1 psi		
4:25	5:37	3748	2.5	2.5	1110	1 psi		
4:30	5:42	3765	2.5	2.5	1112	1 psi		
4:35	5:47	3777	2.5	2.5	1100	1 psi		
4:40	5:52	3791	2.5	2.5	1119	1 psi		
4:45	5:57	3808	2.5	2.5	1123	2 psi		
4:50	6:02	3825	2.5	2.5	1125	2 psi		
4:55	6:07	3838	2.5	2.5	1127	1 psi		
5:00	6:12	3851	2.5	2.5	1130	1 psi		
5:05	6:17	3868	2.5	2.5	1136	1 psi		
5:10	6:22	3880	2.5	2.5	1141	0 psi		
5:15	6:27	3896	2.5	2.5	1147	1 psi		
5:20	6:32	3909	2.5	2.5	1150	1 psi		
5:25	6:37	3922	2.5	2.5	1151	0 psi		
5:30	6:42	3940	2.5	2.5	1153	0 psi		
5:35	6:47	3953	2.5	2.5	1160	0 psi		
5:40	6:52	3976	2.5	2.5	1170	0 psi		
5:45	6:57	3987	2.5	2.5	1171	0 psi		
5:50	7:02	3997	2.5	2.5	1170	0 psi		
5:55	7:07	4013	2.5	2.6	1175	0 psi		
6:00	7:12	4030	2.5	2.6	1182	0 psi		
6:05	7:17	4042	2.5	2.6	1200	0 psi		

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CONSTANT RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1
 (Fayette County, PA)

Injection Formation: Balltown SS
 Interval Depth (ft bgs):

Logger:

Date:

Log Sheet: _____
 of _____

Time (hr.min.)	Cumulative Time (hr:min)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
			Design (bbl/min)	Actual (bbl/min)				
6:10 AM	7:22	4055	2.6	2.6	1230	0		
6:15 AM	7:27	4070	2.6	2.6	1230	0		
6:20 AM	7:32	4084	2.6	2.6	1230	0		
6:25 AM	7:37	4101	2.5	2.6	1230	0		
6:30 AM	7:42	4121	2.5	2.6	1230	0		
6:35 AM	7:47	4130	2.5	2.6	1235	0		
6:40 AM	7:52	4148	2.5	2.6	1215	0		
6:45 AM	7:57	4160	2.5	2.6	1205	0		
6:50 AM	8:02	4174	2.5	2.6	1207	0		
6:55	8:07	4190	2.5	2.6	1202	0		
7:00	8:12	4202	2.5	2.6	1205	0		
7:05	8:17	4223	2.5	2.6	1212	0		
7:10	8:22	4234	2.5	2.6	1223	0		
7:15	8:27	4247	2.5	2.6	1224	0		
7:20	8:32	4264	2.5	2.6	1230	0		
7:25	8:37	4277	2.5	2.6	1242	0		
7:30	8:42	4291	2.5	2.6	1240	0		
7:35	8:47	4308	2.5	2.6	1245	0		
7:40	8:52	4322	2.5	2.6	1250	0		
7:45	8:57	4335	2.5	2.6	1260	0		
7:50	9:02	4349	2.5	2.6	1260	0		
7:55	9:07	4364	2.5	2.6	1265	0		
8:00	9:12	4378	2.5	2.6	1265	0		
8:05	9:17	4392	2.5	2.6	1270	0		
8:10	9:22	4407	2.5	2.6	1270	0		
8:15	9:27	4424	2.5	2.6	1270	0		
8:20	9:32	4432	2.5	2.6	1275	0		
8:25	9:37	4451	2.5	2.6	1280	0		
8:30	9:42	4466	2.5	2.6	1285	0		
8:35	9:47	4482	2.5	2.6	1285	0		

CONSTANT RATE TEST DATA

Tetra Tech, Inc.

Well ID: Diversified Higinbotham #1
(Fayette County, PA)

Injection Formation: Balltown SS
Interval Depth (ft bgs):

Logger:

Date:

Log Sheet: _____ of _____

Time (hr.min.)	Cumulative Time (hr:min)	Cumulative Volume (bbls)	Flow Rate		Surface Inj. Pressure (psi)	Annular Pressure (psi)	Specific Gravity	Remarks
			Design (bbl/min)	Actual (bbl/min)				
8:40	9:52	4499	2.5	2.6	1292	0		
8:45	9:57	4515	2.5	2.6	1296	0		
8:50	10:02	4527	2.5	2.6	1302	0		
8:55	10:07	4541	2.5	2.6	1305	0		
9:00	10:12	4556	2.5	2.6	1310	0		
9:05	10:17	4569	2.5	2.6	1314	0		
9:10	10:22	4586	2.5	2.6	1320	0		
9:15	10:27	4599	2.5	2.6	1330	0		
9:20	10:32	4612	2.5	2.6	1344	0		
9:25	10:37	4627	2.5	2.6	1350	0		
9:30	10:42	4642	2.5	2.6	1348	0		
9:35	10:47	4655	2.5	2.6	1350	0		
9:40	10:52	4670	2.5	2.6	1351	0		
9:45	10:57	4686	2.5	2.6	1355	0		
9:50	11:02	4701	2.5	2.6	1358	0		
9:55	11:07	4712	2.5	2.6	1360	0		
10:00	11:12	4734	2.5	2.6	1358	0		
10:05	11:17	4750	2.5	2.6	1358	0		
10:10	11:22	4760	2.5	2.6	1359	0		
10:15	11:27	4773	2.5	2.6	1360	0		
10:20	11:32	4791	2.5	2.6	1362	0		
10:25	11:37	4807	2.5	2.6	1364	0		
10:30	11:42	4819	2.5	2.6	1365	0		
10:35	11:47	4830	2.5	2.6	1370	0		
10:40	11:52	4849	2.5	2.6	1370	1		
10:45	11:57	4862	2.5	2.6	1373	3		
10:50	12:02	4875	2.5	2.6	1375	5		
10:55	12:07	4891	2.5	2.6	1375	4		
11:00	12:12	4906	2.5	2.6	1378	5		
11:05	12:17	4921	2.5	2.6	1380	6		

ATTACHMENT C. WELL CONSTRUCTION/CONVERSION INFORMATION

I. Well Schematic Diagram

- a. See Attachment C, Addendum 1
 - i. Detailed proposed well schematic diagram that includes:
 1. Identification of USDWs and confining and injection zones
 - a. USDWs Zone(s)
 - i. Casselman Formation (Pcc)
 1. Depth surface – 300'
 - ii. Glenshaw Formation (Pcg)
 1. Depth 300' – 660'
 - iii. NOTE: Per Injectivity Test Report on Attachment B, Addendum 5 water was located at 945'. We are cementing at a depth of 1310'
 - b. Confining Zone(s)
 - i. Catskill Formation
 1. Depth 2000' – 6000'
 - c. Injection Zone
 - i. Balltown Sandstone
 1. Depth 3407' – 3517'
 2. Casing and cementing details, including demonstrated or calculated top of cement
 - a. See Attachment C, Addendum 1 for detail
 3. Tubing and packer, *if applicable*
 - a. 2.875" 6.5# EUE casing
 - b. 4.5" x 2.875" AS1-X packer, on off tool
 4. Open hole or perforated levels
 - a. Open Hole
 - b. Perforation levels 3407' to 3417'
 5. Surface trace, *if horizontal or deviated well of conversion to injection well*
 - a. **This well is not a horizontal or deviated well**
 6. Current well schematic diagram
 - a. See Attachment C, Addendum 1

II. Well construction or Conversion Procedure

- a. See Attachment C, Addendum 2
 - i. Description of well construction or conversion procedures that includes:
 1. Proposed logs and other tests conduction during the drilling and construction of new well(s)
 - a. Gamma Ray
 - b. Casing Collar Log
 - c. Cement Bod Log
 2. Proposed stimulation plan(s), *if applicable*
 - a. Stimulate Open Hole with 2000 gallons of 28% HCL Acid

3. Description of alarms and shut-down systems at the well, *if applicable*
 - a. Tubing and Casing (Annular) Pressure Transmitters will be installed and will automatically shut down the system in an over pressure situation.
 - b. Tubing and Casing (Annular) Murphy pressure switchgages will be installed and will shut down the system on a maximum set pressure. These will serve as a secondary shut down mechanism on failure of the Pressure Transmitters
 - c. In a shut down scenario, alarms will be present on the automation system.
4. *if conversion to injection well:*
 - a. well completion and cementing records
 - b. previously run logs/tests

Attachment A, Addendum List

Addendum 1- Higinbotham #1 Well Schematic

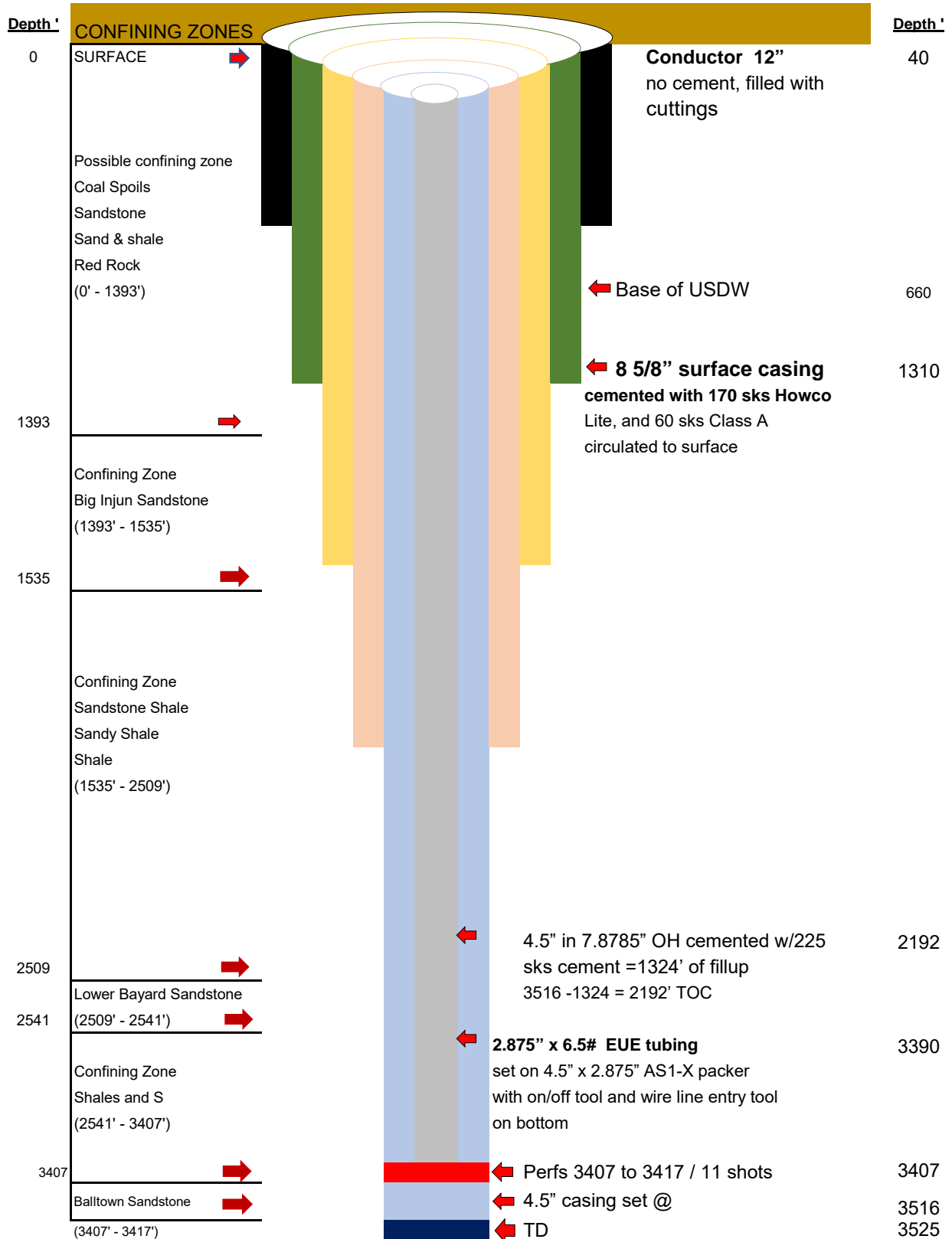
Addendum 2 - Higinbotham #1 Conversion Procedures

ATTACHMENT C, ADDENDUM 1

Higinbotham Well Stratigraphy

Higinbotham # 1
37-051-20470-00

Well schematic with 4.5" casing and 2 7/8" tubing set on AS1-X packer



ATTACHMENT C, ADDENDUM 2

Conversion procedure
Higinbotham 1 well
35-051-20470-00

Run in hole Gamma Ray, Casing Collar Log, Cement Bond Log
Run in hole wire line set retrievable bridge plug
Load hole with fresh water, pressure test casing
Pull out of hole retrievable bridge plug
Run in hole casing scraper
Run in hole 2.875" 6.5 PPF EUE tubing with Arrow set AS1-X packer with on/off tool , wire line entry
guide and pump out plug
Set packer at approximately 3390'
J off on/off tool, circulate hole with inhibited fresh water
J on tool
Pressure up annulus to 1500 PSI, hold for 30 minutes
Install well tree

ATTACHMENT D. INJECTION OPERATION AND MONITORING PROGRAM

- I. Flow diagram of fluid flow through the facility**
 - a. See Attachment D, Addendum 1.

- II. Contingency plan(s) to respond to well failures**
 - a. The facility will be fully automated. The facility will utilize pressure transmitters as well as pressure switchgauge's serving as a redundant safety system. In the event of a well failure, the system will stop immediately and not restart until the failure is known.
 - i. In the event of well failure, a verbal notification to the EPA will happen withing 24 hours
 - ii. In the event of a well failure, written notification to the EPA will happen within 7 days
 - b. Monitoring devices will be installed at the wellhead in addition to the discharge side of the injection equipment. These items constantly monitor pressures.
 - i. Monitoring devices will be analog pressure transmitters
 - ii. Monitoring devices will be a two-pin chart recorder
 - c. A camera will be installed at the wellhead to visually monitor the wellhead in real time.

- III. Drawing of the surface construction**
 - a. See Attachment D, Addendum 3 & 4.
 - i. Addendum 2 – Projected Site Layout
 - ii. Addendum 3 - Constructed Site layout

- IV. Location of monitoring ports (show on the map(s) of reference in section A. III above**
 - a. See Attachment D, Addendum 2
 - i. Flow Monitoring
 - 1. Flow Meters on the truck offloading area
 - 2. Flow Meter on the filtration skid
 - 3. Flow Meters on the discharge side of each injection pump
 - ii. Pressure Monitoring
 - 1. Pressure Recording
 - a. Injection pump discharge
 - i. Pressure Transmitters
 - ii. Murphy Pressure Switchgages
 - b. Well Head Tubing Pressure
 - i. Pressure Transmitter
 - ii. Chart Recorder
 - c. Annulus (Casing) Pressure
 - i. Pressure Transmitter
 - ii. Chart Recorder

V. Description of sampling and monitoring devices to monitor the nature of the injection fluids, injection pressure, annulus pressure (if applicable), flowrate, and cumulative volume

- a. See Attachment D, Addendum 2 for reference
 - i. FM1 are Coriolis flow meters that measures the rate, total, and specific gravity of the incoming fluids to the plant.
 - ii. LT1 and LT2 are level transmitters that measure the fluid height in the tanks
 - iii. MLG1 are level switchgauge's that serves as a secondary level switch to ensure that the tanks do not overflow.
 - iv. GPT2 are pressure transmitters on the discharge side of the injection units that measures pump discharge pressure in real time.
 - v. MPG2 are pressure switchgages that serves as a secondary pressure switch so the pump units do not exceed the MAOP of the well.
 - vi. FM2 are flow meters that measures rate and total injection rates for each injection pump.
 - vii. GPT2 are pressure transmitters located on the wellhead and annulus that measures real time pressures. The system will shut down if the maximum pressure on the wellhead is achieved.
 - viii. Two Pin Chart Recorder will be installed at the well head for a continual paper logging report.

VI. Description of manifold monitoring program and how the program is comparable to individual well monitoring

- a. Not Applicable as there is only one well on this location that will be used for injection.

VII. Operating Information

- a. Average and maximum daily rate and volume of fluids to be injected.
 - i. Average Volume Projection = 2500 BPD (Barrels Per Day)
 - ii. Maximum Volume Projection = 4000 BPD
- b. Average Maximum Injection Pressure
 - i. Average Pressure Requested = 1800 PSI Surface Tubing Pressure
 - ii. Maximum Injection Pressure = 2000 PSI Surface Tubing Pressure
- c. Source(s) of injection fluid (including field and formation names)
 - i. Due to this facility being a commercial disposal facility, field and formation names vary. Source water will be produced brine
- d. Proposed Annular Fluid
 - i. 10# Brine

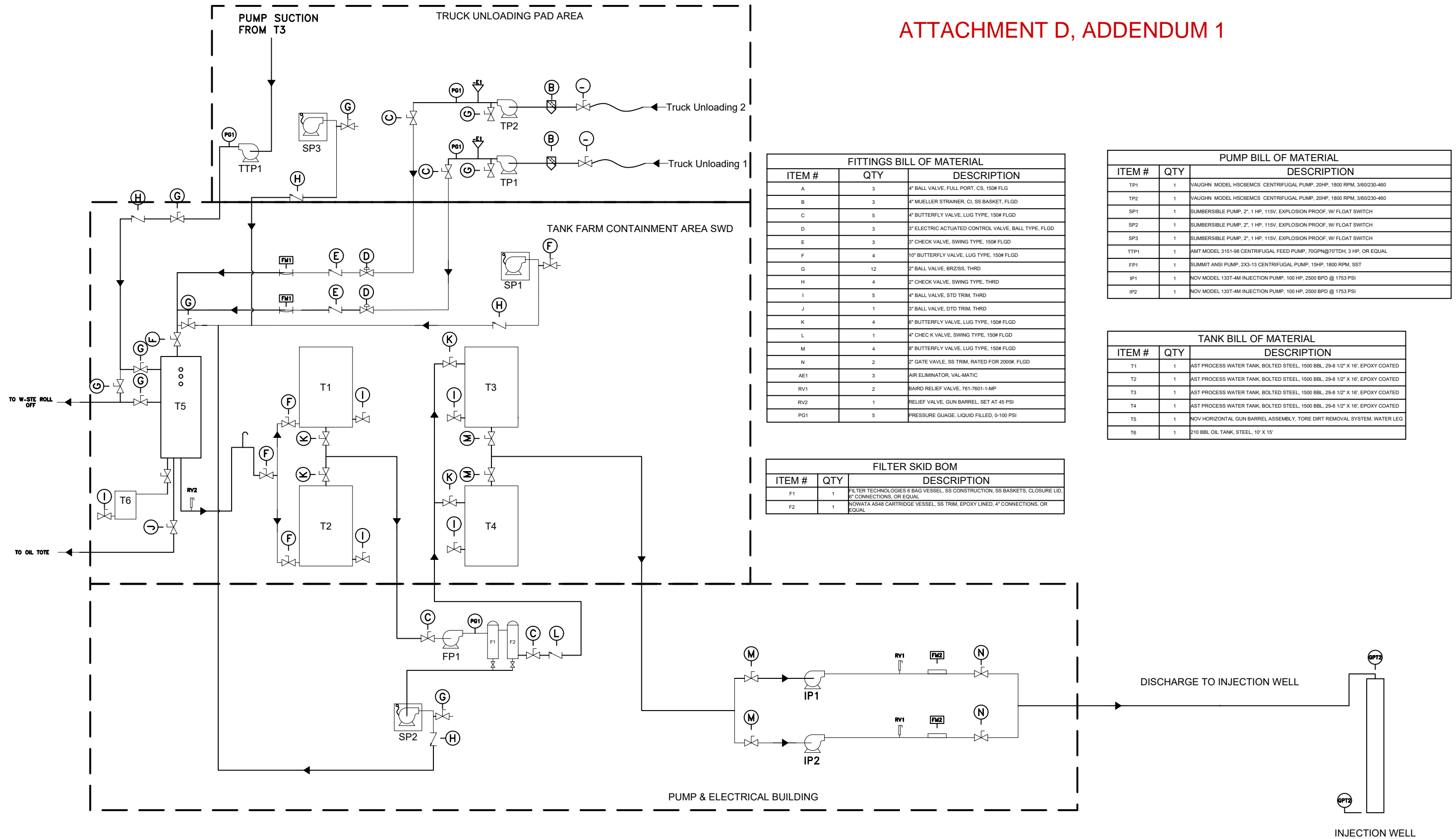
VIII. Analysis of the chemical and physical characteristics of the injection fluid. At a minimum this should include pH, specific gravity, TDS, and conductivity

- a. See Addendum 5 & 6 for a sample of the fluid known
 - i. This is the analysis of known water that will be coming into the facility
 - ii. **Requested maximum Specific Gravity is 1.23**

Attachment D. Addendum List

- Addendum 1- Process Flow Diagram (PFD)
- Addendum 2 - Process & Instrumentation Diagram (P&ID)
- Addendum 3 - Projected Site layout
- Addendum 4 - Projected Construction Layout
- Addendum 5 - Sample Water Analysis
- Addendum 6 - Specific Gravity Central PA

ATTACHMENT D, ADDENDUM 1



FITTINGS BILL OF MATERIAL		
ITEM #	QTY	DESCRIPTION
A	3	4" BALL VALVE, FULL PORT, CS, 150# FLG
B	3	4" MUELLER STRAINER, CI, SS BASKET, FLGD
C	5	4" BUTTERFLY VALVE, LUG TYPE, 150# FLGD
D	3	3" ELECTRIC ACTUATED CONTROL VALVE, BALL TYPE, FLGD
E	3	3" CHECK VALVE, SWING TYPE, 150# FLGD
F	4	10" BUTTERFLY VALVE, LUG TYPE, 150# FLGD
G	12	2" BALL VALVE, BRZ/SS, THRD
H	4	2" CHECK VALVE, SWING TYPE, THRD
I	5	4" BALL VALVE, STD TRIM, THRD
J	1	3" BALL VALVE, DTD TRIM, THRD
K	4	6" BUTTERFLY VALVE, LUG TYPE, 150# FLGD
L	1	4" CHECK VALVE, SWING TYPE, 150# FLGD
M	4	6" BUTTERFLY VALVE, LUG TYPE, 150# FLGD
N	2	2" GATE VALVE, SS TRIM, RATED FOR 2000#, FLGD
AE1	3	AIR ELIMINATOR, VAL-MATIC
RV1	2	BAIRD RELIEF VALVE, 761-7601-1-MP
RV2	1	RELIEF VALVE, GUN BARREL, SET AT 45 PSI
PG1	5	PRESSURE GAUGE, LIQUID FILLED, 0-100 PSI

PUMP BILL OF MATERIAL		
ITEM #	QTY	DESCRIPTION
TP1	1	VAUGHN MODEL HSC6MCS CENTRIFUGAL PUMP, 20HP, 1800 RPM, 3/60/230-460
TP2	1	VAUGHN MODEL HSC6MCS CENTRIFUGAL PUMP, 20HP, 1800 RPM, 3/60/230-460
SP1	1	SUMBERSIBLE PUMP, 2", 1 HP, 115V, EXPLOSION PROOF, W/ FLOAT SWITCH
SP2	1	SUMBERSIBLE PUMP, 2", 1 HP, 115V, EXPLOSION PROOF, W/ FLOAT SWITCH
SP3	1	SUMBERSIBLE PUMP, 2", 1 HP, 115V, EXPLOSION PROOF, W/ FLOAT SWITCH
TTP1	1	AMT MODEL 3151-98 CENTRIFUGAL FEED PUMP, 70GPN@70TDH, 3 HP, OR EQUAL
FP1	1	SUMMIT ANSI PUMP, 2X3-13 CENTRIFUGAL PUMP, 15HP, 1800 RPM, SST
IP1	1	NOV MODEL 133T-4M INJECTION PUMP, 100 HP, 2500 BPD @ 1753 PSI
IP2	1	NOV MODEL 133T-4M INJECTION PUMP, 100 HP, 2500 BPD @ 1753 PSI

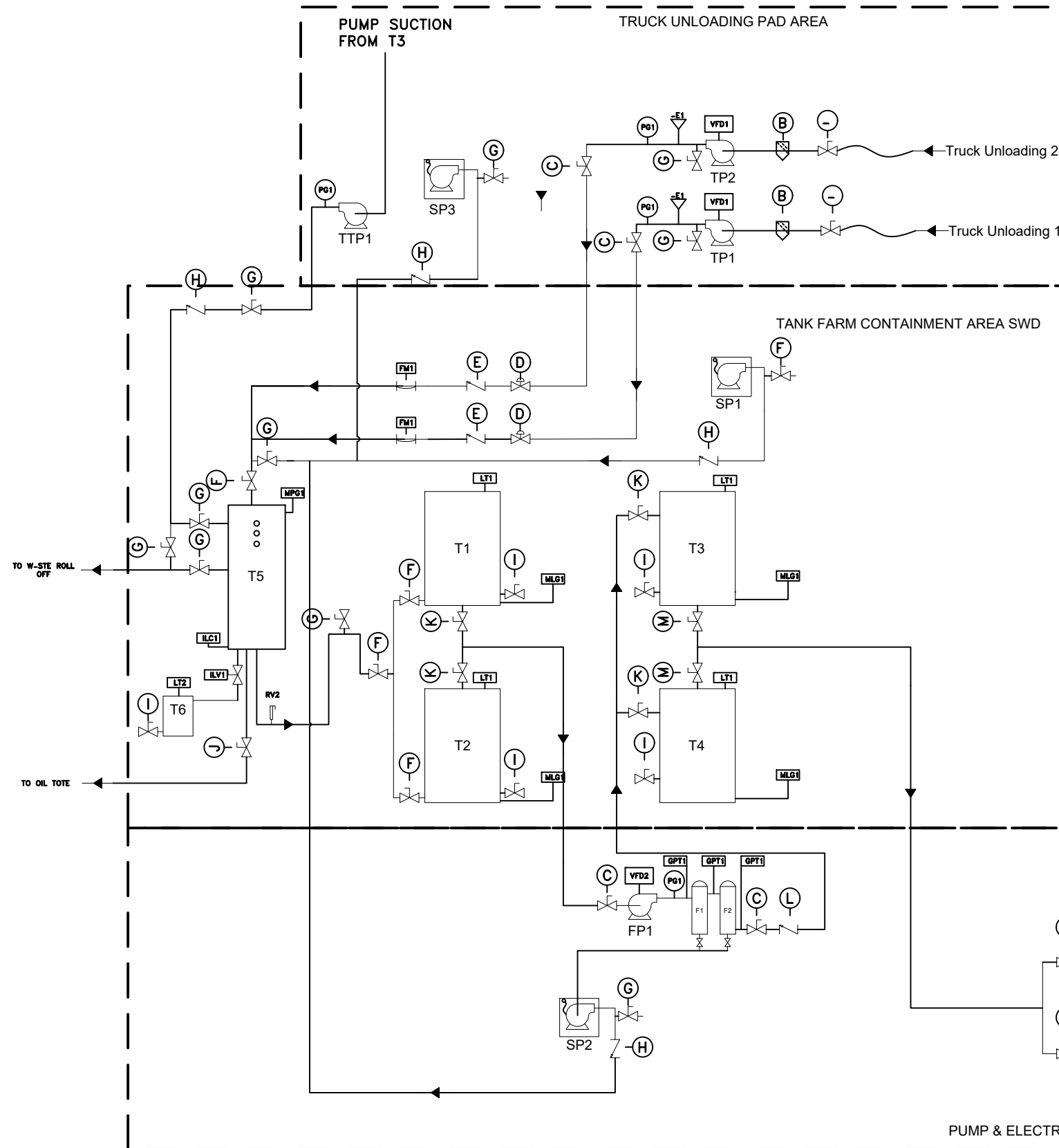
TANK BILL OF MATERIAL		
ITEM #	QTY	DESCRIPTION
T1	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T2	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T3	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T4	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T5	1	NOV HORIZONTAL GUN BARREL ASSEMBLY, TORE DIRT REMOVAL SYSTEM, WATER LEG
T6	1	210 BBL OIL TANK, STEEL, 10' X 15'

FILTER SKID BOM		
ITEM #	QTY	DESCRIPTION
F1	1	FILTER TECHNOLOGIES 6 BAG VESSEL, SS CONSTRUCTION, SS BASKETS, CLOSURE LID, 6" CONNECTIONS, OR EQUAL
F2	1	NOVATA AS48 CARTRIDGE VESSEL, SS TRIM, EPOXY LINED, 4" CONNECTIONS, OR EQUAL

FOR APPROVAL 1: _____

REFERENCE DR-WINGS		REFERENCE DR-WINGS		DR-WING ST-TUS			REVISIONS		
DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION	NO.	DATE	BY	DESCRIPTION	NO.	DATE

<p>FMS</p> <p>Ph: 812/431-7314</p>	<p>SCALE</p> <p>DRAWN: _____ DATE: _____</p> <p>CHK'D: _____ DATE: _____</p> <p>APPROVED: _____ DATE: _____</p> <p>EMS JOB NO.:</p> <p>A/E/P O. NO.:</p> <p>CLIENT FILE NO.:</p> <p>EMS FILE NO.:</p>	<p>G2 STEM</p> <p>HIGHBOTHAM #1 PROCESS FLOW DIAGRAM</p>
	<p>NO. _____</p> <p>REV. _____</p>	<p>D-7601-A</p> <p>A</p>



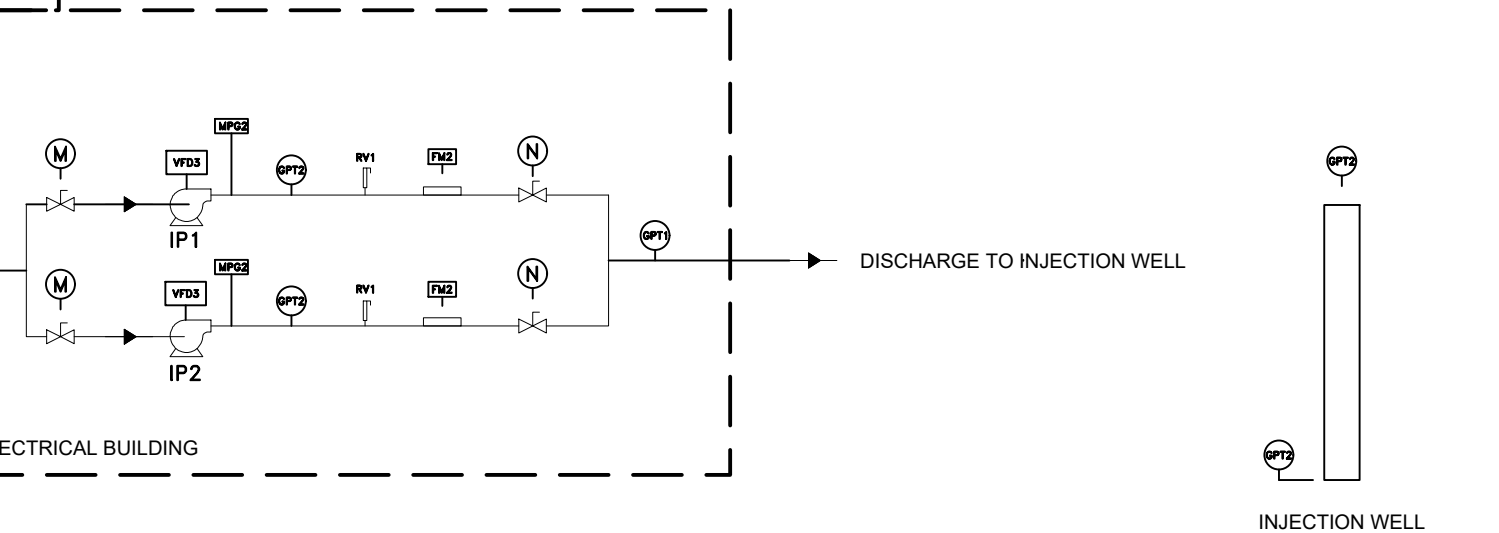
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G	12	2" BALL VALVE, BRZ/SS, THRD
H	4	2" CHECK VALVE, SWING TYPE, THRD
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AE1	3	AIR ELIMINATOR, VAL-MATIC
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TP2	1	VAUGHN MODEL HSC6EMCS CENTRIFUGAL PUMP, 20HP, 1800 RPM, 3/60/230-460
SP1	1	SUMBERSIBLE PUMP, 2", 1 HP, 115V, EXPLOSION PROOF, W/ FLOAT SWITCH
SP2	1	SUMBERSIBLE PUMP, 2", 1 HP, 115V, EXPLOSION PROOF, W/ FLOAT SWITCH
SP3	1	SUMBERSIBLE PUMP, 2", 1 HP, 115V, EXPLOSION PROOF, W/ FLOAT SWITCH
TTP1	1	AMT MODEL 3151-98 CENTRIFUGAL FEED PUMP, 70GPN@70TDR, 3 HP, OR EQUAL
FP1	1	SUMMIT ANSI PUMP, 2X3-13 CENTRIFUGAL PUMP, 15HP, 1800 RPM, SST
IP1	1	NOV MODEL 133T-4M INJECTION PUMP, 100 HP, 2500 BPD @ 1753 PSI
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TANK BILL OF MATERIAL		
ITEM #	QTY	DESCRIPTION
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T2	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T3	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T4	1	AST PROCESS WATER TANK, BOLTED STEEL, 1500 BBL, 29-8 1/2" X 16', EPOXY COATED
T5	1	NOV HORIZONTAL GUN BARREL ASSEMBLY, TORE DIRT REMOVAL SYSTEM, WATER LEG
T6	1	210 BBL OIL TANK, STEEL, 10' X 15'

AUTOMATION/INSTRUMENTS BILL OF MATERIAL		
ITEM #	QTY	DESCRIPTION
FM1	2	MICRO MOTION CMF300M355NOAME222 W/2400S1A118ME222 TRANSMITTER
FM2	2	TURBINES INC FW0110-P FLOW MONITOR W/TM0200 FLOW METER, REMOTE MOUNT
VFD1	2	VARIABLE FREQ DRIVE, 20 HP, NEMA 12, 3/60/460
VFD2	2	VARIABLE FREQ DRIVE, 15HP, NEMA 12, 3/60/460
VFD3	2	VARIABLE FREQ DRIVE, 100HP, NEMA 12, 3/60/460
ILC1	1	V100 INTERFACE LEVEL CONTROLLER SWITCH, EX-PRF
ILV1	1	V100 INTERFACE LEVEL CONTROL VALVE
MPG1	2	MURPHY MODEL OPLC-S-100 PRESSURE SWITCHGAGE
MPG2	2	MURPHY MODEL OPLC-S-3000 PRESSURE SWITCHGAGE
MLG1	4	MURPHY OPL-HC-20 LIQUID LEVEL SWITCHGAGE
LT1	4	ROSEMOUNT MODEL 3101LA1FRCA ULTRASONIC LEVEL TRANSMITTER, 4-20MA, 0-24" RANGE
LT2	1	ROSEMOUNT MODEL 3101LA1FRCA ULTRASONIC LEVEL TRANSMITTER, 4-20MA, 0-16" RANGE
GPT1	4	ROSEMOUNT MODEL 2088 GAUGE PRESSURE TRANSMITTER, 4-20MA, 0-150 PSI RANGE
GPT2	4	ROSEMOUNT MODEL 2088 GAUGE PRESSURE TRANSMITTER, 4-20MA, 0-4000 PSI RANGE

FILTER SKID BOM		
ITEM #	QTY	DESCRIPTION
F1	1	FILTER TECHNOLOGIES 6 BAG VESSEL, SS CONSTRUCTION, SS BASKETS, CLOSURE LID, 6" CONNECTIONS
F2	1	NOWATA AS48 CARTRIDGE VESSEL, SS TRIM, EPOXY LINED, 4" CONNECTIONS

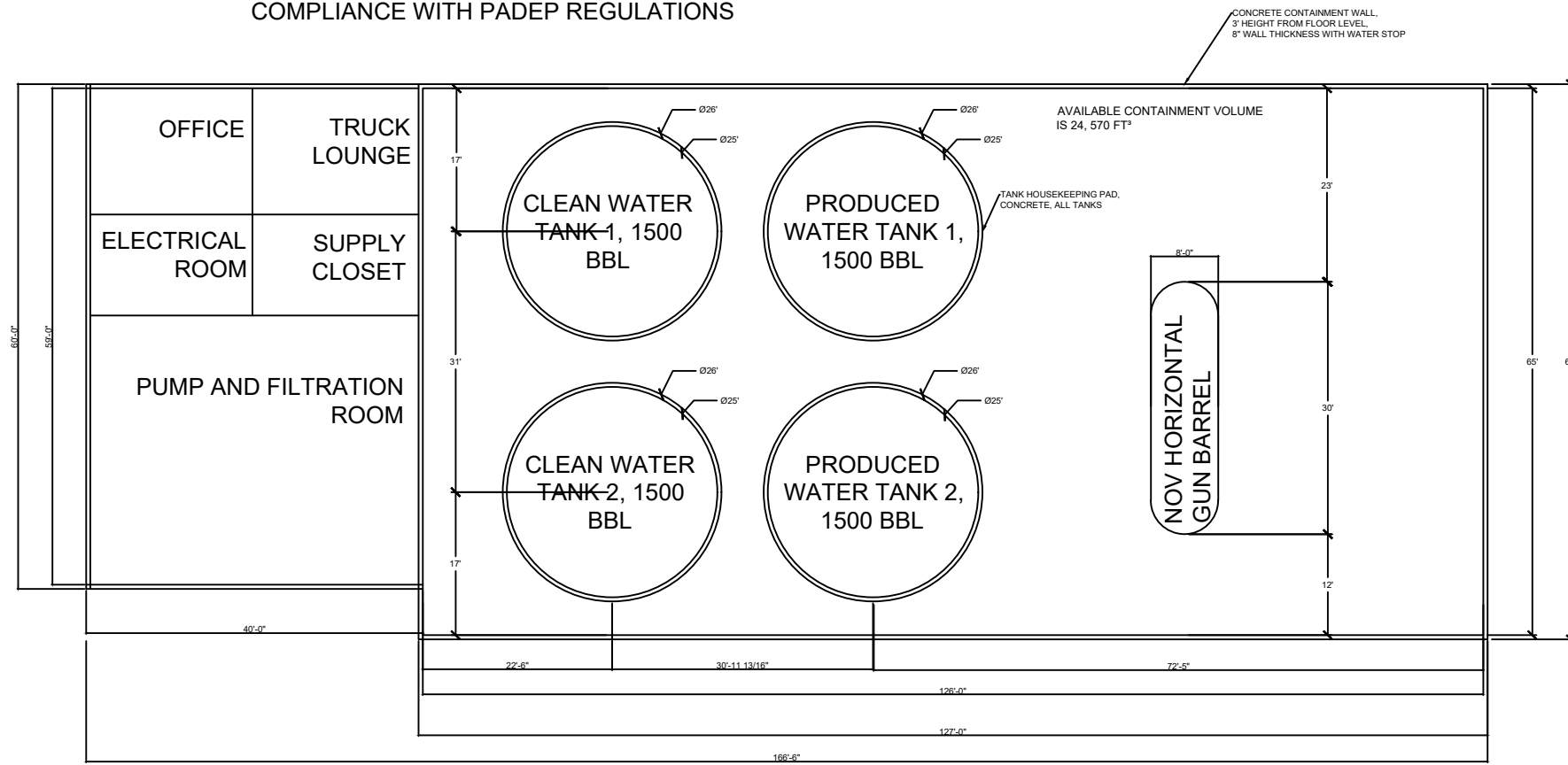


FOR APPROVAL 1: _____

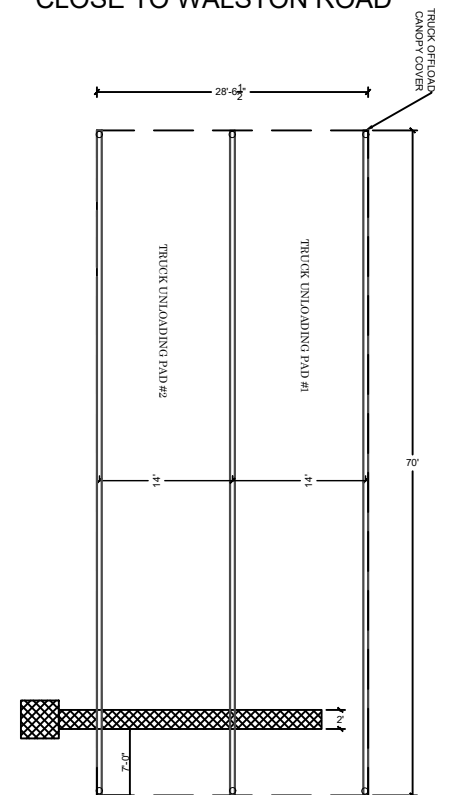
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DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION	NO.	DATE	BY	NO.	DATE

<p>FMS</p> <p>Ph: 812/431-7314</p>	<p>SCALE</p> <p>DRAWN: _____ DATE: _____</p> <p>CHKD: _____ DATE: _____</p> <p>APPROVED: _____ DATE: _____</p> <p>EMS JOB NO.:</p> <p>A/E/P O. NO.:</p> <p>CLIENT FILE NO.:</p> <p>EMS FILE NO.:</p>	<p>G2 STEM</p> <p>HIGINBOTHAM #1 P&ID (PROCESS & INSTRUMENTATION DIAGRAM)</p>
	<p>NO. _____</p> <p>REV. _____</p>	<p>D-7602-A</p>

PROJECTED SITE LAYOUT LOCATED AT WELL SITE. BUILDING AND CONTAINMENT WILL BE BUILT IN COMPLIANCE WITH PADEP REGULATIONS



TRUCK OFFLOAD PAD WILL BE LOCATED ON PROPERTY CLOSE TO WALSTON ROAD



GENER-L NOTES

REFERENCE DR - WINGS

REFERENCE DR - WINGS

DR - WING ST - TUS

REVISIONS

SCALE

DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION	NO.	DATE	BY	DESCRIPTION	NO.	DATE	DESCRIPTION
								A	11/30/21	INITIAL DRAWING

DRAWN	DATE
CHK'D	DATE
APPROVED	DATE
EMS JOB NO.	
AFEP O NO.	
CLIENT FILE NO.	
EMS FILE NO.	

FMS

Ph: 812/431-7314

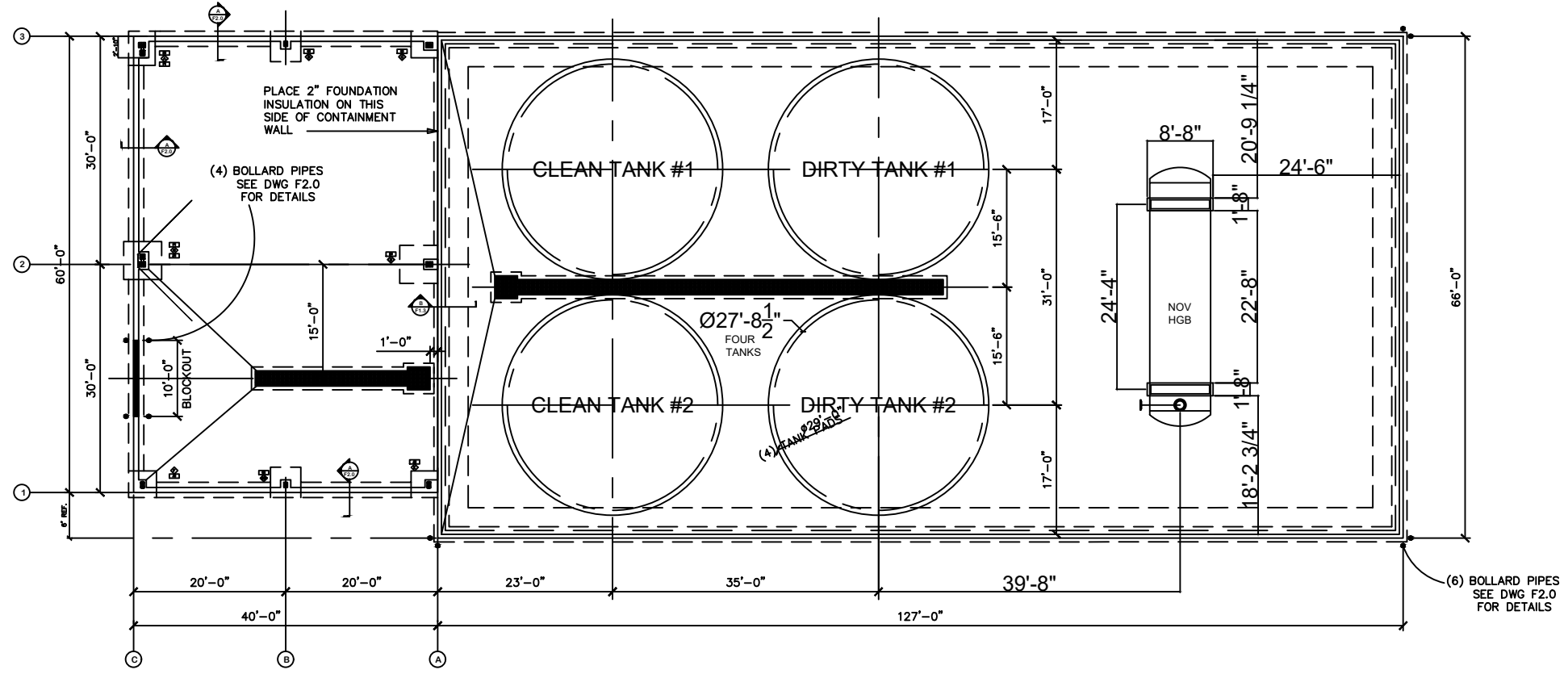
G2 STEM

HIGINBOTHAM #1 PROJECTED SITE LAYOUT

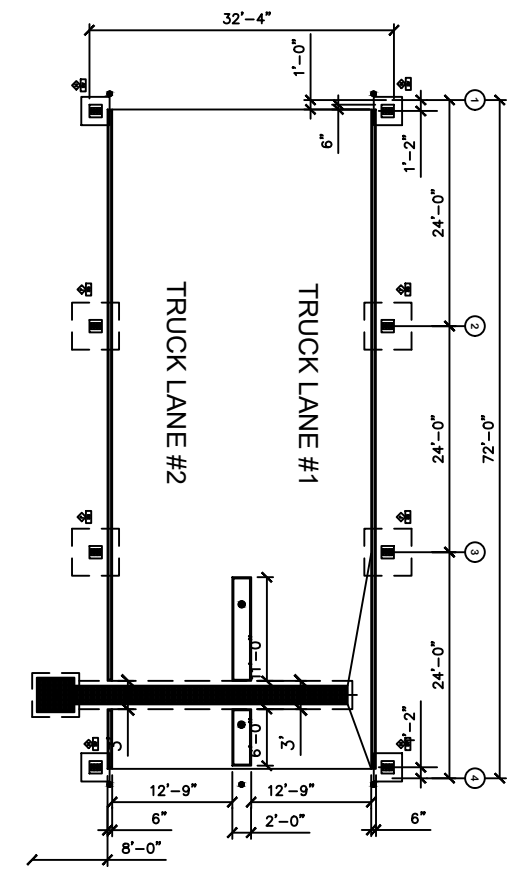
D-7603-A

REV. A

BUILDING AND CONTAINMENT CONSTRUCTION
 DETAIL, LOCATED ON WELL SITE, WILL BE
 CONSTRUCTED PER THE PADEP REGULATIONS



TRUCK OFFLOAD PAD WITH
 CANOPY COVER, 2 LANE, REMOTE
 LOCATION AT WALSTON ROAD
 BUILT PER PADEP REGULATIONS



GENERAL NOTES	REFERENCE DRAWINGS		REFERENCE DRAWINGS		DRAWING STATUS			REVISIONS			SCALE		
	DWG. NO.	DESCRIPTION	DWG. NO.	DESCRIPTION	NO.	DATE	BY	DESCRIPTION	NO.	DATE	DESCRIPTION	DRAWN	DATE
									A	11/30/21	INITIAL DRAWING	CHK'D	DATE
												APPROVED	DATE
												EMS JOB NO.	
												AFEP O NO.	
												CLIENT FILE NO.	
												EMS FILE NO.	

FMS

G2 STEM

HIGINBOTHAM #1 CONSTRUCTION LAYOUT

Ph: 812/431-7314

D-7604-A

REV. A



2019 Ninth Avenue
 PO Box 1925
 Altoona, PA 16603
 (814) 946-4306
 NELAP: PA 07-062, VA 460212

89 Kristi Road
 Pennsdale, PA 17756
 (570) 494-6380
 PaDEP: PA 41-04684



www.fairwaylaboratories.com

State Certifications: MD 275, WV 364

Diversified Oil & Gas LLC

Project: 2017 sampling - 26R

101 McQuiston Drive

Project Number: [none]

Reported:

Jackson Center PA, 16133

Collector: DB

11/21/17 15:14

Project Manager: Doug Byers & Kirk Elkin

Number of Containers: 14

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Sample Type	Date Sampled	Date Received
RAU UNIT 2H	7J24134-01	Water	Grab	10/24/17 10:15	10/24/17 18:18

Gross Alpha +/- 2172 C: NA T: NA

Gross Beta +/- 996C: NA T: NA

Radium 226 +/- 1017.70 C: NA T: NA

Radium 228 +/- 281.63 C: NA T: NA

Thorium 228 +/- 1561.50 C: NA T: NA

Thorium 230 +/- 15223 C: NA T: NA

Thorium 232 +/- 10043 C: NA T: NA

Uranium 234 +/- 867.90 C: NA T: NA

Uranium 235 +/- 92.00 C: NA T: NA

Uranium 238 +/- 318.38 C: NA T: NA

Fairway Laboratories, Inc.

Reviewed and Submitted by:

Michael P. Tyler
 Laboratory Director

Fairway Labs in Altoona, PA is a NELAP (National Environmental Laboratory Accreditation Program) accredited lab, and as such, certifies that all applicable test results meet the requirements of NELAP, unless otherwise stated on the analytical report.

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.



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Diversified Oil & Gas LLC
101 McQuiston Drive
Jackson Center PA, 16133
Project Manager: Doug Byers & Kirk Elkin

Project: 2017 sampling - 26R
Project Number: [none]
Collector: DB
Number of Containers: 14

Reported:
11/21/17 15:14

Client Sample ID: RAU UNIT 2H

Date/Time Sampled: 10/24/17 10:15

Laboratory Sample ID: 7J24134-01 (Water/Grab)

Analyte	Result	MDL	RL	Units	Date / Time Analyzed	Analytical Method	* Analyst	Note
---------	--------	-----	----	-------	----------------------	-------------------	-----------	------

Analyses to be performed immediately upon sampling. See Definition indicated by: #

# pH @ 20.9°C	5.43			pH Units	11/01/17 13:14	SM 4500-H+B-11	elb	
---------------	------	--	--	----------	----------------	-------------------	-----	--

Calculated Analytes

Hardness (calculated)	79400		4140	mg/l	11/03/17 17:23	CALC	sr	
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Conventional Chemistry Parameters by SM/EPA Methods

Acidity to pH 8.3	590.0	-10000		mg CaCO3/L	11/01/17 14:20	SM20-2310B	elb	
Total Alkalinity to pH 4.5	22.0	20.0		mg CaCO3/L	11/01/17 14:20	SM20-2320B	elb	
Biochemical Oxygen Demand	<12.0	12.0		mg/l	10/25/17 13:52	SM 5210 B-11	caa	D4
Bromide	1330	500		mg/l	11/06/17 13:50	EPA 300.0/2.1	bdw	
Chloride	188000	125000		mg/l	11/06/17 14:19	EPA 300.0/2.1	bdw	
Chemical Oxygen Demand	12500	2000		mg/l	10/30/17 16:52	EPA 410.4	TJO	
Specific Conductance (EC)	203000	5.00		umhos/cm	11/01/17 10:54	SM20-2510B	elb	
Methylene Blue Active Substances	1.84	0.500		mg/l	10/25/17 10:59	SM 5540 C-11	TJO	H
Nitrate as N	<200.0	200.0		mg/l	10/25/17 15:11	EPA 300.0/2.1	bdw	
Nitrite as N	<40.00	40.00		mg/l	10/25/17 15:11	EPA 300.0/2.1	bdw	
Oil & Grease	<5.15	5.15		mg/l	11/06/17 09:33	EPA 1664A	SNW	
Phenolics	<0.0200	0.0200		mg/l	11/02/17 09:37	EPA 420.1	acg	A

Fairway Laboratories, Inc.

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State Certifications: MD 275, WV 364

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Diversified Oil & Gas LLC
101 McQuiston Drive
Jackson Center PA, 16133
Project Manager: Doug Byers & Kirk Elkin

Project: 2017 sampling - 26R
Project Number: [none]
Collector: DB
Number of Containers: 14

Reported:
11/21/17 15:14

Client Sample ID: RAU UNIT 2H

Date/Time Sampled: 10/24/17 10:15

Laboratory Sample ID: 7J24134-01 (Water/Grab)

Analyte	Result	MDL	RL	Units	Date / Time Analyzed	Analytical Method	* Analyst	Note
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Conventional Chemistry Parameters by SM/EPA Methods

Total Dissolved Solids	270000		200	mg/l	10/25/17 12:57	SM 2540 C-97	ark	
Total Suspended Solids	820		8.00	mg/l	10/25/17 14:49	SM 2540 D-97	ark	
Sulfate as SO4	<200		200	mg/l	10/25/17 15:11	EPA 300.0/2.1	bdw	
Total Kjeldahl Nitrogen	253.2		25.00	mg/l	10/27/17 15:19	SM20-4500N orgC/ASTMD 6919-09	SNW	

Glycols by EPA Method 8015 (modified)

Ethylene glycol	<8.90	8.90	50.0	mg/l	10/27/17 00:03	SW846 8015D	smm	
Surrogate: 2-Octanone		134 %	70-130		10/27/17 00:03	SW846 8015D	smm	O

Metals by EPA 245.1

Mercury	<0.0200		0.0200	mg/l	10/27/17 13:45	EPA 245.1/3.0	jks	Q
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Metals by Prep Method EPA 200.2

Silver	<0.400		0.400	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Aluminum	<10.0		10.0	mg/l	11/03/17 17:16	EPA 200.7/4.4	sr	L
Arsenic	<0.800		0.800	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Boron	25.3		5.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	

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 (814) 946-4306
 NELAP: PA 07-062, VA 460212

89 Kristi Road
 Pennsdale, PA 17756
 (570) 494-6380
 PaDEP: PA 41-04684



State Certifications: MD 275, WV 364

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Analyte	Result	MDL	RL	Units	Date / Time Analyzed	Analytical Method	* Analyst	Note
---------	--------	-----	----	-------	----------------------	-------------------	-----------	------

Metals by Prep Method EPA 200.2

Barium	6520		20.0	mg/l	11/03/17 17:15	EPA 200.7/4.4	sr	T
Beryllium	<0.200		0.200	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Calcium	28400		1000	mg/l	11/03/17 17:23	EPA 200.7/4.4	sr	L
Cadmium	<0.400		0.400	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Cobalt	<1.00		1.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Chromium	<0.500		0.500	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Copper	<1.00		1.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Iron, Dissolved	206		4.00	mg/l	11/02/17 22:04	EPA 200.7/4.4	sr	X
Iron	196		4.00	mg/l	11/03/17 17:16	EPA 200.7/4.4	sr	
Lithium	214		20.0	mg/l	11/03/17 17:23	EPA 200.7/4.4	sr	
Magnesium	2080		400	mg/l	11/03/17 17:23	EPA 200.7/4.4	sr	
Manganese	7.92		1.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Molybdenum	<1.00		1.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Sodium	66700		2000	mg/l	11/03/17 17:23	EPA 200.7/4.4	sr	
Nickel	<5.00		5.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Lead	<0.800		0.800	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Selenium	<2.00		2.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
Strontium	12400		40.0	mg/l	11/03/17 17:23	EPA 200.7/4.4	sr	L, T

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101 McQuiston Drive
Jackson Center PA, 16133
Project Manager: Doug Byers & Kirk Elkin

Project: 2017 sampling - 26R
Project Number: [none]
Collector: DB
Number of Containers: 14

Reported:
11/21/17 15:14

Client Sample ID: RAU UNIT 2H

Date/Time Sampled: 10/24/17 10:15

Laboratory Sample ID: 7J24134-01 (Water/Grab)

Analyte	Result	MDL	RL	Units	Date / Time Analyzed	Analytical Method	* Analyst	Note
---------	--------	-----	----	-------	----------------------	-------------------	-----------	------

Metals by Prep Method EPA 200.2

Zinc	<2.00		2.00	mg/l	11/03/17 17:17	EPA 200.7/4.4	sr	
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Physical Parameters by APHA/ASTM/EPA Methods

Ammonia as N	298.8		20.00	mg/l	11/01/17 18:18	ASTM D6919-09	SNW	
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Subcontracted Analyses

Gross Alpha - Radiological Suite	8914		1726	pCi/L	11/01/17 18:30	EPA 900.0	sub	C1
Gross Beta - Radiological Suite	3226		1204	pCi/L	11/01/17 18:30	EPA 900.0	sub	C1
Radium 226	7579		592.1	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Radium 228	2484.8		60.16	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Thorium-232	<32010		32010	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Thorium-230	<18360		18360	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Thorium-228	<2767		2767	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Uranium-238	<513.7		513.7	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Uranium-235	<182.7		182.7	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1
Uranium-234	<1797		1797	pCi/L	11/15/17 13:37	EPA 901.1	sub	C1

Volatile Organic Compounds by EPA Method 8260B

Benzene	<5.00		5.00	ug/l	10/26/17 00:58	EPA 8260B	bag	
Toluene	<5.00		5.00	ug/l	10/26/17 00:58	EPA 8260B	bag	

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State Certifications: MD 275, WV 364

Diversified Oil & Gas LLC

101 McQuiston Drive

Jackson Center PA, 16133

Project Manager: Doug Byers & Kirk Elkin

Project: 2017 sampling - 26R

Project Number: [none]

Collector: DB

Number of Containers: 14

Reported:

11/21/17 15:14

Client Sample ID: RAU UNIT 2H

Date/Time Sampled: 10/24/17 10:15

Laboratory Sample ID: 7J24134-01 (Water/Grab)

Analyte	Result	MDL	RL	Units	Date / Time Analyzed	Analytical Method	* Analyst	Note
---------	--------	-----	----	-------	----------------------	-------------------	-----------	------

Volatile Organic Compounds by EPA Method 8260B

Q

Surrogate: 4-Bromofluorobenzene	96.6 %		70-130		10/26/17 00:58	EPA 8260B	bag	
Surrogate: 1,2-Dichloroethane-d4	104 %		70-130		10/26/17 00:58	EPA 8260B	bag	
Surrogate: Fluorobenzene	112 %		70-130		10/26/17 00:58	EPA 8260B	bag	

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Project: 2017 sampling - 26R
 Project Number: [none]
 Collector: DB
 Number of Containers: 14

Reported:
 11/21/17 15:14

Notes

- A Sample preparation for this analysis was completed on: 11-1-17@1335.
- C1 This sample was subcontracted to Laboratory - ID# 65-00282.
- D4 This result is an estimated value because the sample dilutions set-up for the BOD analysis did not meet the oxygen depletion criteria of at least 2mg/L.
- H The spike recovery was above the acceptance range for the Matrix Spike (MS) and/or Matrix Spike Duplicate (MSD) sample analyzed with the preparation batch.
- J Detected between the Method Detection Limit (MDL) and the Reporting Limit (RL); therefore, the result is an estimated value.
- L The noted analyte was detected in the method blank.
- O The noted surrogate value was above the acceptance range.
- Q Sample was analyzed at a dilution. Reporting limits were adjusted accordingly.
- T Result was over the calibration range, but within the linear dynamic range of the instrument for the noted analyte.
- X Sample for dissolved metal analysis was filtered at the laboratory.



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 Project Manager: Doug Byers & Kirk Elkin

Project: 2017 sampling - 26R
 Project Number: [none]
 Collector: DB
 Number of Containers: 14

Reported:
 11/21/17 15:14

Definitions

If surrogate values are not within the indicated range, then the results are considered to be estimated.

Reporting limits are adjusted accordingly when samples are analyzed at a dilution due to the matrix.

MBAS, calculated as LAS, mol wt 348

If the solid sample weight for VOC analysis does not fall within the 3.5-6.5 gram range, the results are considered estimated values.

Unless otherwise noted, all results for solids are reported on a dry weight basis.

Samples collected by Fairway Laboratories' personnel are done so in accordance with Standard Operating Procedures established by Fairway Laboratories.

- # The following analyses are to be performed immediately upon sampling: pH, sulfite, chlorine residual, dissolved oxygen, filtration for ortho phosphorus, and ferrous iron. The date and time reported reflect the time the samples were analyzed at the laboratory; and should be considered as analyzed outside the EPA holding time.
- ^ The following analytes are to be filtered immediately upon sampling: Hexavalent Chromium. Filtration through a 0.45 micron filter within 15 minutes of sampling is required for compliance with the Clean Water Act (CWA) for reporting of hexavalent chromium to prevent interconversion of chromium species.
- * P indicates analysis performed by Fairway Laboratories, Inc. at the Pennsdale location. This location is PaDEP Chapter 252 certified.
- * G indicates analysis performed by Fairway Laboratories, Inc. at the Greensburg location PaDEP: 65-00392. This location is PaDEP Chapter 252 certified.
- < Represents "less than" - indicates that the result was less than the reporting limit.
- MDL Method Detection Limit - is the lowest or minimum level that provides 99% confidence level that the analyte is detected. Any reported result values that are less than the RL are considered estimated values.
- RL Reporting Limit - is the lowest or minimum level at which the analyte can be quantified.
- [CALC] Indicates a calculated result. Calculations use results from other analyses performed under accredited methods.

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Diversified Oil & Gas LLC

Project: 2017 sampling - 26R

101 McQuiston Drive

Project Number: [none]

Reported:

Jackson Center PA, 16133

Collector: DB

11/21/17 15:14

Project Manager: Doug Byers & Kirk Elkin

Number of Containers: 14

Terms & Conditions

Services provided by Fairway Laboratories Inc. are limited to the terms and conditions stated herein, unless otherwise agreed to in a formal contract.

CHAIN OF CUSTODY Fairway Laboratories Inc. ("Fairway," "us" or "we") will initiate a chain-of-custody/request for analysis upon sample receipt unless the client includes a completed form with the received sample(s). Upon request, Fairway will provide chain-of-custody forms for use.

CONFIDENTIALITY Fairway maintains confidentiality in all of our client interactions. The client's consent will be required before releasing information about the services provided.

CONTRACTS All contracts are subject to review and approval by Fairway's legal council. Each contract must be signed by a corporate officer.

PAYMENT/BILLING Unless otherwise set forth in a signed contract or purchase order, terms of payment are "NET 30 Days." The time allowed for payment shall begin based on the invoice date. A 1.5% per month service charge may be added to all unpaid balances beyond the initial 30 days. In its sole discretion, Fairway reserves the right to request payment before services and hold sample results for payment of due balances. We will not bill a third party without prior agreement among all parties acknowledging and accepting responsibility for payment.

SAMPLE COLLECTION AND SUBMISSION Clients not requesting collection services from Fairway are responsible for proper collection, preservation, packaging, and delivery of samples to the laboratory in accordance with current law and commercial practice. Fairway shall have no responsibility for sample integrity prior to the receipt of the sample(s) and/or for any inaccuracy in test or analyses results as a result of the failure of the client or any third party to maintain the integrity of samples prior to delivery to Fairway. All samples submitted must be accompanied by a completed chain of custody or similar document clearly noting the requested analyses, dates/time sampled, client contact information, and trail of custody. Samples received at the laboratory after business hours are verified on the next business day. Discrepancies are documented on the Receiving Document.

SUBCONTRACTING Some analyses may require subcontracting to another laboratory. Unless the client indicates otherwise, this decision will be made by Fairway. Subcontracted work will be identified on the final report in accordance with NELAC requirements.

RETURN OF RESULTS Fairway routinely provides faxed or verbal results within 10 working days of receipt of sample(s) and a hard copy of the data results is routinely received via US Postal Service within 15 working days. At the request of the client, Fairway may offer expedited return of sample results. Surcharges may apply to rush requests. All rush requests must be pre-approved by Fairway. We reserve the right to charge an archive retrieval fee for results older than one (1) year from the date of the request. All records will be maintained by Fairway for 5 years, after which, they will be destroyed.

SAMPLE DISPOSAL Fairway will maintain samples for four (4) weeks after the sample receipt date. Fairway will dispose of samples which are not and/or do not contain hazardous wastes (as such term is defined by applicable federal or state law), unless prior arrangements have been made for long-term storage. Fairway reserves the right to charge a disposal fee for the proper disposal of samples found or suspected to contain hazardous waste. A return shipping charge will be invoiced for samples returned to the client at their request.

HAZARD COMMUNICATION The client has the responsibility to inform the laboratory of any hazardous characteristics known or suspected about the sample, and to provide information on hazard prevention and personal protection as necessary or otherwise required by applicable law.

WARRANTY AND LIMITATION OF LIABILITY For services rendered, Fairway warrants that it will apply its best scientific knowledge and judgment and to employ its best level of effort consistent with professional standards within the environmental testing industry in performing the analytical services requested by its clients. We disclaim any other warranties, expressed or implied by law. Fairway does not accept any legal responsibility for the purposes for which client uses the test results.

LITIGATION All costs associated with compliance to any subpoena for documents, for testimony in a court of law, or for any other purpose relating to work performed by Fairway Laboratories, Inc. shall be invoiced by Fairway and paid by client. These costs shall include, but are not limited to, hourly charges for the persons involved,

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#1

CHAIN OF CUSTODY / REQUEST FOR ANALYSIS		FAIRWAY LABORATORIES INC.				COC # <u>7174134</u> Page <u>1</u> of <u>2</u>										
Client Name: _____		Received on ice? <input type="checkbox"/> Y <input type="checkbox"/> N		PADEP Reportable? Yes <input type="checkbox"/>		Analyses Requested							Please email results to: dbyers@atlasenergy.com kelkin@dgasoil.com			
Address: 101 McQuiston Drive Jackson Center PA 16133		Sample Temp: _____		PWSID#: _____												
Contact: Doug Byers & Kirk Elkin		TAT: _____		-or-												
Phone #: 724-662-0300		Composite Start		Composite End									Comments			
Fax #: _____																
Project Name: 2017 sampling-26R																
Quote/PO #: _____																
Normal <input type="checkbox"/>																
Rush <input type="checkbox"/>																
Date Required: _____																
Sample Description / Location	Grab/Composite	Start Date	Start Time	End Date	End Time	Soil	Water	Other? Explain	# of Containers	PADEP 26R list- Brine						
Rau UNIT 2H	Grab	NA	NA	10.24	1015		X			X						
Signature		Date	Time		REMARKS											
Sampled by: <i>Doug Byers</i>		10.24.17	1015 hr													
Received by: <i>Kirk Elkin</i>		10-24-17	1105													
Relinquished by: <i>Kirk Elkin</i>		10-24-17	1818													
Received by: _____																
Relinquished by: <i>Doug Byers</i>																
Received by: _____																

Page 10 of 11

Chain of Custody Receiving Document

Receiver: AI

Page 2 of 2

Date/Time of this check: 10-24-17 1910 Client: Diversified Lab # 7J24134

Received on ICE? * Sample Temperature when delivered to the Lab: 0.9 Acceptable? * or In cool down process? *
 (Not applicable for WV compliance)

Custody Seals? NO Intact? NA

COC/Labels on bottles agree? * Correct containers for all the analysis requested? * Matrix: water

COC #	Number and Type of BOTTLES										Comments <input type="checkbox"/> * Internal notification completed for deviations.
	Poly Non-Pres. <small>M 10-24-17</small>	Poly H2SO4	Poly HNO3	Amber H2SO4	Amber Non-Pres. H2SO4 <small>500</small>	Poly NaOH	VOCS (Head space?)	Other <input type="checkbox"/> *	Properly Preserved <input type="checkbox"/> *	Bacteriological	
1	76	1	1	1	1		2-HCl 2-NP		Y		

<p>* DEVIATION PRESENT:</p> <p><input checked="" type="checkbox"/> No Ice ()</p> <p><input checked="" type="checkbox"/> Not at Proper Temperature ()</p> <p><input checked="" type="checkbox"/> Wrong Container ()</p> <p><input checked="" type="checkbox"/> Missing Information: ()</p>	<p>CLIENT CALLED:</p> <p>YES ()</p> <p>By Whom: _____</p> <p>Date: _____</p>	<p>CLIENT RESPONSE:</p> <p>Proceed with analysis; qualify data ()</p> <p>Will Resample ()</p> <p>Provided Information ()</p> <p>No Response; Proceed and qualified ()</p> <p>Client Contact: _____ Date: _____</p>
--	--	---

* Comments: _____



1803 Philadelphia Street
Indiana, PA 15701
P: (724) 463-8378
F: (724) 465-4209
PADEP: 32-00382

1276 Bentleyville Road
Van Voorhis, PA 15366
P: (724) 258-8378
F: (724) 258-8376
PADEP: 63-04247

435 Broad Street
Montoursville, PA 17754
P: (570) 321-9002
F: (570) 321-1957
PADEP: 41-04880

950 West Main Street
Sharpsville, PA 16150
P: (724) 463-8378 x 500
F: (724) 465-4209
PADEP: 43-04934

19 May 2021

Diversified Gas & Oil - Indiana
Attn: Paul Hart
130 Raymond Drive
Indiana, PA 15701

Work Order: 1051371
Project: Produced Water

Report of Analysis

Client Sample ID	Lab Sample ID	Matrix	Date Sampled	Date Received	Sample Notes
Central PA Marcellus Production Water	1051371-01	Waste Water	05/16/2021 18:00	5/17/21 12:45	

Report Narrative

The results contained in this report are only representative of the samples received. Environmental Service Laboratories, Inc. is not responsible for use or interpretation of the data included herein.

Definitions

RL Reporting Limit

Certifications

Analyses performed by Environmental Service Laboratories, Inc., Indiana PA unless otherwise specified.

Z = Environmental Service Laboratories, Inc., Indiana, PA is not accredited for analysis in the specified matrix.

Approved By

Rebecca Erwin
Project Manager





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Indiana, PA 15701
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PADEP: 32-00382

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F: (724) 258-8376
PADEP: 63-04247

435 Broad Street
Montoursville, PA 17754
P: (570) 321-9002
F: (570) 321-1957
PADEP: 41-04880

950 West Main Street
Sharpsville, PA 16150
P: (724) 463-8378 x 500
F: (724) 465-4209
PADEP: 43-04934

Diversified Gas & Oil - Indiana
130 Raymond Drive
Indiana, PA 15701

Reported: 05/19/2021 14:42

Lab Sample ID#: 1051371-01
Sample Type: Waste Water
Sample Source: Composite
Sampler: Client
Client Sample ID: Central PA Marcellus Production Water

Sample Begin Date: 05/16/2021 09:00
Sample End Date: 05/16/2021 18:00
Receipt Date: 05/17/2021 12:45

Analyte	Sample Result	Units	Data Qualifier	RL	Analyst/ Certification	Prep Date/Time	Analysis Date/Time
General Chemistry	Analytical Method: -		Prep Method: No Prep - WetChem				
Specific Gravity	1.18				LMB/Z	05/19/21 09:48	05/19/21 09:48



SAMPLE RECEIPT AND REVIEW FORM

Client: <u>Diversified Gas & Oil</u>	Work 1051371
--	--

PART A: GENERAL INFORMATION- SATELLITE LABORATORY

Received by/Lab ID: _____	Date/Time Received: / / _____
Method of Delivery: Client Drop-Off ESL Courier Other: _____	Received on Ice? YES NO
Sample Receipt Temperature: _____ °C	IR Gun ID: _____
Containers Removed by Satellite Lab for Analysis of: FECAL TC/EC TC MPN EC MPN TC/EC MPN N/A	

PART B: GENERAL INFORMATION- INDIANA LABORATORY

Received by/Lab ID: <u>CSW (00382)</u>	Samples Received on Ice? <input checked="" type="checkbox"/> YES NO
Date/Time Received: <u>5/17/21 1245</u>	Date Sampled: <u>5/16/21</u>
Method of Delivery: FedEx UPS <u>Client Drop off</u> ESL courier Other: _____	
Sample Receipt Temperature: <u>20.0</u> °C	IR Gun ID: <u>/</u>
Sample State of Collection: <input checked="" type="checkbox"/> PA NY OH WV Other: _____	PWSID Compliance Drinking Water Samples: YES <input checked="" type="checkbox"/> NO

PART C: Receipt Details Completed (if different from above): _____ / _____ / _____

		Signature	Date	Time	
Sample Receipt Criteria					Comments/Qualifiers (Required for Non-Conforming Items)
Chain of custody documents included with samples?	YES NO				Comments:
COC form is properly signed in relinquished/received sections?	YES NO				Comments:
Sample containers intact and sealed?	YES NO				Circle Applicable: Damaged Container Leaking Container Custody Seal Broken Other: _____
Number of containers received matches number indicated on COC?	YES NO				Sample IDs and Containers Affected:
Sample IDs on COC match IDs on bottles?	YES NO				Sample IDs and Containers Affected:
Date and time on COC match date and time on bottles?	YES NO				Sample IDs and Containers Affected:
Samples received within holding time?	YES NO				Sample IDs and Containers Affected:
Samples received at appropriate pH for analysis requested?	YES NO				Sample IDs and Containers Affected and Observed pH:
Samples requiring thermal preservation within 0 ≤ 6°C? Microbiology within 0 ≤ 10°C?	YES NO				For non-WV samples outside of thermal preservation range sampled same day and received on ice are considered acceptable as long as the cooling process has begun.
Adequate sample volume received?	YES NO				Analyses Affected:
VOA vials free of headspace (defined as < 6 mm bubble)?	YES NO				Sample IDs and Containers Affected:
Other Comments:					Deficiency Log Created:
					YES NO

06

Effective Date:

GP.25.A-1 Sample Receipt Log

ATTACHMENT E. PLUGGING and ABANDONMENT (P&A) PLAN

- I. **P&A Plan of the well on EPA Form 7520-19**
 - a. See Attachment E, Addendum 1

- II. **P&A Diagram that includes:**
 - a. See Attachment E, Addendum 2
 - i. Type, and number of plugs to be used
 - 1. 1ST Plug 35 SKS Class A, @3390'
 - 2. 2nd Plug 38 SKS Class A, 3390' to 2890'
 - 3. 3rd Plug Cut 4.5" at 2150' set 500 cement on top of casing cut
 - 4. 4th Plug In 8.625" casing plug from 1560' to 1060'
 - 5. 5th Plug 362 SKS Class A, 1050' to surface
 - ii. Placement of each plug including the elevation of top and bottom
 - 1. See Attachment E, Addendum 2
 - 2. 1st Plug 3390'
 - 3. 2nd Plug 2890'
 - 4. 3rd Plug 1650'
 - 5. 4th Plug 1060'
 - 6. 5th Plug 1050'
 - iii. Type, grade, and quantity of cement to be used
 - 1. See Attachment E, Addendum 2
 - 2. 1st Plug 35 Sacks Class A Cement
 - 3. 2nd Plug 38 Sacks Class A Cement
 - 4. 3rd Plug 500' Sacks Class A Cement
 - 5. 4th Plug 500' Sacks Class A Cement
 - 6. 5th Plug 362 Sacks Class A Cement
 - iv. Method of placement of the plugs
 - 1. Circulation for the bottom 4 plugs
 - v. At least one cost estimate from an independent firm in the business of plugging and abandoning wells for third party (EPA) to complete proposed P&A plan
 - 1. See Attachment E, Addendum 3
 - a. Proposal Submitted by DGO
 - b. DGO Supervisor Drew Adamo

Attachment A, Addendum List

Addendum 1- EPA Form 7520-19

Addendum 2 - Well Plugging Diagram

Addendum 3 - Well Plugging Estimate

United States Environmental Protection Agency



WELL REWORK RECORD, PLUGGING AND ABANDONMENT PLAN, OR PLUGGING AND ABANDONMENT AFFIDAVIT

Name and Address, Phone Number and/or Email of Permittee

G2 STEM LLC
4826 Piney Branch Road
Suite 200
Fairfax, VA 22030

Permit or EPA ID Number

API Number

051-20470

Full Well Name

Higinbotham #1

State

PA

County

Fayette

Locate well in two directions from nearest lines of quarter section and drilling unit

Latitude S39.5230

Surface Location

Longitude W79.5000

1/4 of 1/4 of Section Township Range

14600' ft. from (N/S) South Line of quarter section

5925' ft. from (E/W) West Line of quarter section.

Well Class

Timing of Action (pick one)

Type of Action (pick one)

- Class I
- Class II
- Class III
- Class V

Notice Prior to Work

Date Expected to Commence

Report After Work

Date Work Ended

Well Rework

Plugging and Abandonment

Conversion to a Non-Injection Well

Provide a narrative description of the work planned to be performed, or that was performed. Use additional pages as necessary. See instructions.

Pull out of hole packer and tubing, Run wire line CCL and cement bond log to verify TOC on annulus Run in hole wire line set cast iron cement squeeze retainer set 3390', Run in hole 2.375" work string sting into squeeze retainer, pump into perforations 35 sacks Class A cement, pressure up until perforations are squeezed off, sting out of retainer, check for flow, circulate 38 sacks of Class A cement 500' of fillup 3390' to 2890', pull out of hole work string, run in hole wire line jet cutter cut 4.5" casing at 2150', pull 1 joint, circulate hole, circulate 500' cement plug 2108' to 1608', 170 sacks of Class A cement, pull 4.5" casing to 1560', set 500' cement plug 250' below 8.625" and 250' into 8.625" casing, TOC would be 1060', pull 4.5" out of hole, run in hole 8.625" wire line set cast iron bridge plug set at 1050', run in hole 2.375" work string to 1050', circulate 362 sacks of Class A cement to surface, top off after cement settle back, cut off casings 4' below ground level, weld on monument with permit number restore ground to as near original condition as possible, remove all pipes and above ground tanks.

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments 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 and imprisonment. (Ref. 40 CFR § 144.32)

Name and Official Title (Please type or print)

Fredric R. Gumbinner, Managing Partner

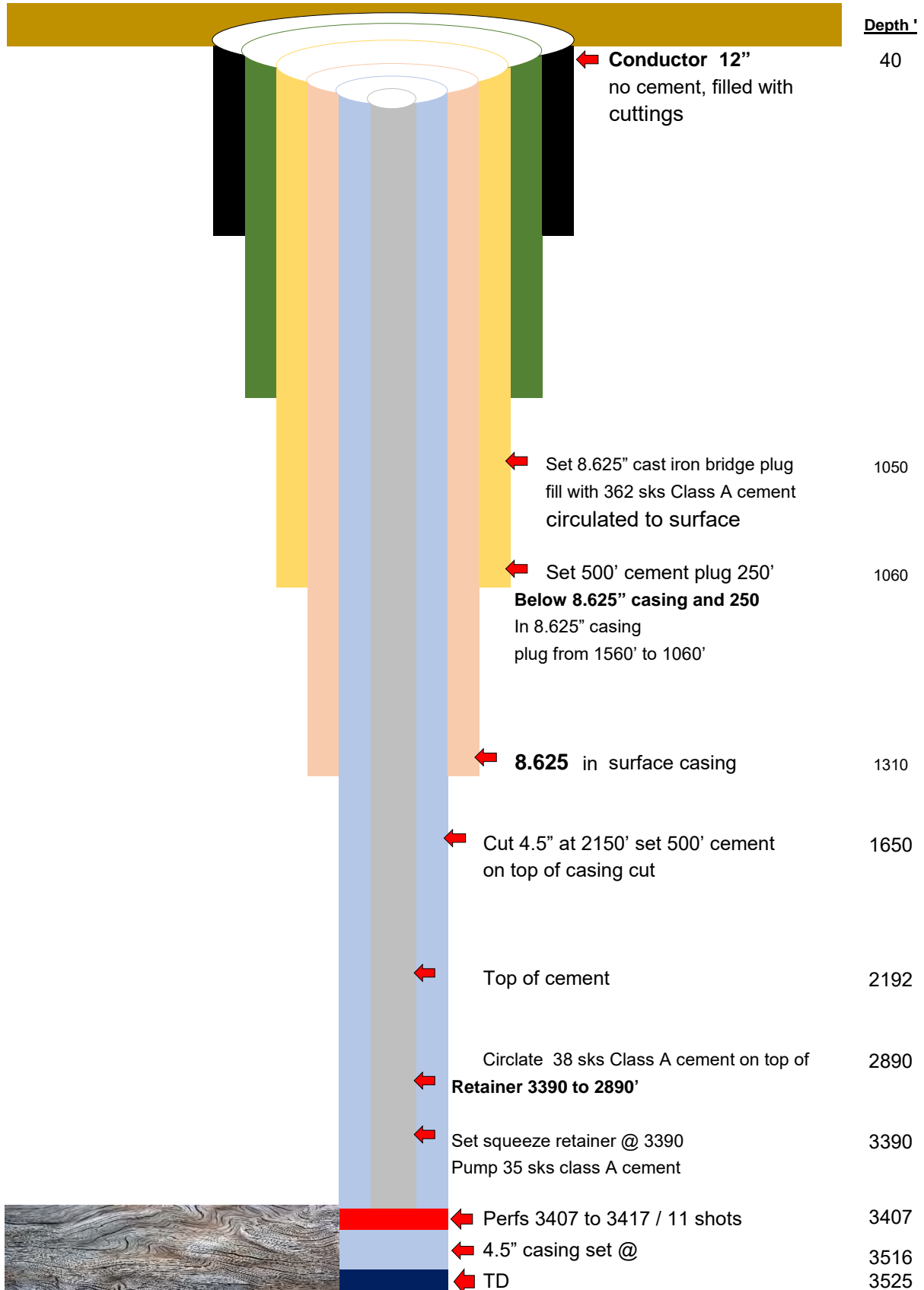
Signature

Date Signed

6/27/22

ATTACHMENT E, ADDENDUM 2

Higinbotham # 1
37-051-20470-00
Plugging schematic





P O BOX 215
GRATIOT, OHIO 43740
PHONE 740-787-1391 FAX 740-787-1319

March 31, 2023

Don Tron
Fluid Moving Solutions

RE: Higinbotham #1 Injection Well
API# 051-20470, Fayette County, PA

Here is a quote for plugging above mentioned well and what all is included , according to P&A Procedure we received. \$ 135,750.00

We will supply the following:

Work over rig with all needed handing tools for pulling and running casing and tubulars. Includes Power tongs and weight indicator. Personal to carry out needed labor to assist in P&A.

Rig Pusher

Water trucking

150 bbl steel pit and 300 bbl tank

Wireline services to run CCL and Bond, set retainer and Cut casing, cast iron B.P.

Trucking of all equipment within 75 miles

Dozer and Hoe as required for operations.

Cement and Pumping for P&A operations.

Remove all equipment from location, Pipe, tanks, flow lines.

Reclaim location and seed to required specs.

Thank you for the opportunity to quote this project. If you have any questions, feel free to call.



William J. Mitton

V.P. Operations Knox Energy Inc. DBA Berry Well Service

Cell 740-404-1447

ATTACHMENT F. FINANCIAL ASSURANCE

- I. Evidence of financial resources, such as a surety bond or financial statement, necessary to close, plug, or abandon the well**
 - a. See Attachment F, Addendum 1

Attachment A, Addendum List

Addendum 1- Financial Documentations

ATTACHMENT F, ADDENDUM 1

G2 DEVELOPMENT PARTNERS

4826 PINEY BRANCH RD
SUITE 200
FAIRFAX, VA 22030-62333
703-577-6696

March 2022

RE: Permit Application

To Whom It May Concern:

In conjunction with the “Class II Permit Application Completeness Review Checklist”, specifically Attachment F regarding the “Financial Assurance (40 CFR 144.52)”, we are submitting this letter in support of the application of G2 STEM, LLC for the permitting of saltwater injection wells in western Pennsylvania.

By way of background, G2 Development Partners provides \$1-5 million in development capital per project to various waste-to-energy, green fuels and other environmentally focused projects such as G2 STEM, LLC (see accompanying information on our firm).

Furthermore, our affiliated entity G2 STEM Investco is the majority owner of G2 STEM, LLC.

G2 STEM Investco and G2 Development Partners are committed to providing the necessary funds for any eventual plugging responsibilities undertaken by G2 STEM, LLC. Our bank (Pacific West Bank) stands ready to provide assurance of our standing and ability to meet the requirements of the Financial Assurance provision. We intend to procure an independent third-party financial instrument such as a surety bond(s) or letter(s) of credit sufficient to guarantee that a specified amount of money will be available to meet any required plugging responsibility when necessary.

Please let us know what additional information from us would be helpful in this matter.

Sincerely,



Fredric R. Gumbinner

Managing Partner

**ATTACHMENT G. SITE SECURITY and MANIFEST
REQUIREMENTS (COMMERCIAL WELLS ONLY: FORM 7520)**

- I. **Site security plan**
 - a. See Attachment G, Addendum 1

- II. **Description of manifest system**
 - a. See Attachment G, Addendum 2

Attachment A, Addendum List

Addendum 1- Site Security Plan

Addendum 2 - Manifest System

ATTACHMENT G. ADDENDUM 1

SITE SECURITY PLAN

G2 STEM, Higinbotham #1 will implement several security protocols. These protocols are as follows:

1. Camera (CCTV) System
 - a. A Lorex Technologies Security Camera System will be installed at Higinbotham #1
 - i. This security system will have the following components
 1. A 16 Channel NVR (Network Video Recorder) System will be utilized to record motion in critical areas. Critical Areas are as follows:
 - a. Incoming Traffic Areas
 - b. Outgoing Traffic Areas
 - c. Well Head
 - d. Pump/Filtration Room
 - e. Office Area
 - f. Truck Ingress
 - g. Truck Egress
 - h. Tank Farm
 2. Eight (8) bullet type security cameras will be installed at R&P Coal #4 to continually record video on motion and activities around the facility.
 - a. These cameras will have a 180° visual range
 - b. These cameras will have night vision capabilities
 - c. Cameras will be POE (Power Over Ethernet)
 3. The NVR to have a memory capacity of no less than 1 TB
2. Gates & Fencing
 - a. Fencing and Gates will be installed at the truck offload ingress and egress. Gates will be locked during times when no company personnel are on site.
3. Automation System Lock Procedures
 - a. A control valve will be installed on each truck offload pad. These controls valves will not open and allow for offloading unless the following permissive are met:
 - i. Trucking company is an approved customer
 - ii. All information in the manifest is completed
 1. NOTE: Manifest data is included in Attachment F, Addendum 2
 - iii. Operator has to approve information and start the system
 - b. The control valve will then open and allow the system to unload the truck
 - c. The truck will continue to offload until empty
 - d. The system will stop
 - e. The control valve will shut 100%
 - f. Truck offload data will be logged.

ATTACHMENT G. ADDENDUM 2

DESCRIPTION OF MANIFEST SYSTEM

G2 STEM, Higinbotham #1 will utilize an automated system along with a paper back up system to record incoming water data. A sequence of operations as well as recorded data is as follows:

1. Sequence of Operations
 - a. A certified G2 STEM customer arrives on site and is directed to a truck offload bay
 - b. The certified customer is mechanically connected to the offload system via a hose
 - c. The certified customer's truck is electrically grounded
 - d. A certified customer's BOL (Bill Of Lading) is handed to a G2 STEM operator and information will be input into the automation system. The input is as, but not limited to the following:
 - i. Trucking Company Name
 - ii. Truck Driver Name
 - iii. Well Operators Name
 - iv. Truck Number
 - v. Well Pad Name/Location
 - vi. Well API Number
 - vii. Source Lease Name
 - viii. BOL Number
 - ix. Multiple Pad Loads
 1. If multiple pad loads, input additional information as above
 - e. The G2 STEM operator starts the system
 - i. The automation control valve will open to 100%
 - ii. The truck offload pump will start and ramp to a set speed
 - iii. The system will measure the following
 1. Flow Rate
 2. Total Flow
 3. Density/Specific Gravity of the Fluid
 - iv. When the truck is empty
 1. The pump will stop
 2. The automated control valve will shut
 3. All data will be logged into the system
 4. A truck offload ticket will be printed in duplicate
 - a. A copy of the ticket with given to the truck driver
 - b. A copy of the ticket is stapled with the truck driver BOL
 - v. The truck leaves the facility
2. All manifest information will be logged and tickets kept for at least 3 years
 - a. Monthly and annual reports will be sent to regulating agencies

Facility Operator	
Facility	:
Ticket #	4017
Date	February 17 2022
Start Time	End Time
01:31 PM	01:51 PM
Service Company	
THE BAUER COMPANY, INC	
Driver	John Maxwell
Truck #	Service Ticket #
55	3
Source Operator	
SNYDER BROS INC	
Source Name (Lease)	
NOLDER	
Source #	Well #
	4H
Drilling Permit #	
00531272	
Manifest #	
3	
Material	Volume
PA889 Other O&G Fluid	102.12 bbls

STEPRO

ATTACHMENT H. AQUIFER EXEMPTION (AE)

- I. Supporting documentation for proposed AE, *if applicable***
 - a. The AE is not applicable

ATTACHMENT I. EXISTING EPA PERMITS

- I. List of existing EPA permits, *if applicable***
 - a. Not applicable, no permits

ATTACHMENT J. DESCRIPTION OF BUSINESS

- I. Description of the nature of the business**
 - a. The Salt Water Disposal (SWD) Facility will be G2 STEM's sole business. G2 STEM does not have any other SWD facilities at this time, however they may add additional facilities in the future.
 - b. Higinbotham #1 will be a commercial salt water disposal facility serving the oil and gas producers. This highly automation facility will receive salt water and brine from oil and gas operators, store the material, remove particulate entrained in the fluid, and inject the material in the disposal well.
 - c. Every aspect of this process will be monitored and controlled by a PLC (Programmed Logic Control) system receiving inputs from both digital and analog signals strategically located to collect data and control equipment.
 - d. All required documentation will be made from incoming water, chemical injection into the fluid, particulate removal, tank levels, injection volumes, and well data. All data collected will be retained historically.

ATTACHMENT K. OPTIONAL ADDITIONAL PROJECT INFORMATION

- I. **The Wild and Scenic Rivers Act, 16 U.S.C 1273 et seq**
 - a. List of national wild and scenic rivers that may be impacted by the activities associated with proposed project, *if applicable*
 - b. Not Applicable

- II. **The National Historic Preservation Act of 1966, 16 U.S.C. 470 et seq.**
 - a. List of properties listed or eligible for listing in the National Register of Historic Places. If available, historic and cultural resource survey(s) that have been conducted, *if applicable*
 - b. Not applicable, EPA to Review

- III. **The Endangered Species Act, 16 U.S.C. 1531 et seq.**
 - a. List of endangered or threatened species that may be affected by the activities associated with proposed project. If available, previous endangered or threatened species surveys that have been conducted, *if applicable*
 - b. Not Applicable, EPA to Review

- IV. **The Coastal Zone Management Act, 16 U.S.C. 1451 et seq.**
 - a. List of coastal zones that may be affected by the activities associated with the proposed project, *if applicable*
 - b. Not Applicable