DELTA HELIX ENERGY LLC

W. M. KAUFMAN W-19

UIC PERMIT APPLICATION

UIC #2D08701056

12/15/24

CHECKLIST FOR FILING A UIC PERMIT APPLICATION

Please utilize this checklist to ensure you have prepared, completed, and enclosed all required documentation and payment to ensure a timely review of your submittal.

Operator	Delta Helix Energy, LLC		
Existing UIC Permit ID Number	2D08701056-002	UIC Well API Number	4708701056

Office of Oil and Gas Office Use Only	
Permit Reviewer	
Date Received	
Administratively Complete Date	
Approved Date	
Permit Issued	

Please check the fees and payment included.

Fees		Payment Type	
UIC Permit Fee: $500	✓	Check	✓
Groundwater Protection Plan (GPP) Fee: $50.00		Electronic	
		Other	

Please check the items completed and enclosed.

- ✓ Checklist
- ✓ UIC-1
  - ✓ Section 1 – Facility Information
  - ✓ Section 2 – Operator Information
  - ✓ Section 3 – Application Information
  - ✓ Section 4 – Applicant/Activity Request and Type
  - ✓ Section 5 – Brief description of the Nature of the Business
  - ✓ CERTIFICATION
- ✓ Section 6 – Construction
  - ✓ Appendix A Injection Well Form
  - ✓ Appendix B Storage Tank Inventory
- ✓ Section 7 – Area of Review
  - ✓ Appendix C Wells Within the Area of Review

N/A ☑ Appendix D Public Service District Affidavit

☑ Appendix E Water Sources

☑ Appendix F Area Permit Wells

☑ Section 8 – Geological Data on Injection and Confining Zones

☑ Section 9 – Operating Requirements / Data

☑ Appendix G Wells Serviced by Injection Well

☑ Section 10 – Monitoring

☑ Section 11 – Groundwater Protection Plan (GPP)

☑ Appendix H Groundwater Protection Plan (GPP)

☑ Section 12 – Plugging and Abandonment

☑ Section 13 – Additional Bonding

☑ Section 14 – Financial Responsibility

☑ Appendix I Financial Responsibility

☑ Section 15 – Site Security Plan

☑ Appendix J Site Security for Commercial Wells

☑ Section 16 – Additional Information

☑ Appendix K Other Permit Approvals

NOTE: For all 2D wells an additional bond in the amount of $5,000 is required.

Reviewed by (Print Name): Brad Morris

Reviewed by (Sign): Brad R Morris

Date Reviewed: 5/28/25

Section 1 – 5

UIC-1 Form

UIC-1
(4/25)

WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
601 57th Street, SE
Charleston, WV 25304
(304) 926-0450
www.dep.wv.gov/oil-and-gas

UNDERGROUND INJECTION CONTROL (UIC) PERMIT APPLICATION

UIC PERMIT ID # 2D08701056002 **API #** 4708701056 **WELL #** Kaufman W-19

Section I. Facility Information

Facility Name: Kaufman W-19 Disposal

Address: 1.25 miles East on Kaufman Road (CR 48/3) off of Otto Road (CR 48)

City: Spencer State: WV Zip: 25276

County: Roane District: Smithfield 7.5' Quad: Spencer

Location description:
1.25 miles East on Kaufman Road (CR 48/3) off of Otto Road (CR 48) on the waters of Millstone Run.

Location of well(s) or approximate center of field/project in UTM NAD 83 (meters) Latitude: 38.759149
Northing: 4290082 Easting: 477216 Longitude: -81.262228

Environmental Contact Information:
Name: Brad Morris Title: Office Manager
Phone: 681-229-1558 Email: bmorris@topdrilling.com

Section 2. Operator Information

Operator Name: Delta Helix Energy, LLC
Operator ID: 494530855

Address: 300 Star Avenue, Suite 321
City: Parkersburg State: WV Zip: 26101
County: Roane

Contact Name: Brian Haught Contact Title: Operator Manager
Contact Phone: 681-229-1558 Contact Email: bhaught@topdrilling.com

Promoting a healthy environment.

Section 3. Applicant Information

Ownership Status: ☒ PRIVATE ☐ PUBLIC ☐ FEDERAL ☐ STATE
☐ OTHER (explain):

SIC code: ☒ 1311 (2D, 2H, 2R) ☐ 1479 (3S) ☐ OTHER (explain):

Section 4. Applicant / Activity Request and Type:

A. Apply for a new UIC Permit: ☐ 2D ☐ 2H ☐ 2R ☐ 3S
B. Reissue existing UIC Permit: ☒ 2D ☐ 2H ☐ 2R ☐ 3S
C. Modify existing UIC Permit: ☐ 2D ☐ 2H ☐ 2R ☐ 3S
(Submit only documentation pertaining to the modification request)

2D COMMERCIAL FACILITY: ☐ YES ☐ NO

Section 5. **Briefly describe the nature of business and the activities to be conducted:**

Oil & Natural Gas production. Water Produced from approximately 75 shallow wells is injected into the Big Injun Sand.

APPLICATION CERTIFICATION

In accordance with WV Code 47CSR13.13.11, all UIC permit applications must be signed by one of the following:

1. For a corporation: by a principle corporate officer of at least the level of vice-president;
2. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;
3. For a municipality, State, Federal, or other public agency: by either a principle executive officer or ranking elected official;
4. Or a duly authorized representative in accordance with 47CSR13.13.11.b.
   (A person may be duly authorized by one of the primary entities (1-3) listed above by submitting a written authorization to the Chief of the WVDEP Office of Oil and Gas designating an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

Delta Helix Energy, LLC

(Company Name)

2D08701056-002 (Kaufman W-19)

(UIC Permit Number)

I certify under 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. (47CSR13.13.11.d)

B. Douglas Haught

(Print Name)

CEO

(Print Title)

(Signature)

5-28-25

(Date)

Section 6

Construction

Section No. 6

1. The water produced in conjunction with crude oil from the William Kaufman lease is separated from the oil and gathered in a 100 bbl storage tank near the location of Kaufman W- 17. This water along with the water produced from nearby Clover Field Big Injun wells is filtered and injected into Kaufman W- 19. A Schematic of the production facility is shown in the attached Fig No. 1. The attached Fig No. 2 shows the location of the tanks, injection facility, and injection line to W M Kaufman W-19 and W M Kaufman W-7. Figure No. 3 (attached) shows the oil lines and oil and water stock tank locations. The ¼ mile AOR is shown on both Fig Nos 2 and 3. Fig No 3 also shows the lone USDW (James Warden) located within the AOR. Warden's USDW was sampled as well as that of Joseph Lung- located approximately 800' to the east of the AOR boundary.

2. The attached Fig No. 4 is a schematic of the as drilled injection well, W M Kaufman W-19 with Big Injun (injection zone), Big lime and shale (confining layers) marked. Tubing and casing depths along with cement info (TOC) is also shown on the schematic.

3. See Appendices A& B.

4. This disposal well was drilled in 1964 and logged with Gamma Ray / Density/ Caliper logs. A copy of the United States Department of the Interior Report No. 6992 (Reservoir Study of the William Kaufman Clover-Rush Run Oilfield, Roane County, WV by Karl-Heinz Frohne) is enclosed in Fig No. 5. This study provides a detailed study of the reservoir based on a core from W M Kaufman No. 7 located approximately 2600' South-West of Kaufman W-19. Reservoir properties as determined from that study are:

   Gross Sand thickness: 24'

   Pay thickness:12.5'

   Permeability: .8 md

   Porosity: 15%

   Connate water saturation: 65%

   Kaufman W-19 was completed with a small fracture treatment soon after drilling. Both the Breakdown Pressure and Instantaneous Shut In Pressure were recorded at 1400 psig (surface).

   The attached Fig No. 6 is a copy of the McCullough Scintillometer Gamma Ray / Neutron Long run at the time the well was drilled. The tops of the relevant formations are marked on this log.

API No. 4708701056

APPENDIX A
Injection Well Form

1) GEOLOGIC TARGET FORMATION Big Injun

Depth 2202 Feet (top) 2235 Feet (bottom)

2) Estimated Depth of Completed Well, (or actual depth of existing well): 2275 Feet

3) Approximate water strata depths: Fresh 200-400 Feet Salt 1245 Feet

4) Approximate coal seam depths: NONE

5) Is coal being mined in the area? Yes ☐ No ☑

6) Virgin reservoir pressure in target formation 960 psig Source Estimated

7) Estimated reservoir fracture pressure 2060 per step-rate test (1987) psig (BHFP)

8) MAXIMUM PROPOSED INJECTION OPERATIONS:

Injection rate (bbl/hour) 12

Injection volume (bbl/day) 50

Injection pressure (psig) 883

Bottom hole pressure (psig) 1966

9) DETAILED IDENTIFICATION OF MATERIALS TO BE INJECTED, INCLUDING ADDITIVES:

Produced water, bactericides, and other chemicals as may be necessary to maintain water quality.

Temperature of injected fluid: (°F) 60

10) FILTERS (IF ANY)

Cartridge filters at injection pump and well head

11) SPECIFICATIONS FOR CATHODIC PROTECTION AND OTHER CORROSION CONTROL

No cathodic protection is utilized at this time.

4708701056

APPENDIX A (cont.)

12. Casing and Tubing Program

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	10 3/4	NA	NA	NA	9	9	NA
Fresh Water	8 5/8	N	H-40	28	466	466	CTS
Coal							
Intermediate 1							
Intermediate 2							
Production	4 1/2	N	J-55	9.5	2272	2272	53
Tubing	2 3/8	N	J-55	4.6	2103	2103	
Liners							

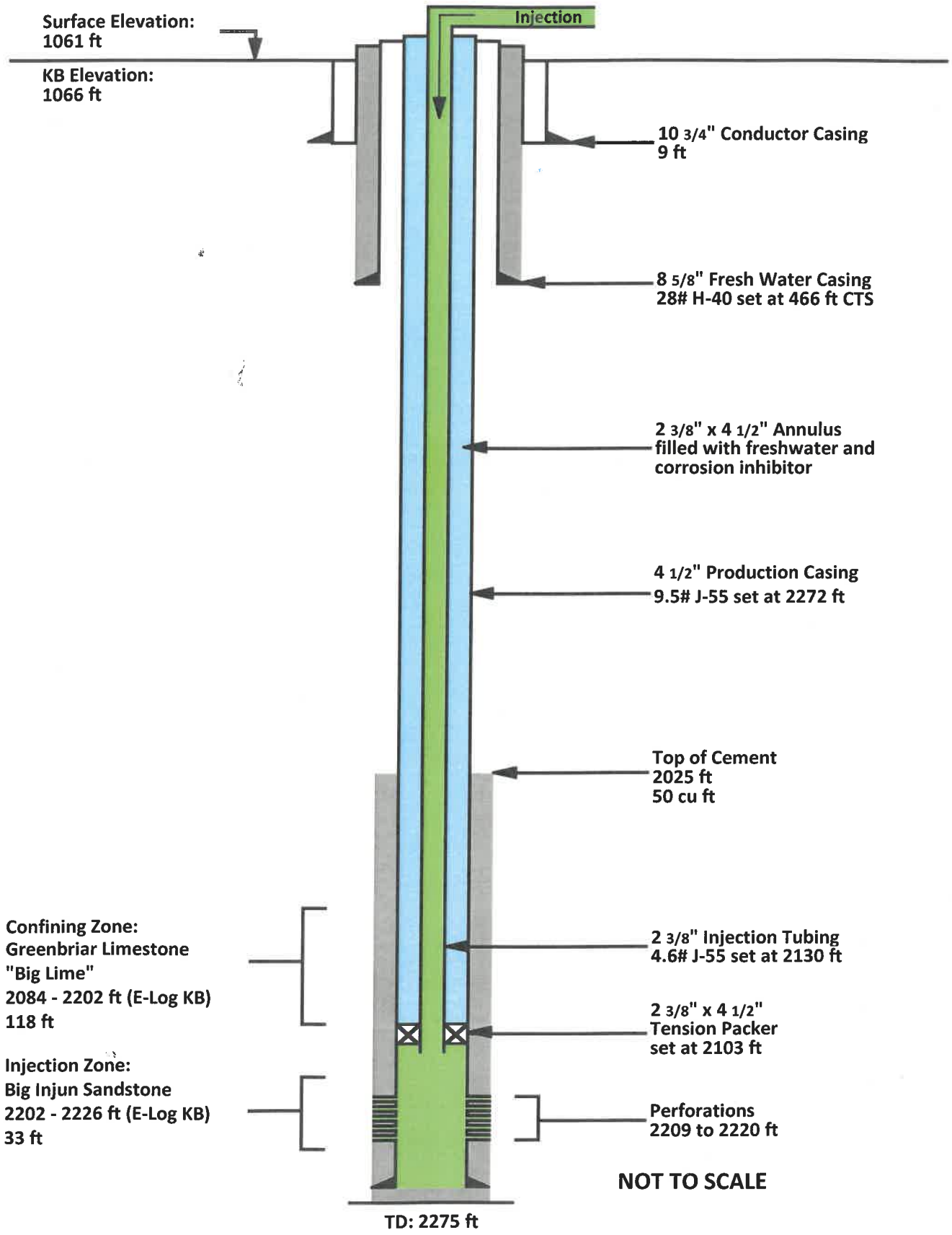
TYPE	Wellbore Diameter	Casing Size	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./sk)	Cement to Surface ? (Y or N)
Conductor	DRIVE	10 3/4	NA	NA	NA	NA	N
Fresh Water	10	8 5/8	.264	2950	Reg. Neat	1.18	Y
Coal							
Intermediate 1							
Intermediate 2							
Production	7 7/8	4 1/2	.205	4380	50/50 Poz	1.26	N
Tubing		2 3/8	.167	6770	NA	NA	N
Liners							

PACKERS	Packer #1	Packer #2	Packer #3	Packer #4
Kind:	tension			
Sizes:	4" x 2"			
Depths Set:	2103			

Well Bore Diagram

W.M. Kaufman W-19
API 47-087-01056

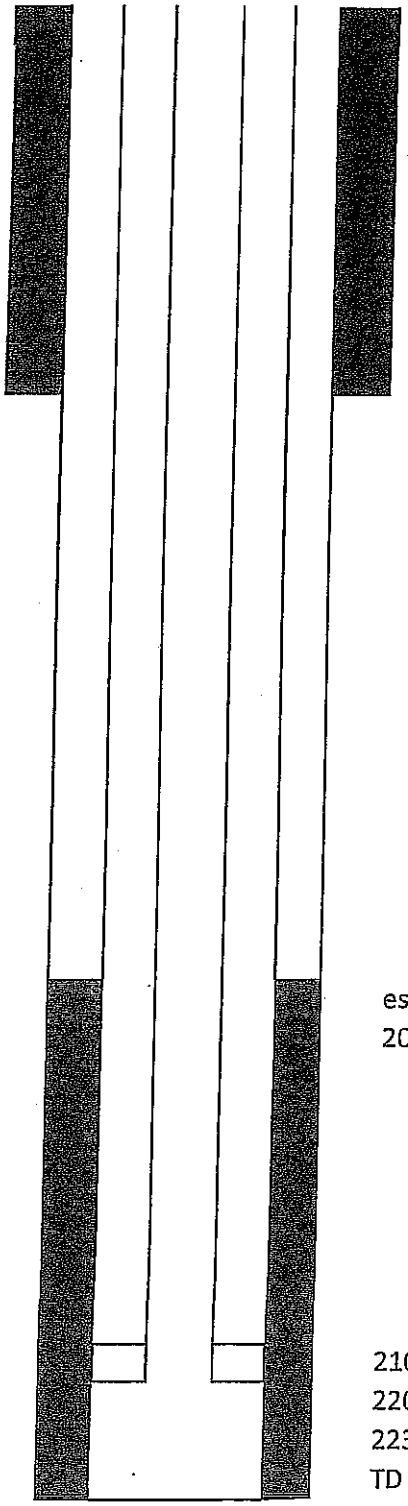
Delta Helix Energy, LLC
UIC 2D08701056-003



4708701056

W M Kaufman W-19
47-087-01056

Fig No 4



Drive pipe 9'

8 5/8" csng set @ 466'- CTS

est TOC = 2025'

2078'-2193'	Big Lime
2103'	2 3/8" tubing on tension packer
2209'-2220'	Big Injun perforations
2235'-2277'	Shale
TD 2275'	4 1/2" csng @ 2272'

5/24/2018
Not to scale

Form OG-10

4708701056

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION

Quadrangle SPENCER

Permit No. ROA-1056

WELL RECORD

Oil or Gas Well Oil & Gas (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-19 Elev. 1060.85
District Smithfield County Roane
The surface of tract is owned in fee by Maxel Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced June 12, 1964
Drilling completed June 19, 1964
Date Shot - From - To -
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Drilled w/Rotary (Show Only) Cu. Ft.
Rock Pressure No Test lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe
13			Float Collar
10 3/4"OD	9'	9'	Guide Shoe
8 5/8"OD	466'	466'	Size of 8 5/8" 4½"OD
6¾			4½"OD
~~Surg~~ 4½"OD/ Tallay	2286'	2286'	Depth set 454'
S.L.M.	2272'	2272'	2248'
			2272'
2 3/8"OD	2251.83'	2251.83'	Perf. top
Liners Used			Perf. bottom
			Perf. top
			Perf. bottom

Surface to;
CASING CEMENTED 8 5/8" SIZE 454 No. Ft. 6/13/64 Date
4½" 2272 6/20/64
COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 6/27/64 - Used: 1,050 Bbls. Water, 46,000 # Sand, 300 Gal. BDA Acid, 175# J-98, 350# J-84, 20 Gal. Deterger and 35 Gal. Freflo
RESULT AFTER TREATMENT Gas - 50,000 Cu. Ft. Oil - 25 Bbls.
ROCK PRESSURE AFTER TREATMENT 400 Lbs.
Fresh Water - Feet - Salt Water - Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	10			
Conductor				9			
Red Rock			10	20			
Slate			20	85			
Sand			85	200			
Slate			200	230			
Red Rock			230	265			
Slate			265	295			
Sand			295	395			
Slate			395	420			
Red Rock			420	430			
Sand			430	470			
Slate			470	485			
Red Rock			485	495			
Slate			495	515			
Red Rock			515	525			
Slate			525	675			
Red Rock			675	735			
Sand			735	765			
Red Rock			765	815			
Slate			815	840			
Sand			840	905			
Red Rock			905	925			
Slate			925	965			
Red Rock			965	985			
Slate			985	1245			
Sand			1245	1350			
Slate			1350	1375			
Sand			1375	1400			

(over)

4708701056

Formation	Color	Hard or Soft	Top 10	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate			1400	1570			
Sand			1570	1620			
Slate			1620	1730			
Sand			1730	1760			
Slate			1760	1805			
Sand			1805	1920			
Slate			1920	1990			
Sand			1990	2027			Water
Little Lime			2027	2062			
Pencil Cave			2062	2078			
					Oil & Gas	2115-2120	Show Only
Big Lime			2078	2193			
Keener			2193	2202			
Big Injun			2202	2235			
Pay			2206	2216			Show
Slate			2235	2277			
4½" Casing				2272			
TOTAL DEPTH				2277			

Date July 13, 19 64

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC., Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

APPENDIX B

UIC Permit No. **2D08701056**

Storage Tank Inventory

Tank ID No.	AST Registration No.	Tank Location		Capacity (barrels)	Type of Fluid Stored	Construction Material (Steel, Plastic, etc.)	Tank Type (Single / Double Wall)	Installation Date	Tank Age (Months)
		Northing	Easting						
324	044-00000032	4289305.8	476875.7	210	Brine	Steel	Single	2013	144
325	044-00000033	4289308.4	476873.2	210	Brine	Steel	Single	2013	144
326	044-00000034	4289310.5	476870.9	100	Brine	Steel	Single	206	228

Operator: Delta Helix Energy, LLC
UIC Permit No.: 2D08701056

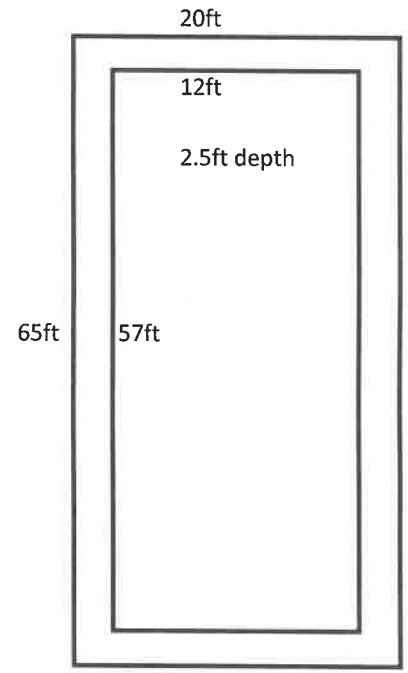
Secondary Containment Calculations
Earth Berm Containment
(Input Measurements In Blue Cells)

Tank	Tank Dimensions		Capacity		
	Height (Ft)	Dia (Ft)	Barrels	Gallons	Cu Ft
1	15	10	209.8	8812.8	1178.1
2	15	10	209.8	8812.8	1178.1
3	10	8.5	101.1	4244.8	567.4
4			0.0	0.0	0.0
5			0.0	0.0	0.0
6			0.0	0.0	0.0
7			0.0	0.0	0.0
8			0.0	0.0	0.0
9			0.0	0.0	0.0
10			0.0	0.0	0.0
		Total	520.7	21,870.4	2,923.6

Enter largest tank as Tank 1.

Tank	Tank Base Exclusions		
	Dia (Ft)	Depth (Ft)	Vol (CuFt)
1	0	2.50	0.0
2	10	2.50	196.3
3	8.5	2.50	141.9
4	0	2.50	0.0
5	0	2.50	0.0
6	0	2.50	0.0
7	0	2.50	0.0
8	0	2.50	0.0
9	0	2.50	0.0
10	0	2.50	0.0
Total Tank Base Exclusions			338.2

Tank 1 entered as "0" diameter to exclude it from the tank base exclusion calculations.



Containment Dimensions	
Top Interior Perimeter	
Length (Ft)	Width (Ft)
65.00	20.00
Bottom Interior Perimeter	
Length (Ft)	Width (Ft)
57.00	12.00
Depth (Ft)	
2.50	
Total Containment Volume (CuFt)	2439.1

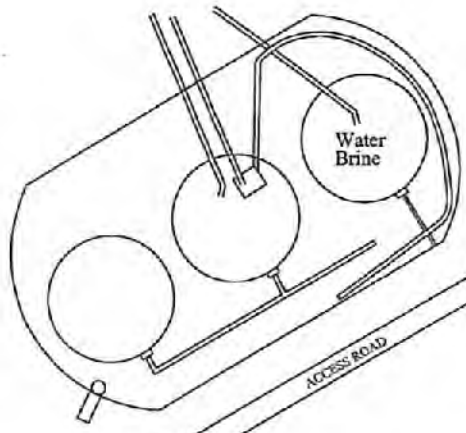
All containment measurements must be interior dimensions.

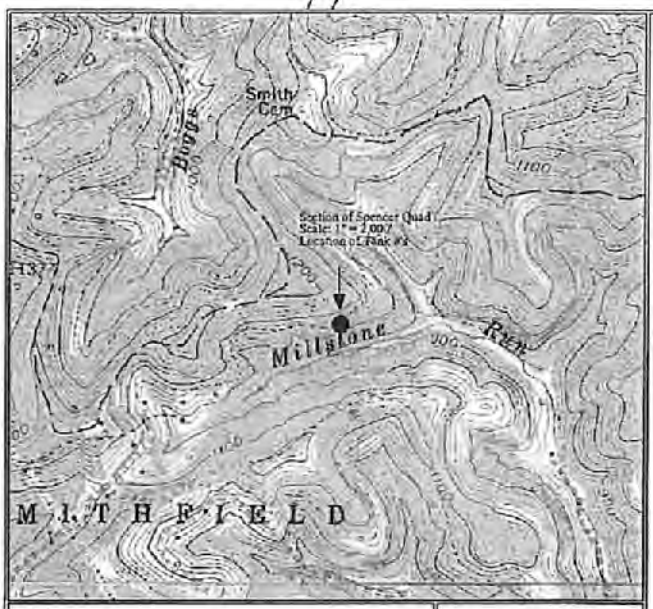
Tank Containment Volume (CuFt)	2439.1
Minus Tank Base Exclusions (CuFt)	338.2
Net Containment Volume (CuFt)	2100.9
Largest Tank Volume (CuFt)	1178.1
Available Containment Volume (CuFt)	178.3%

4708701056

Fig No 1

FACILITY SITE PLAN





HG ENERGY, LLC
SPCC PLAN

Drawn By KAB
File Name Clover Area
Scale
Date 11-6-14
Point No.

Facility Name: Kaufman, Wm. W-5, W-6, W-8, W-12, W-13, W-17, W-18, W-20, W-21, 5, 605 & 606

State: WV

County: Roane

District: Smithfield

Name of Nearest Stream: Millstone Run

Direction & Distance from Facility: 185° @ 300'

~STORAGE TANKS~

No. 3

Volume bbl: 210

Tank #'s: 321-323

Dike Dimensions: 150' peri. X 2.2' depth

Calculated Capacity: 471 bbl

Section 7

Area of Review

Section No. 7

1. A ¼ mile fixed radius from the injection well, W M Kaufman W-19, was utilized for the AOR investigation.

2. Attached in Fig No 3 is a map showing the wells within the AOR. The wells within the AOR are listed in the attached APPENDIX C. The Well Records available are also enclosed in Fig No. 7. The attached Fig No 8 is a topographic map extending a mile from the Kaufman W-19 injection well. The map shows the facilities and injection, producing, plugged and abandoned wells within the one mile radius.

3. The Local PSD (Clover PSD) was contacted and the required Affidavit obtained. It is enclosed in APPENDIX D.

4. The USDWs in this area vary from approximately 20' to 100'. One USDW is located within the AOR. This well and one additional USDW located 800' to the east of the AOR boundary were sampled. The results of the analysis are shown in the attached APPENDIX E. TDS was measured as part of the analysis. Most of the USDWs in this field were drilled prior to the current owner and they know very little about the wells. The results of the analysis are shown in APPENDIX E.

5. The samples were collected by a WVDEP certified laboratory as set forth in 40CFR Part 136.

6. No corrective action is deemed necessary at this time.

7. This application is for a single disposal well and not an area permit.

8. Groundwater use in this area of Roane County is limited. Located approximately 3 miles from this injection well is the Charles Fork Lake. This lake is utilized as a water source for the City of Spencer as well as recreational activities. It is located on a different drainage than W M Kaufman W-19. Other than the water supply for the City of Spencer the only other know Ground water uses are agricultural.

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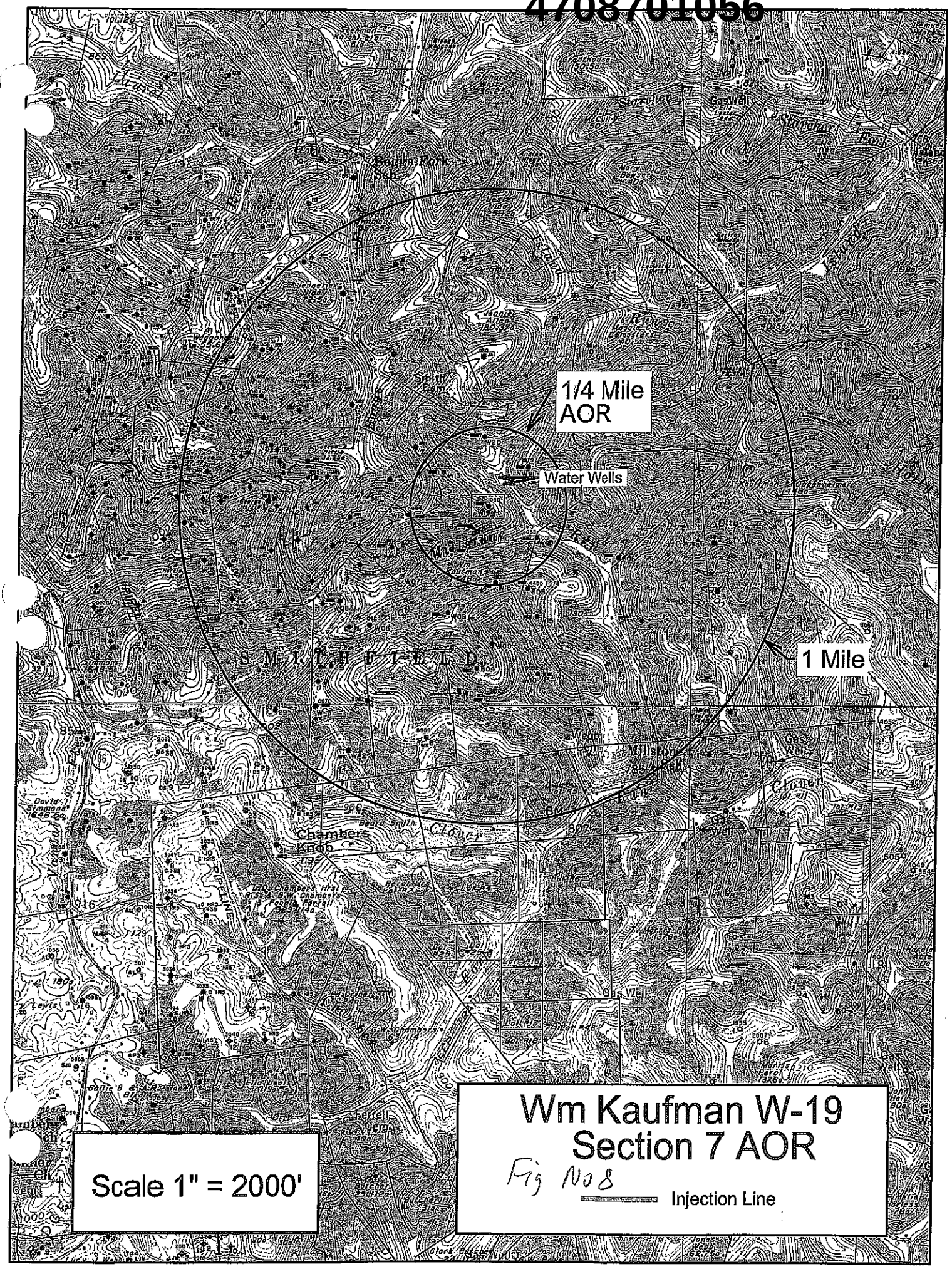
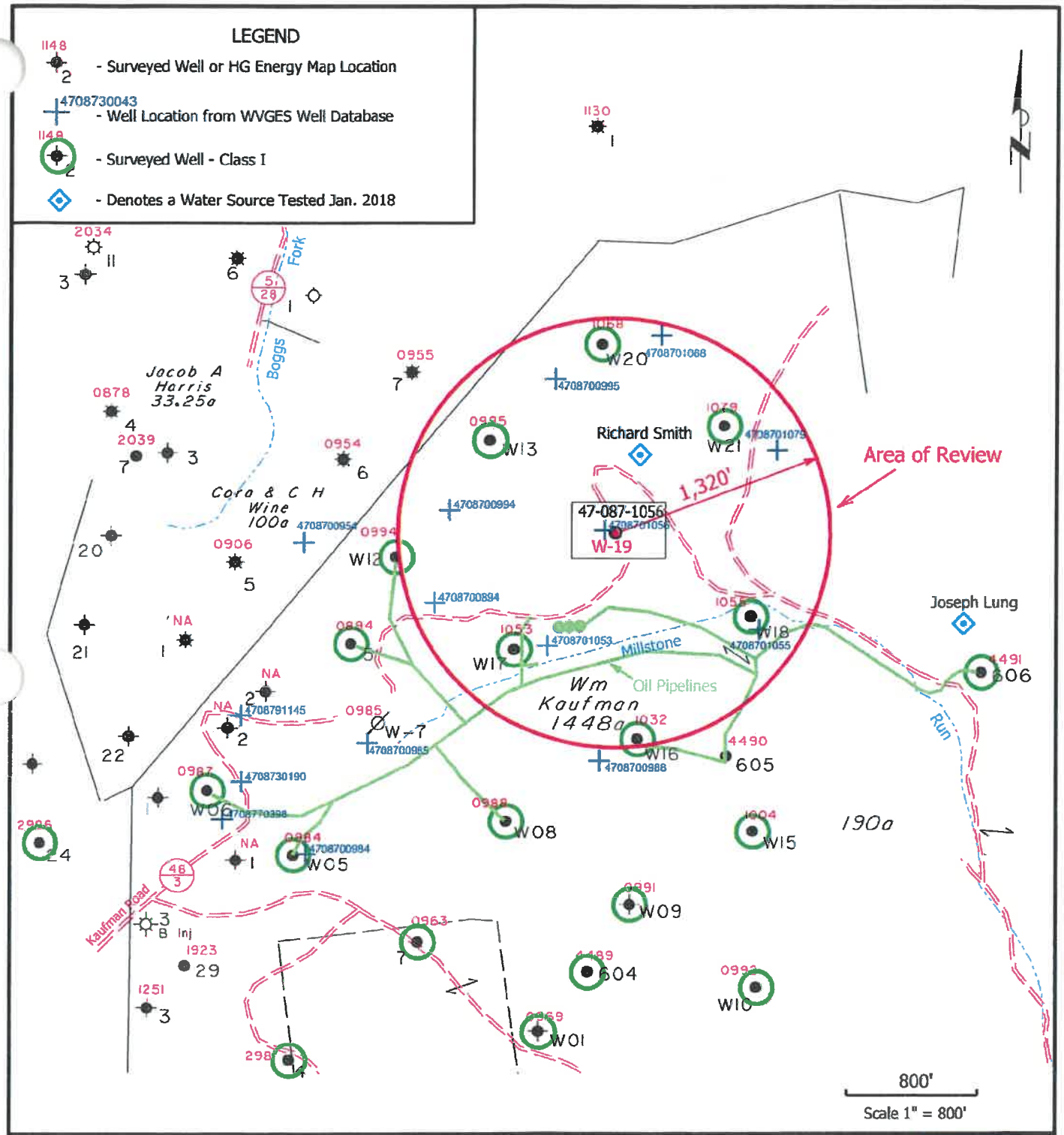

1/4 Mile
AOR
Water Wells
1 Mile
S M I T H F I E L D
Chambers
Knob
Millstone
Cloner
Scale 1" = 2000'
Wm Kaufman W-19
Section 7 AOR
Fig No 8
Injection Line

4708701056



- CLOVER FIELD -
Injection Well

Wm. Kaufman No.W-19 (47-087-01056)

Roane Co., WV

Map Showing All Known Wells
Within the Quarter-Mile AOR
& WVGES Well Data Spots

8/15/2018

RECEIVED
Office of Oil and Gas
JUL 11 2019
WV Department of
Environmental Protection

HG ENERGY LLC

4708701056

APPENDIX C

Wells within the Area of Review

	API No.	Well No.	Well Type	Well Status	Northing	Easting	Penetrate Injection Zone	Penetrate Confining Zone	Total Vertical Depth	Surface Elevation
1	4708700955	Wines 7	Gas Prod	Active	4290299.5	476794.4	Y	Y	2278	1095
2	4708700988	W-8	Oil Prod	Active	4289673.2	477190.2	Y	Y	2430	1225
3	4708700994	W-12	Oil Prod	Active	4290143.6	476912.3	Y	Y	2380	1152
4	4708700995	W-13	Oil Prod	Active	4290388.4	477106.1	Y	Y	2313	1096
5	4708701032	W-16	Gas Prod	Active	4289685.6	477409.7	Y	Y	2371	1163
6	4708701053	W-17	Oil Prod	Active	4289888.7	477092.4	Y	Y	2190	971
7	4708701055	W-18	Gas Prod	Active	4289919.8	477488.3	Y	Y	2097	875
8	4708701056	W-19	Injector	Active	4290082.0	477216.0	Y	Y	2277	1061
9	4708701068	W-20	Oil Prod	Active	4290470.8	477304.6	Y	Y	2255	1022
10	4708701079	W-21	Oil Prod	Active	4290255.7	477520.7	Y	Y	2260	1046

See WR-35 Completion Logs Attached Below

NOT REQUIRED

(4/25)

APPENDIX D

Public Service District Affidavit

Underground Injection Control Permit applicants must identify all publically recorded drinking water sources within a one (1) mile radius of the proposed injection well facility. If no drinking water sources are present within this radius a written affidavit shall be supplied by the local Public Service District (PSD) as ample verification.

"I certify under penalty of law that (state name of business)

Top Drilling / Delta Helix

has verified with the public service district (state name of PSD)

Clover Public Service District

that there are no such publically recorded sources.

Allison Spaus

(Signature of Authorized Representative)

Sworn and subscribed to before me this 15th day of October, 2024.

Ella D. Cottrell, my commission expires Dec. 7th 2025.

(Notary Signature)

Ella D. Cottrell.

OFFICIAL SEAL
NOTARY PUBLIC, STATE OF WEST VIRGINIA
ELLA D COTTRELL
Peoples Bank
100 Bailey Road
Spencer, WV 25276
My Commission Expires December 07, 2025

4708701056

DOMESTIC WATER ANALYSES

APPENDIX E

Water Sources

Operator: Delta Helix Energy Year: 2024 UIC Permit: 2D08701056

		Source # 1	Source# 2
Water Source Name		Joseph Lung	James Warden
Norhting		4,289,922.12	4,290,238.23
Easting		477,868.12	477,263.23
Parameter	Units		
Chloride	mg/L	4.9	5.8
Bromide	mg/L	0.10	0.10
Strontium	mg/L	0.093	0.054
Barium	mg/L	0.051	0.14
Iron	mg/L	0.050	0.76
Total Dissolved Solids	mg/L	254	210
pH	SI Units	8.57	6.93
Manganese	mg/L	0.0081	0.10
Aluminum	mg/L	0.020	0.020
Arsenic	mg/L	0.020	0.020
Sodium	mg/L	101	66.3
Calcium	mg/L	2.4	8.5
Sulfate	mg/L	5.0	5.1
MABAS	mg/L	ND	ND

Delta Helix

TABLE 1A. Chemical water quality for stations (KJL) and (KJW) associated with ~~HG~~ Energy's Kaufman Sites. Kirk Environmental, LLP., October 31, 2024.

PARAMETER	SAMPLING STATION KJL	KJW
Field Water Temperature (°C)	16.4	18.0
Field Dissolved Oxygen (mg/L)	7.08	3.64
Field pH (SI Units)	8.57	6.93
Field Conductivity (µS)	561.1	434.0
Aluminum (mg/L)	< 0.020	< 0.020
Arsenic (mg/L)	< 0.020	< 0.020
Barium (mg/L)	0.051	0.14
Calcium (mg/L)	2.4	8.5
Total Iron (mg/L)	< 0.050	0.76
Manganese (mg/L)	0.0081	0.10
Sodium (mg/L)	101	66.3
Strontium (mg/L)	0.093	0.054
TDS (mg/L)	254	210
Bromide (mg/L)	< 0.10	< 0.10
Chloride (mg/L)	4.9	5.8
Sulfate (mg/L)	< 5.0	5.1

Samples Collected 10/31/24

KJL = Joseph Lung USDW Northing 4,289,922.116
easting 477,868.117

KJW = James Warden USDW Northing 4,290,238.230
easting 477,263.225

Pace Analytical Services, LLC
225 Industrial Park RD
Beaver, WV 25813
(800)999-0105

Laboratory Report

ED KIRK
KIRK ENVIRONMENTAL,LLP
PO BOX 1783
Beaver, WV 25813

Report Date: 11/26/2024
Date Received: 10/31/2024

Project: KAUFMAN SITES
Pace Project No.: 30730511

Sample: KJL Joe Lung **Lab ID: 30730511001** Collected: 10/31/24 11:55 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 200.7	Aluminum	ND	mg/L	0.020	11/04/24 17:08	
EPA 200.7	Arsenic	ND	mg/L	0.020	11/04/24 17:08	
EPA 200.7	Barium	**0.051**	mg/L	0.0050	11/04/24 17:08	
EPA 200.7	Calcium	**2.4**	mg/L	0.50	11/04/24 17:08	
EPA 200.7	Iron	ND	mg/L	0.050	11/04/24 17:08	
EPA 200.7	Manganese	**0.0081**	mg/L	0.0050	11/04/24 17:08	
EPA 200.7	Sodium	**101**	mg/L	0.50	11/04/24 17:08	
EPA 200.7	Strontium	**0.093**	mg/L	0.010	11/04/24 17:08	N2
SM 2540C-2015	Total Dissolved Solids	**254**	mg/L	10.0	11/01/24 18:20	
EPA 300.0, Rev 2.1	Bromide	ND	mg/L	0.10	11/20/24 21:28	
EPA 300.0, Rev 2.1	Chloride	**4.9**	mg/L	1.0	11/20/24 21:28	
EPA 300.0, Rev 2.1	Sulfate	ND	mg/L	5.0	11/20/24 21:28	
	Collected By	**EK**			11/01/24 09:53	
	Field pH	**8.57**	Std. Units		11/01/24 09:53	
	Field Temperature, C	**16.4**	deg C		11/01/24 09:53	
	Field Specific Conductance	**561.1**	umhos/cm		11/01/24 09:53	
	Oxygen, Dissolved	**7.08**	mg/L		11/01/24 09:53	

Sample: KJW James Worden **Lab ID: 30730511002** Collected: 10/31/24 12:45 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 200.7	Aluminum	ND	mg/L	0.020	11/04/24 17:10	
EPA 200.7	Arsenic	ND	mg/L	0.020	11/04/24 17:10	
EPA 200.7	Barium	**0.14**	mg/L	0.0050	11/04/24 17:10	
EPA 200.7	Calcium	**8.5**	mg/L	0.50	11/04/24 17:10	
EPA 200.7	Iron	**0.76**	mg/L	0.050	11/04/24 17:10	
EPA 200.7	Manganese	**0.10**	mg/L	0.0050	11/04/24 17:10	
EPA 200.7	Sodium	**66.3**	mg/L	0.50	11/04/24 17:10	
EPA 200.7	Strontium	**0.054**	mg/L	0.010	11/04/24 17:10	N2
SM 2540C-2015	Total Dissolved Solids	**210**	mg/L	10.0	11/01/24 18:20	
EPA 300.0, Rev 2.1	Bromide	ND	mg/L	0.10	11/20/24 21:48	
EPA 300.0, Rev 2.1	Chloride	**5.8**	mg/L	1.0	11/20/24 21:48	
EPA 300.0, Rev 2.1	Sulfate	**5.1**	mg/L	5.0	11/20/24 21:48	
	Collected By	**EK**			11/01/24 09:56	
	Field pH	**6.93**	Std. Units		11/01/24 09:56	
	Field Temperature, C	**18.0**	deg C		11/01/24 09:56	
	Field Specific Conductance	**434.0**	umhos/cm		11/01/24 09:56	
	Oxygen, Dissolved	**3.64**	mg/L		11/01/24 09:56	

Sample: KPW **Lab ID: 30730511003** Collected: 10/31/24 10:50 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 200.7	Aluminum	**0.29**	mg/L	0.20	11/05/24 13:38	

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CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workor

WO#: 30730511

ALL SHADE!

30730511

Company: Kirk Environmental

Address:

Billing Information:

Report To: Ed Kirk

Email To:

Copy To: Crystal Bennett

Site Collection Info/Address:

Customer Project Name/Number: Kaufman sites

State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET

Phone:
Email:

Site/Facility ID #:

Compliance Monitoring? [X] Yes [ ] No

Collected By (print): Ed Kirk

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature): Ed J. Kirk

Turnaround Date Required: normal

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold: _____

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: _____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Container Preservative Type

U | |

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Analyses

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Chloride, Bromide, Sulfate, Fluoride	Fe, Mn, Al, As, Ba, Ca, Sulfate	TDS
KJL	GW	grab	10/31/24	1155				3	X	X	X
KJW	GW	grab	10/31/24	1245				3	X	X	X

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact Y N NA
Custody Signatures Present Y N NA
Collector Signature Present Y N NA
Bottles Intact Y N NA
Correct Bottles Y N NA
Sufficient Volume Y N NA
Samples Received on Ice Y N NA
VOA - Headspace Acceptable Y N NA
USDA Regulated Soils Y N NA
Samples in Holding Time Y N NA
Residual Chlorine Present Y N NA
Cl Strips:
Sample pH Acceptable Y N NA
pH Strips:
Sulfide Present Y N NA
Lead Acetate Strips:

LAB USE ONLY:
Lab Sample # // Comments:

Customer Remarks / Special Conditions / Possible Hazards:
KJL: DO 7.03; pH 8.57; cond 561.1 temp 16.4
KJW: DO 3.64; pH 6.93; cond 434.0 temp 18.0

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 29959225

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 2
Cooler 1 Temp Upon Receipt: 3.4 oC
Cooler 1 Therm Corr. Factor: 0 oC
Cooler 1 Corrected Temp: 3.4 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Ed J. Kirk	10/31/24 1531	10-31-24	1530
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeoH TSP Other

Non Conformance(s): YES / NO

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CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workor: WO#: 30730511 ALL SHADE! 30730511

Company: Kirk Environmental

Address:

Billing Information:

Report To: Ed Kirk

Email To:

Copy To: Crystal Bennett

Site Collection Info/Address:

Customer Project Name/Number: Kaufman sites

State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET

Phone:
Email:

Site/Facility ID #:

Compliance Monitoring? [X] Yes [ ] No

Collected By (print): Ed Kirk

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature): Ed J. Kirk

Turnaround Date Required: normal

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: ____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Container Preservative Type: 4 | 1

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Chloride, Bromide, Sulfate, Barium	Fe, Mn, Al, As, Na, Ca, Sulfate	TDS
KJL	GW	grab	10/31/24	1155				3	X	X	X
KJW	GW	grab	10/31/24	1245				3	X	X	X

Analyses

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips:	
Sample pH Acceptable	Y N NA
pH Strips:	
Sulfide Present	Y N NA
Lead Acetate Strips:	

LAB USE ONLY:
Lab Sample # / Comments:

LL 11-1-24

Received by Pace Greensburg
Therm ID: 19 Corr Factor: +0.6
Receipt Temp: 2.4
Corrected Temp: 2.4
Correct Preservation - Y/N
Res. Chlorine - Y/N Lot#
Rad Samples Screened <0.05 mrem/hr - Y/N
Survey Meter: 25435

Customer Remarks / Special Conditions / Possible Hazards:
KJL: DO 7.08; pH 8.57; cond 561.1 temp 16.4
KJW: DO 3.64; pH 6.93; cond 434.0 temp 18.0

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 29959225

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 20
Cooler 1 Temp Upon Receipt: 4 oC
Cooler 1 Therm Corr. Factor: 0 oC
Cooler 1 Corrected Temp: 4 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Ed J. Kirk	10/31/24 1530	[signature] 10-31-24	1530
Relinquished by/Company: (Signature) Nicely's Del. Service	Date/Time: 11-1-24 2300	Received by/Company: (Signature) [signature] Pace	Date/Time: 11-1-24 2300
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO:

Page: ____ of: ____

Rev 10-6-08

Pace Analytical Services, LLC
225 Industrial Park RD
Beaver, WV 25813
(800)999-0105

Laboratory Report

ED KIRK
KIRK ENVIRONMENTAL,LLP
PO BOX 1783
Beaver, WV 25813

Report Date: 12/18/2024
Date Received: 12/13/2024

Project: KAUFMAN HOMES
Pace Project No.: 30742291

Sample: KAUFMAN JI LUNG **Lab ID: 30742291001** Collected: 12/13/24 10:20 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
SM5540C-2011	LAS Molecular Weight, g/mol	**340**			12/17/24 12:28	H1,H2
SM5540C-2011	MBAS, Calculated as LAS	ND	mg/L	0.10	12/17/24 12:28	H1,H2,M1,R1

Sample: KAUFMAN JI WODEN **Lab ID: 30742291002** Collected: 12/13/24 10:30 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
SM5540C-2011	MBAS, Calculated as LAS	ND	mg/L	0.10	12/17/24 12:28	H1,H2
SM5540C-2011	LAS Molecular Weight, g/mol	**340**			12/17/24 12:28	H1,H2

ANALYTE QUALIFIERS

H1	Analysis conducted outside the EPA method holding time.
H2	Extraction or preparation conducted outside EPA method holding time.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
R1	RPD value was outside control limits.

Reviewed by: Beth Johnson

Beth Johnson
(800)999-0105
beth.johnson@pacelabs.com

Pace Analytical Services Beaver
225 Industrial Park Road, Beaver, WV 25813
Virginia VELAP 460148
West Virginia DEP 060
West Virginia DHHR 00412CM

North Carolina DEQ 466
Kentucky Wastewater Certification KY90039
Pennsylvania DEP 68-00839

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Log MTJL L

WO#: 30742291

30742291

ALL SHADED ARE

Company: Kirk Environmental	Billing Information:
Address:	
Report To: Ed Kirk	Email To: Ed@KirkEnvironmentalUS
Copy To: Crystal Bennet	Site Collection Info/Address:
Customer Project Name/Number: Kaufman Homes	State: WV County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [✓] ET
Phone: Email:	Site/Facility ID #: Compliance Monitoring? [✓] Yes [ ] No
Collected By (print): Jason Shuttlesworth	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (signature): Jason Shuttlesworth	Turnaround Date Required: Immediately Packed on Ice: [✓] Yes [ ] No
Sample Disposal: [ ] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [✓] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [ ] No Analysis: ____

Container Preservative Type **: U

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____

Analyses: MBAS

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips: ____	
Sample pH Acceptable	Y N NA
pH Strips: ____	
Sulfide Present	Y N NA
Lead Acetate Strips: ____	

LAB USE ONLY:
Lab Sample # / Comments:

* Matrix Codes (insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	MBAS
Kaufman J. Lung	W	↓	12/13/24	1020				1	✓
Kaufman J. Warden	W	↓	↓	1030				1	✓

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2950253

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 5
Cooler 1 Temp Upon Receipt: 2.4 oC
Cooler 1 Therm Corr. Factor: -0.1 oC
Cooler 1 Corrected Temp: 2.5 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Jason Shuttlesworth	12/13/2024 0911	BMM / PACE	12/13/24 13:11
BMM / PACE	12/13/24 14:00	[signature]	12-13-24 14:00
[signature]	12-13-24 1600	[signature]	12-13-24 1600

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Title: ENV-FRM-BEAV-0020 v04_SAMPLE CONTAINER FORM
Effective Date: 11/1/24

Notes _____ Profile # 15528

Client _____

Sample Line Item	Matrix	AG1H	AG1U	AG2S	AG3S	AG4U	BP1N	BP1U	BP1Z	BP2N	BP2S	BP2U	BP3B	BP3N	BP3S	BP3U	BP4N	BP4O	CG3H	WGKU	WGFU	CG1U	AG74	DG9H	DG9S	DG9U	VG9A	VG9B	VG9H	VG9U	GN	SP5T	ZPLC			
1								\																												
2								\																												
3																																				
4																																				
5																																				
6																																				
7																																				
8																																				
9																																				
10																																				
11																																				
12																																				

Glass

DG9H	40mL HCl amber voa vial	GBOD	300mL BOD Glass Stopper
DG9M	40mL MeOH clear vial	WGKU	8oz clear soil jar
DG9P	40mL TSP amber vial	WGFU	4oz clear soil jar
DG9S	40mL H_2SO_4 amber vial	BJFU	4oz unpreserved amber wide
DG9T	40mL Na Thio amber vial	CG3H	250mL clear glass HCl
DG9U	40mL amber unpreserved	AG1H	1L HCl amber glass
VG9A	40mL Asc Acid glass	AG1S	1L H_2SO_4 amber glass
VG9B	40mL Sodium Bisulfate glass	AG1U	1liter unpres amber glass
VG9C	40mL NaOH clear vial	AG2S	500mL H_2SO_4 amber glass
VG9H	40mL HCl clear vial	AG3S	250mL H_2SO_4 amber glass
VG9T	40mL Na Thio. clear vial	AG3U	250mL unpres amber glass
VG9U	40mL unpreserved clear vial	AG74	60mL amber glass NH4Cl
		AG4U	100mL unpres amber glass

Plastic

BP1N	1L HNO_3 plastic
BP1S	1L H_2SO_4 plastic
BP1U	1L unpreserved plastic
BP1Z	1L NaOH, Zn Acetate
BP2A	500mL NaOH,Asc Acid plastic
BP2N	500mL HNO_3 plastic
BP2S	500mL H_2SO_4 plastic
BP2U	500mL unpreserved plastic
BP2Z	500mL NaOH, Zn Acetate
BP3B	250mL NaOH plastic
BP3N	250mL HNO_3 plastic
BP3U	250mL unpreserved plastic
BP3S	250mL H_2SO_4 plastic
BP4N	125mL HNO_3 plastic
BP4O	125mL (NH4) 2SO4/NH4OH plastic

Misc.

I	Wipe/Swab
SP5T	120mL Coliform Na Thiosulfate
ZPLC	Ziploc Bag
GN	General Unpreserved
GNN	General Nitric
GNS	General Sulfuric

Matrix

WT	Water
SL	Solid
OL	Non-aqueous liquid
WP	Wipe
DW	Drinking Water

WO#: 30742291

PM: BMJ Due Date: 12/31/24
CLIENT: BV-KIRKENV

LIMS30 Lab Sample Condition Upon Receipt (West Virgi

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ 3rd Party Courier ☑ ~~Pace~~ ☐ Other _____

Tracking #: _____

Custody Seal on Cooler/Box/Containers Present: ☐ yes ☐ no Seals intact: ☐ yes ☐ no

Thermometer Used 24 **Type of Ice:** (Wet) Blue None

Cooler Temperature **Observed Temp** 0.8 °C Correction Factor: 0.0 °C Final Temp: 0.8 °C

Thermal Preservation Requirement Met Yes ☑ ~~No~~ ☐

pH paper Lot#	Date and Initials of person examining contents:

	Yes	No	N/A		
Chain of Custody Present:	✓			1.	
Chain of Custody Filled Out:	✓			2.	
Chain of Custody Relinquished:	✓			3.	
Sampler Name & Signature on COC:	✓			4.	
Sample Labels match COC: -Includes date/time/ID Matrix: WT	✓			5.	
Samples Arrived within Hold Time:	✓			6.	
Short Hold Time Analysis (<72hr remaining):	✓			7.	
Rush Turn Around Time Requested:	✓	on		8. 5 Day	
Sufficient Volume:	✓			9.	
Correct Containers Used: -Pace Containers Used:	✓			10.	
Containers Intact:	✓			11.	
Orthophosphate field filtered:			✓	12.	
Hex Cr Aqueous sample field filtered: -pH adjusted within 24 hours? (If yes, indicate acid lot #)			✓	13.	
Filtered volume received for Dissolved tests:			✓	14.	
All containers have been checked for chemical preservation: exceptions: VOA, coliform, O&G, LLMercury, Non-aqueous matrix			✓	15.	
All containers meet method/chemical preservation requirements:			✓	Initial when completed	Date:
				Tests not preserved:	
Headspace in VOA Vials:			✓	16.	
Trip Blank Present:			✓	17.	
				Initial when completed: AW	Date: 12/13/24

Comments: _____

*PM review is documented electronically in LIMS, when the Project Manager closes the SRF Review schedule in LIMS. The status may be reviewed in the Status section of the Workorder Edit Screen.

Section 8

Geological Data Injection and Confining Zones

Section No. 8

The Clover Field is located on the western flank of the Arches Fork Anticline. The reservoir boundary, as determined from early drilling, was controlled on the west and down dip by water and on the east and up dip by a decrease in permeability. The Big Injun Sandstone is the productive interval in this field. The Keener is a very fine grained to coarse grained, tightly cemented, with very low permeability, sandstone. The Keener grades into the oil productive Pocono Big Injun Sandstone. The Big Injun is light gray to light green, very fine to medium grained, moderate to well sorted, sub angular, calcite or dolomite cemented sandstone. The Big Lime overlays the Keener and the Pocono Shale underlies the Big Injun. Both are thick impermeable formations. The Big Injun Sandstone on the Kaufman lease can be described as follows:

Gross Sand thickness: 24'

Pay thickness:12.5'

Permeability: .8 md

Porosity: 15%

Connate water saturation: 65%

The full core report from W M Kaufman No. 7 is included in the Department of the Interior Report No. 6992 and is shown in Figure No. 5. Also included in the report are isopach and structure maps of the Big Injun that includes the area surrounding this injection well.

A search of the West Virginia Geologic and economic Survey web site revealed data on earthquakes from 1824-2023. There was one event recorded in western Roane County in 2016 (2.51 magnitude). Kanawha and Jackson Counites also recorded a small number of quakes. All the recorded quakes were 20 miles or further from this injection well. A copy of this data is shown in the attached Fig No. 9.

Water injection (both Disposal and Secondary recovery) projects have been active in Roane County since the 1960's. Water injection in the Clover Field has been active since the 1970's with no known cases of induced seismic activity.

The accumulated volume of produced water injected into this well as of 9/30/2024 is 75,843 bbls. Based on this volume and the following reservoir characteristics:

Gross thickness- 33'

Net thickness (pay) -10'

Porosity- 15%

Water saturation – 32%

The Fluid flood front is 301' from the well bore of this injection well.

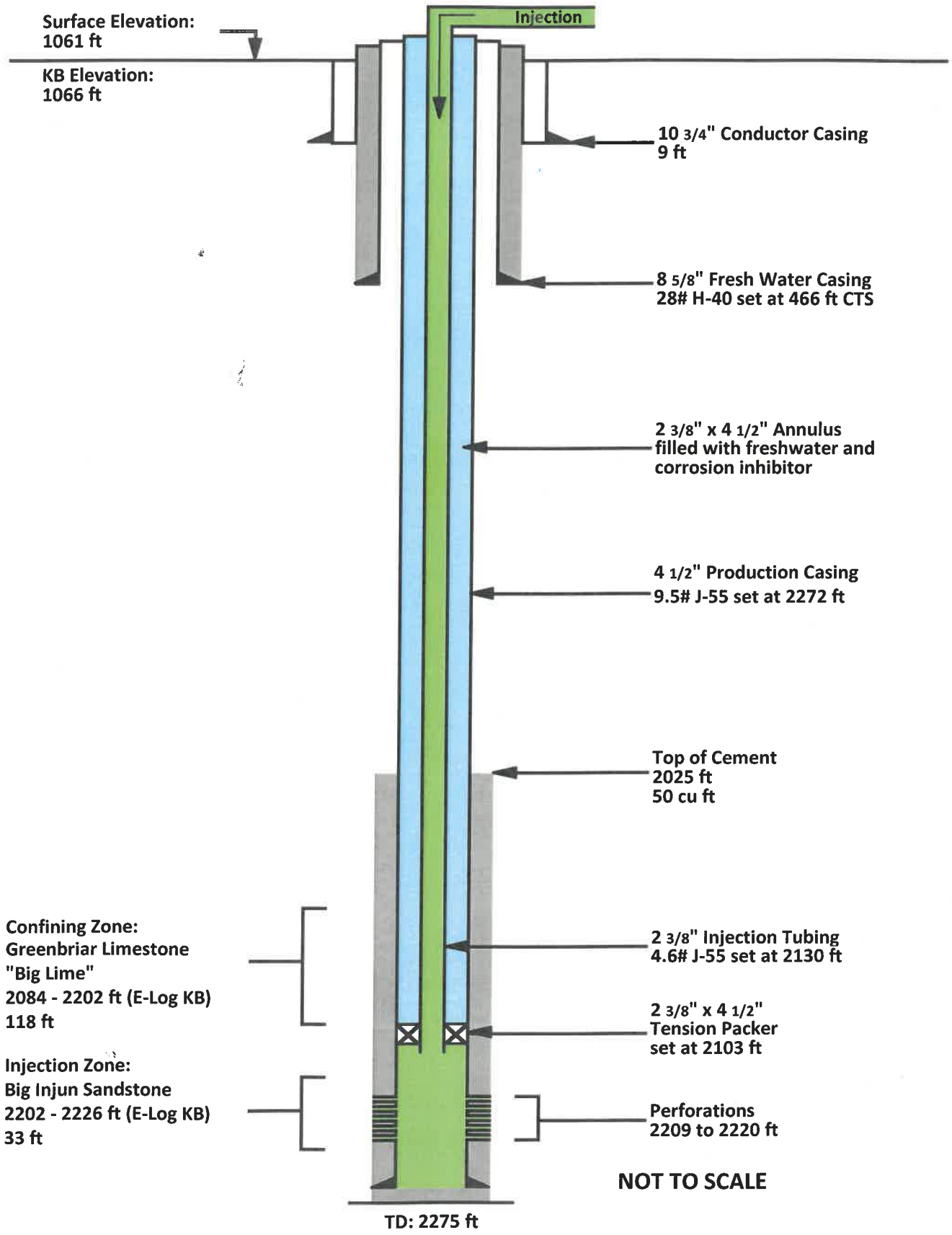
Section No. 8 (cont)

Fig No. 3 shows the calculated radial distance the water injected into this well has moved in the Big Injun formation. Assuming 2000 barrels of water are injected into this well in a years' time over the next 5 years the flood front would advance and additional 19' to 320' from the injection well W M Kaufman W-19.

Well Bore Diagram

W.M. Kaufman W-19
API 47-087-01056

Delta Helix Energy, LLC
UIC 2D08701056-003



4708701056

McCULLOCH SCINTILLOMETER LOG

RUN NO. 1

Field Print

COMPANY Illinois Pacific Oil & Gas Co.

WELL Wm. Rowland #1-19

FIELD Clayton Pool

COUNTY Randolph

LOCATION NW NW NW

South Field Dist.

OTHER SERVICES: Caliper, Induction

SEC. TWP. RGE.

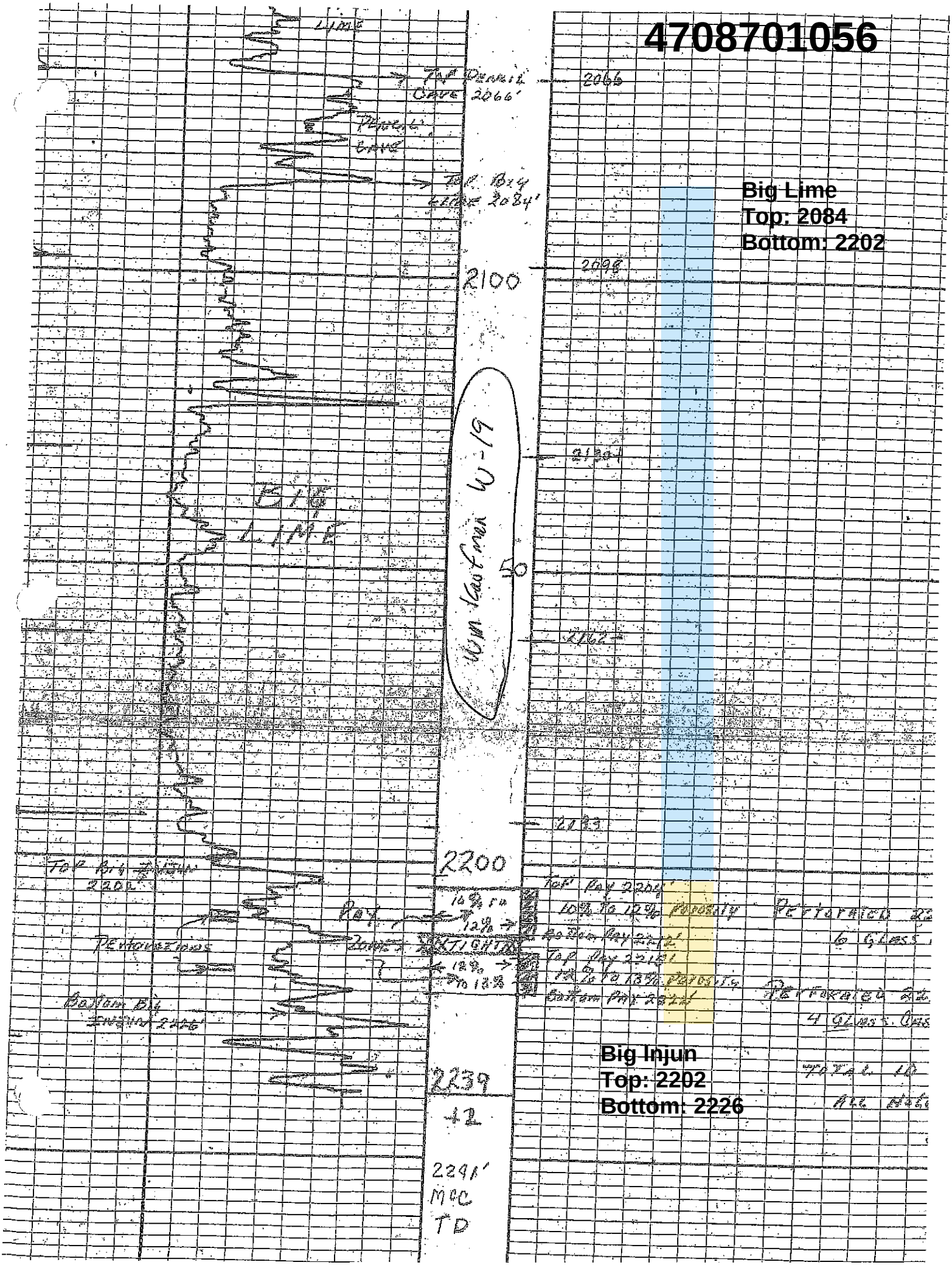
PERMANENT DATUM	Ground Level			ELEVATIONS
LOG MEASURED FROM	20 FT ABOVE	ELEV. 1040.25	PERMANENT DATUM	KB
DRILLING MEASURED FROM	Rotary Table			DF
DATE	1-20-64	1-20-64		GL 1040.25
RUN NO.	One	Two		Three
TYPE LOG	Scintillog	Gamma Ray Neutron		Caliper
DEPTH—DRILLER	2279	2278		2276
DEPTH—LOGGER	2279	2279		2276
BOTTOM LOGGED INTERVAL	2276	2270		2276
TOP LOGGED INTERVAL	1900	2270		2276
TYPE FLUID IN HOLE	Water	Gas		
SALINITY PPM CL				
DENSITY LB/GAL	Full			
LEVEL				
MAX. REC. TEMP. DEG. F.				
OPR. RIG TIME	2½ Hrs	2½ Hrs		2 Hrs
RECORDED BY	Myers			
WITNESSED BY	Wise	Stickler		

BORE HOLE RECORD

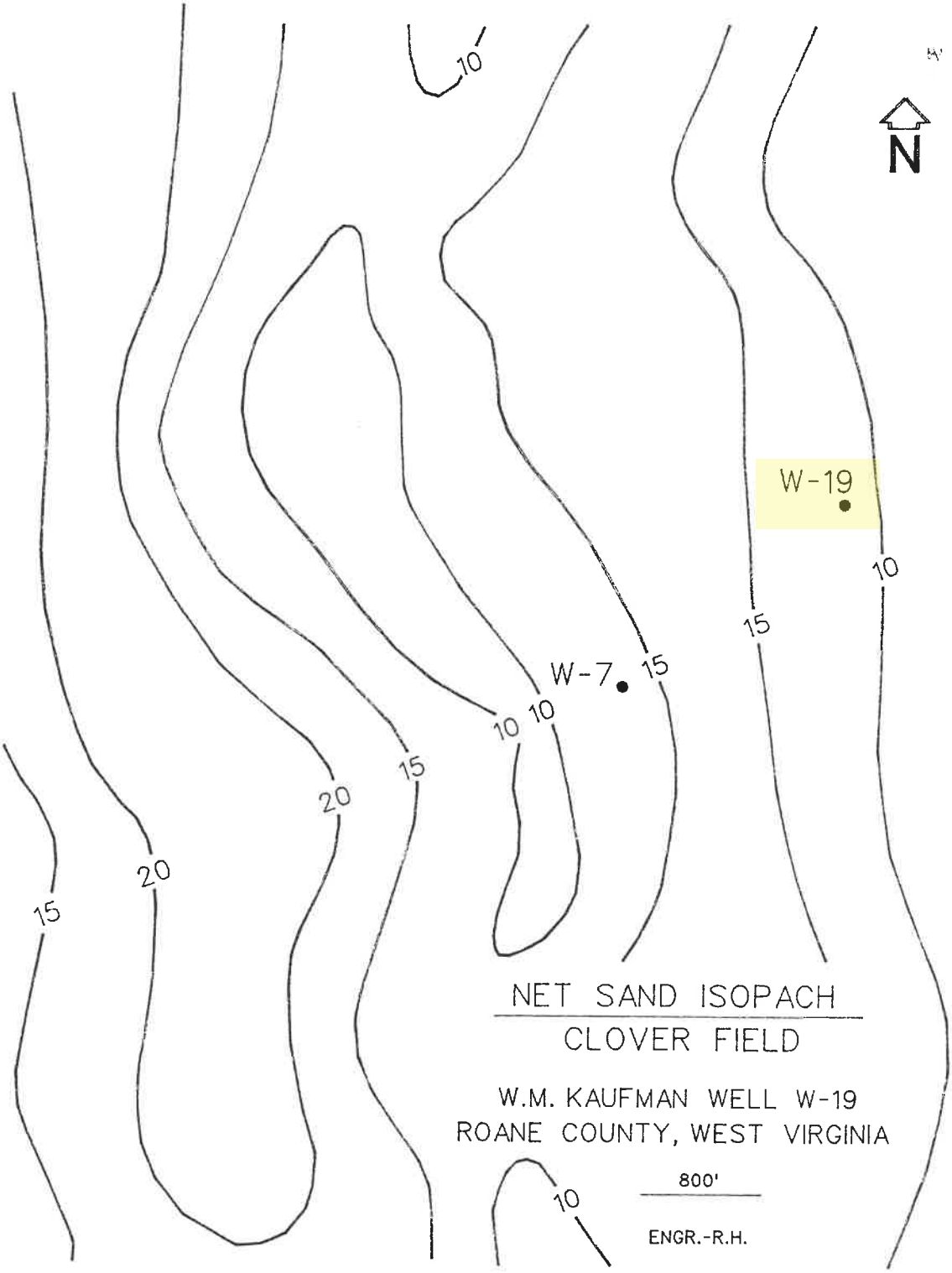
RUN NO.	BIT	FROM	TO	SIZE	WGT.	CASING RECORD FROM	TO
1	12¼	0	10	11¾	42#	0	0
2	9⅞	10	454	8⅝	24#	0	454
3	6¾	454	1120	7"	20#	0	1120
4	6¾	1120	2275	OPEN HOLE			

Pg. No. 6

4708701056


Big Lime
Top: 2084
Bottom: 2202
Big Injun
Top: 2202
Bottom: 2226
2100
2200
2239
+12
2241'
MPC
TD
Big Lime
Top Big Injun
2200
Bottom Big
Injun 2226
Top Pay 2202'
10% To 12% Porosity
Bottom Pay 2212
Top Pay 2216
12% To 13% Porosity
Bottom Pay 2224
Petrotrace
Petforated
6 Glass
4 Glass
Total
Acc

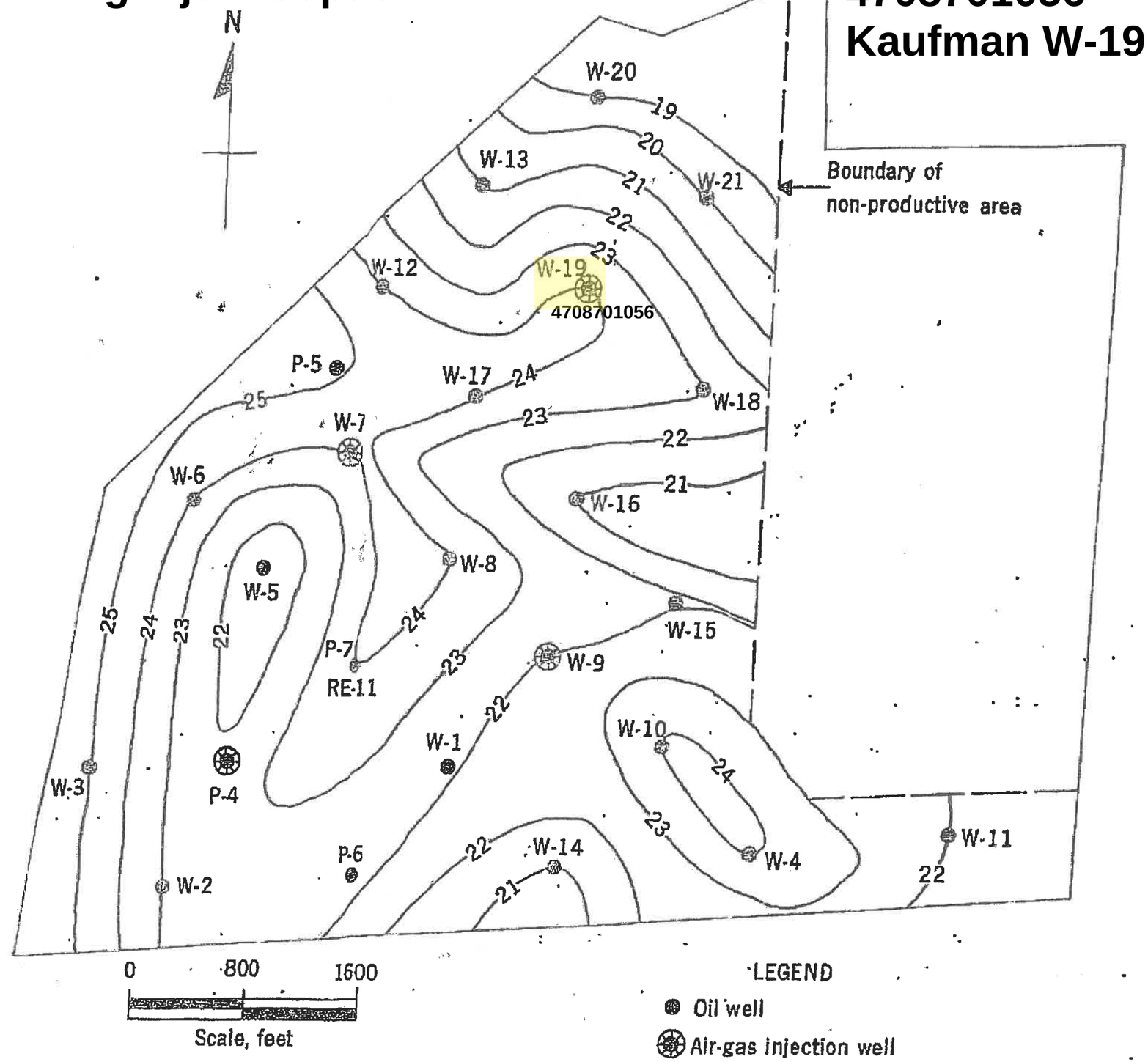
4708700985 W-7
4708701056 W-19



Pay Sand

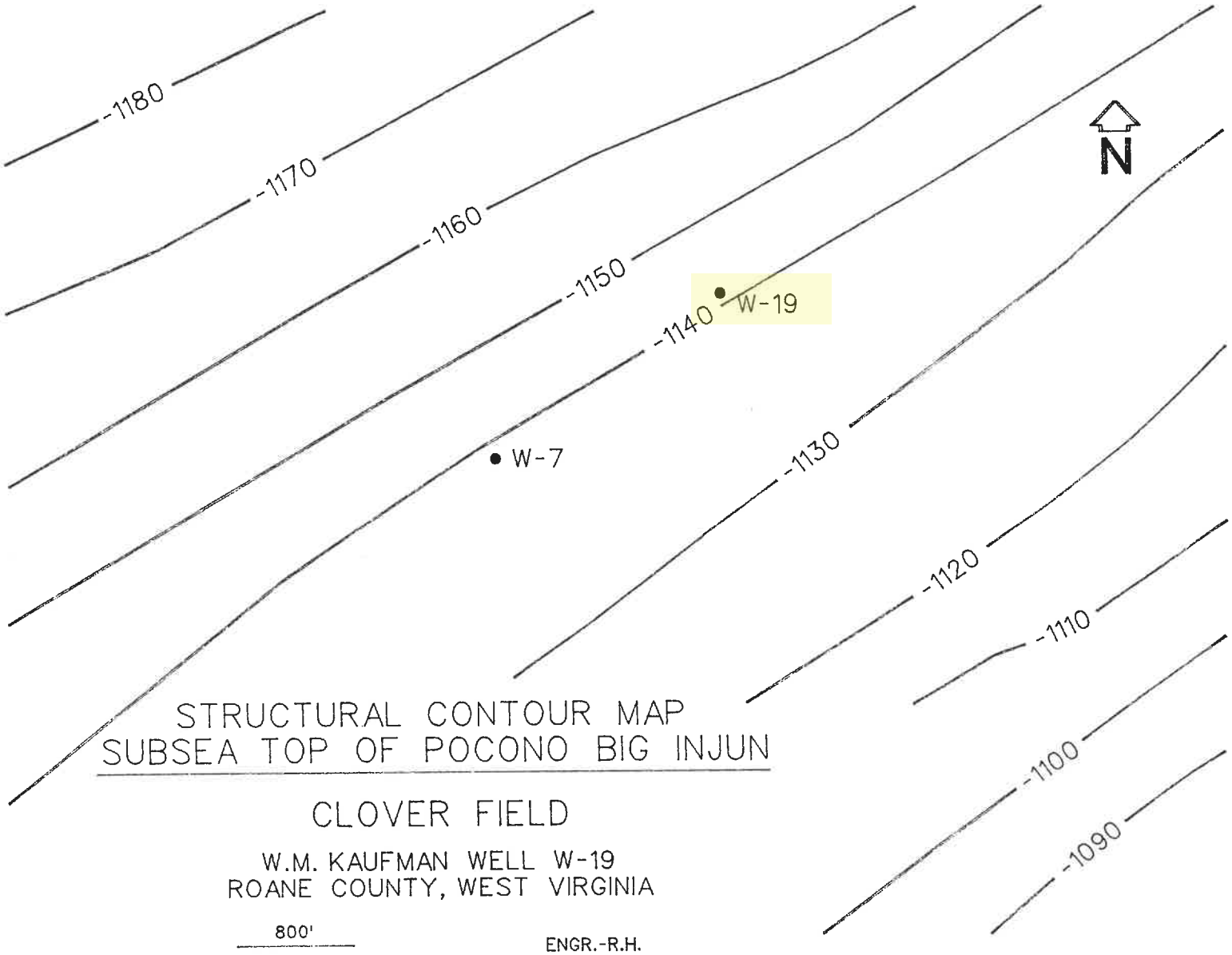
Big Injun Isopach

4708701056
Kaufman W-19



Isopachous Map of the Big Injun Sand, William Kaufman Lease, Clover-Rush Run Oilfield.

4708701056 W-19

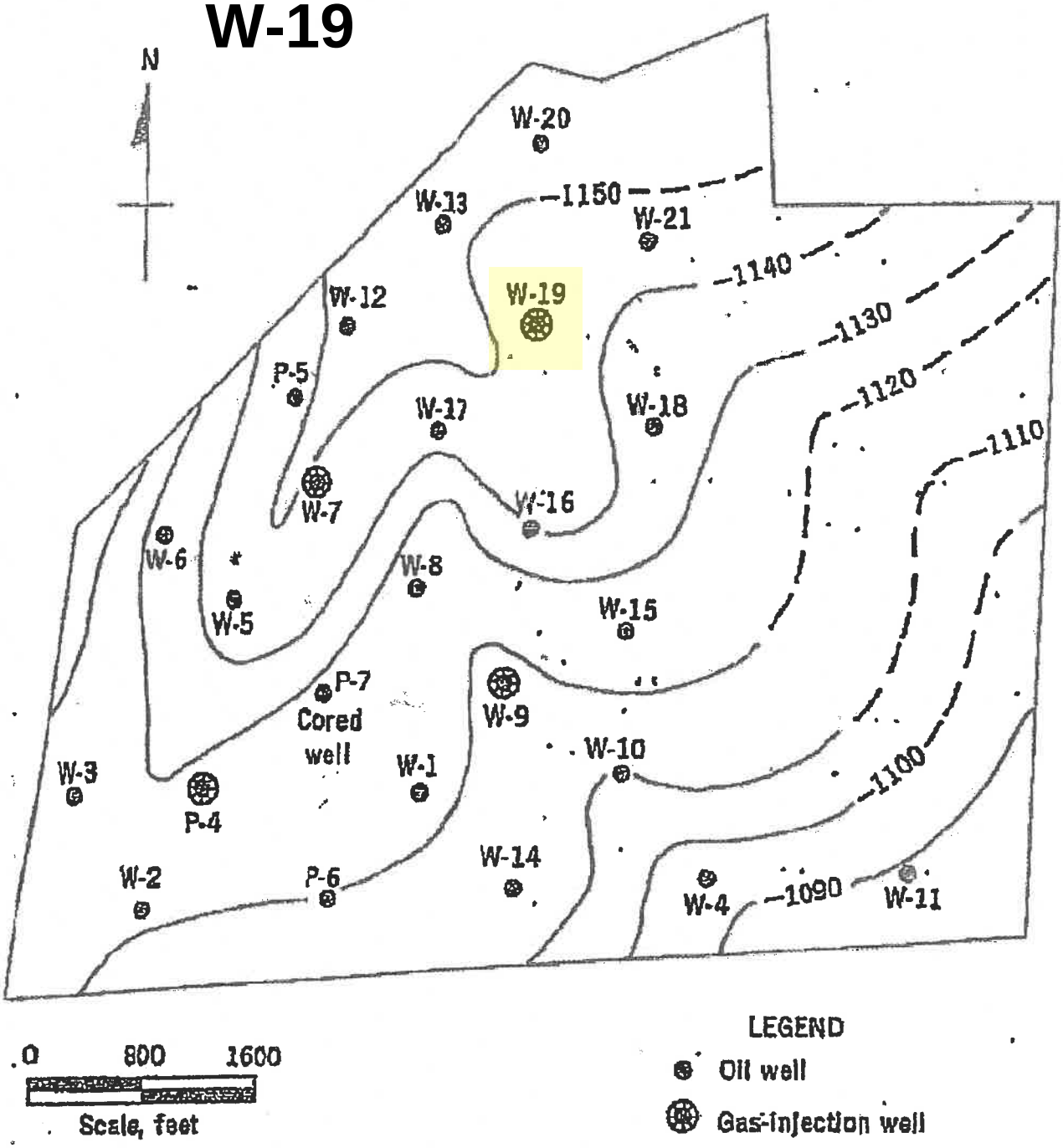


STRUCTURAL CONTOUR MAP
SUBSEA TOP OF POCONO BIG INJUN

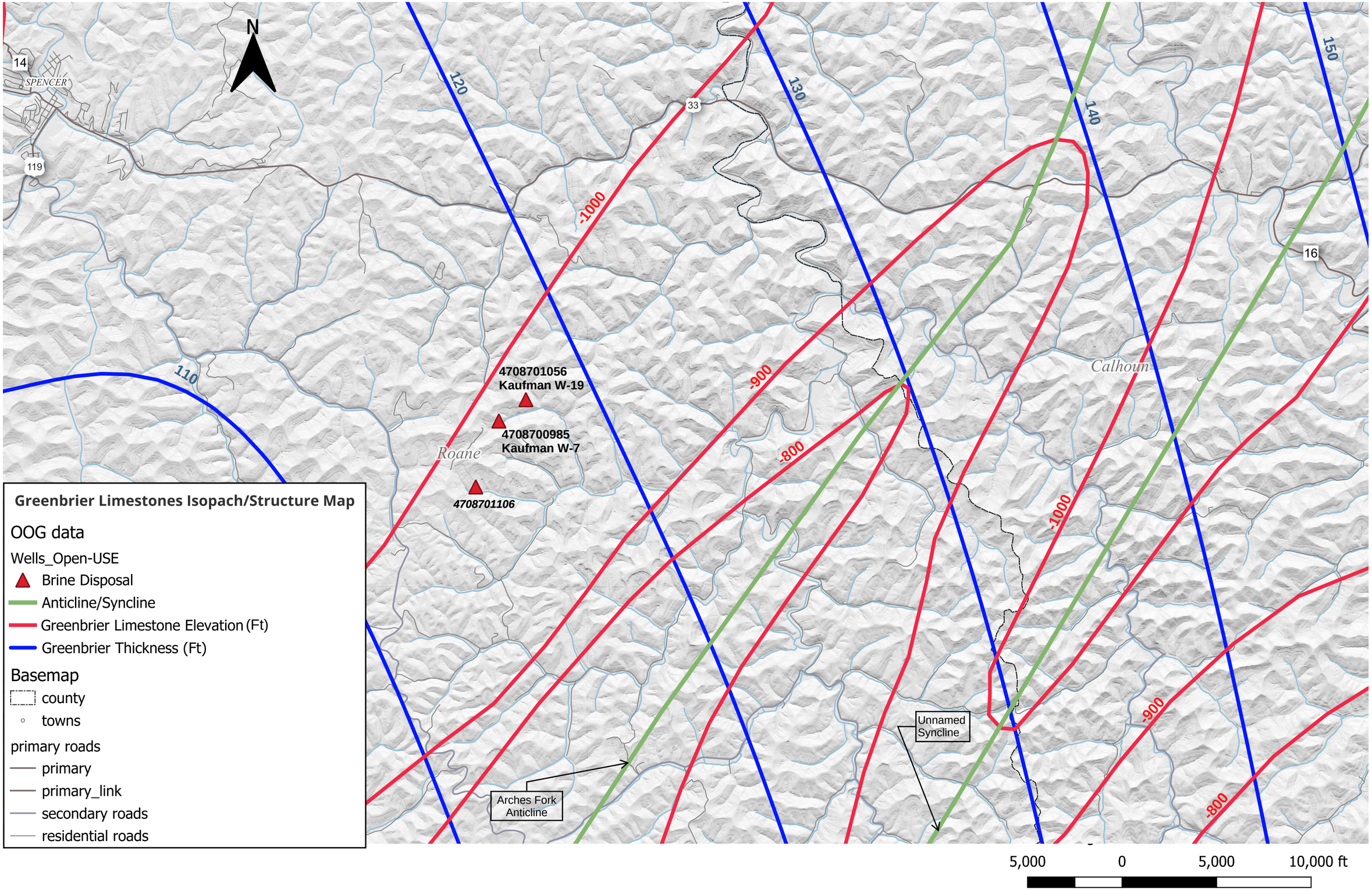
CLOVER FIELD

W.M. KAUFMAN WELL W-19
ROANE COUNTY, WEST VIRGINIA

4708701056
W-19



- Structure Contour Map on Top of Big Injun Sand, William Kaufman Lease, Clover-Rush Run Oilfield.


N
14
SPENCER
119
33
16
120
130
140
150
110
-1000
-900
-800
-1000
-900
-800
Calhoun
Roane
4708701056
Kaufman W-19
4708700985
Kaufman W-7
4708701106
Unnamed Syncline
Arches Fork Anticline
Greenbrier Limestones Isopach/Structure Map
OOG data
Wells_Open-USE
Brine Disposal
Anticline/Syncline
Greenbrier Limestone Elevation (Ft)
Greenbrier Thickness (Ft)
Basemap
county
towns
primary roads
primary
primary_link
secondary roads
residential roads
5,000
0
5,000
10,000 ft

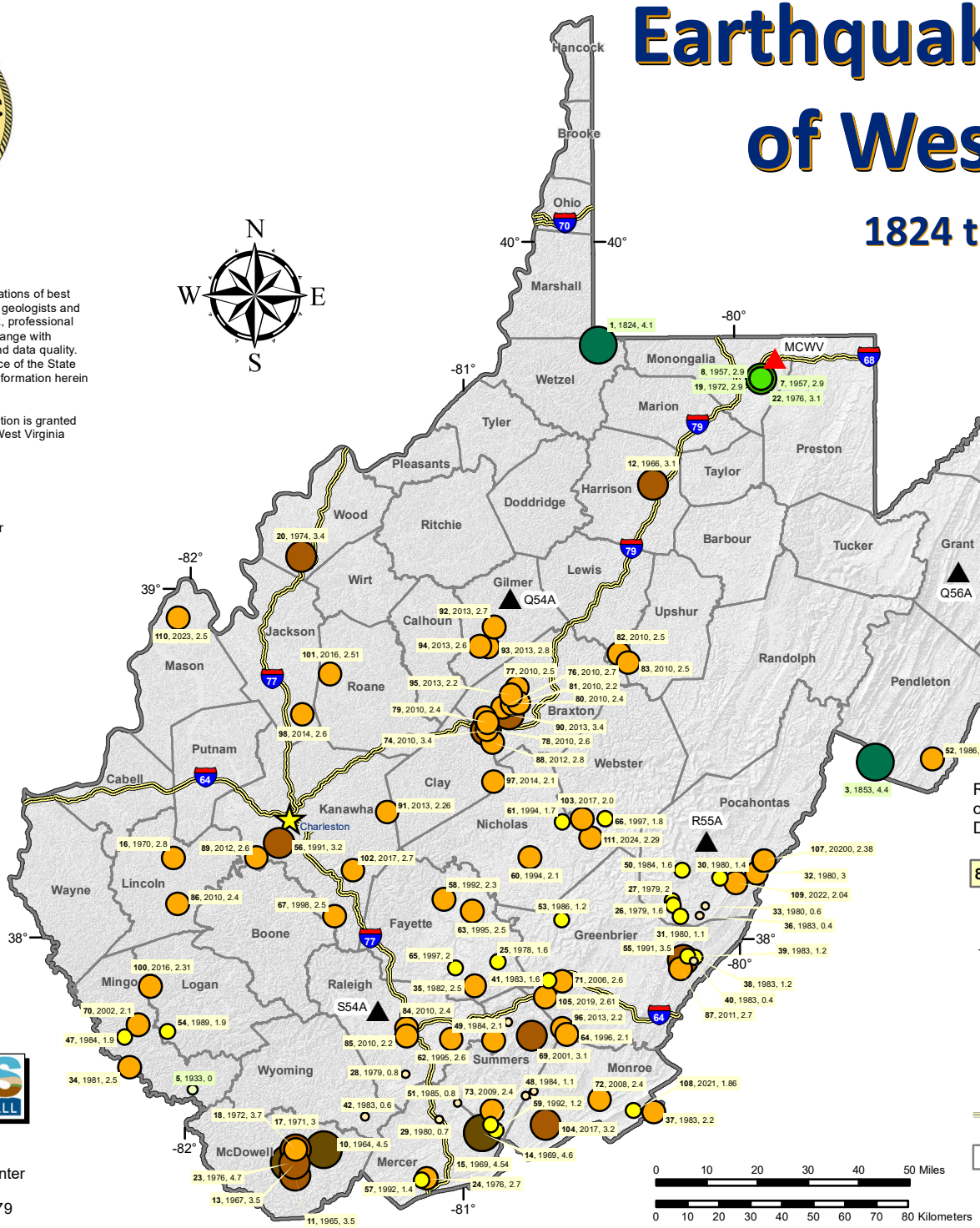
Earthquake Epicenters of West Virginia

1824 through 2024

Publications Policy:

This publication represents interpretations of best available data made by professional geologists and geographers. As in all research work, professional interpretations may vary, and can change with advancements in both technology and data quality. This publication is offered as a service of the State of West Virginia; proper use of the information herein is the sole responsibility of the user.

Map Date: 2/23/2024
Earthquake Data: 2/16/2024
Projection: Transverse Mercator
Horizontal Datum: NAD 1983
Map scale for full 8.5" x 11" display: 1:2,000,000



Legend

Recorded instrumental and reported historic (non-instrumental or felt) earthquake epicenters and magnitudes for West Virginia. Data were compiled from several earthquake catalog sources.

87, 2011, 2.7 — Labels show event number in **bold** followed by year and magnitude. Use event number to reference attached table.

- Charleston
- **Seismic Station** US National Seismic Network (e.g., US, IRIS)
- **Seismic Station** USArray, Central and Eastern US Network (CEUSN-N4)
- Interstate Highways
- Counties

Earthquake Epicenters

Instrumental Magnitude	Historic Magnitude
0.0 - 0.9	0.0 - 0.9
1.0 - 1.9	1.0 - 1.9
2.0 - 2.9	2.0 - 2.9
3.0 - 3.9	3.0 - 3.9
4.0 - 4.9	4.0 - 4.9

West Virginia Geological and Economic Survey
Mont Chateau Research Center
1 Mont Chateau Road
Morgantown, WV 26508-8079
Phone: (304) 594-2331
www.wvgs.wvnet.edu

Map Num	Time (event ID)	County	UTC Year	UTC Month	UTC Day	UTC Hour	UTC Minute	UTC Seconds	Latitude	Longitude	Magnitude	Magnitude Type	Recorded	MMI	Event URL
1	1824-07-15T16:20:00	Wetzel	1824	07	15	16	20	00	39.70000	-80.50000	4.1	mb	Historic	4.0	<NULL>
2	1846-10-19T02:00:00	Jefferson	1846	10	19	02	00	00	39.30000	-77.90000	2.7	<NULL>	Historic	3	<NULL>
3	1853-05-02T14:20:00	Pendleton	1853	05	02	14	20	00	38.50000	-79.50000	4.4	<NULL>	Historic	5	<NULL>
4	1909-04-02T07:25:00	Berkeley	1909	04	02	07	25	00	39.40000	-78.00000	3.6	mb	Historic	5	<NULL>
5	1933-06-15T01:14:36.8	Mingo	1933	06	15	01	14	36.8	37.56800	-81.97300	0.0	<NULL>	Historic	<NULL>	<NULL>
6	1935-11-01T08:30:00	Hardy	1935	11	01	08	30	00	38.90000	-78.90000	3.3	<NULL>	Historic	4	<NULL>
7	1957-03-07T21:05:09	Monongalia	1957	03	07	21	05	09	39.60000	-79.90000	2.9	mb	Historic	3	<NULL>
8	1957-03-13T21:00:41	Monongalia	1957	03	13	21	00	41	39.60000	-79.90000	2.9	mb	Historic	3	<NULL>
9	1963-10-10T00:00:00	Morgan	1963	10	10	00	00	00	39.65500	-78.19700	3.6	<NULL>	Historic	<NULL>	<NULL>
10	1964-11-25T02:50:05	McDowell	1964	11	25	02	50	05	37.40000	-81.50000	4.5	mb	Instrumental	<NULL>	<NULL>
11	1965-04-26T15:26:19.7	McDowell	1965	04	26	15	26	19.7	37.32500	-81.60200	3.5	mblg	Instrumental	<NULL>	<NULL>
12	1966-09-28T00:00:00	Harrison	1966	09	28	00	00	00	39.30000	-80.30000	3.1	<NULL>	Instrumental	4	<NULL>
13	1967-12-16T12:23:33.4	McDowell	1967	12	16	12	23	33.4	37.36000	-81.60400	3.5	mb	Instrumental	<NULL>	<NULL>
14	1969-11-20T01:00:09.3	Mercer	1969	11	20	01	00	09.3	37.44900	-80.93200	4.6	mblg	Instrumental	6	<NULL>
15	1969-11-20T01:00:10.700Z	Mercer	1969	11	20	01	00	10.700	37.449000	-80.932000	4.54	mw	Instrumental	5	https://earthquake.usgs.gov/earthquakes/eventpage/ushis3082/
16	1970-08-11T06:14:25.5	Lincoln	1970	08	11	06	14	25.5	38.23000	-82.05000	2.8	mblg	Instrumental	4	<NULL>
17	1971-04-01T05:05:11	McDowell	1971	04	01	05	05	11	37.40000	-81.60000	3.0	mb	Instrumental	0	<NULL>
18	1972-01-09T23:24:29	McDowell	1972	01	09	23	24	29	37.40000	-81.60000	3.7	mblg	Instrumental	0	<NULL>
19	1972-09-12T15:17:13.7	Monongalia	1972	09	12	15	17	13.7	39.60000	-79.90000	2.9	mb	Historic	3	<NULL>
20	1974-10-20T15:13:55.100Z	Wood	1974	10	20	15	13	55.100	39.095000	-81.593000	3.40	lg	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/usp00008g9/
21	1976-01-30T18:58:49.800Z	Morgan	1976	01	30	18	58	49.800	39.683000	-78.170000	2.80	lg	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/usp0000eu9/
22	1976-05-06T18:46:08.1	Monongalia	1976	05	06	18	46	08.1	39.60000	-79.90000	3.1	mb	Historic	4	<NULL>
23	1976-06-19T05:54:13.900Z	McDowell	1976	06	19	05	54	13.900	37.362000	-81.624000	4.70	mb	Instrumental	6	https://earthquake.usgs.gov/earthquakes/eventpage/usp0000gyg/
24	1976-07-03T20:53:45.08	Mercer	1976	07	03	20	53	45.08	37.32000	-81.13000	2.7	mblg	Instrumental	<NULL>	<NULL>
25	1978-08-14T04:50:05.4	Fayette	1978	08	14	04	50	05.4	37.93900	-80.87400	1.6	mc	Instrumental	<NULL>	<NULL>
26	1979-09-16T09:39:22.6	Pocahontas	1979	09	16	09	39	22.6	38.09900	-80.24000	1.6	mc	Instrumental	<NULL>	<NULL>
27	1979-09-19T00:45:57.4	Pocahontas	1979	09	19	00	45	57.4	38.11000	-80.24300	2.0	mc	Instrumental	<NULL>	<NULL>
28	1979-10-31T08:32:47.3	Raleigh	1979	10	31	08	32	47.3	37.61700	-81.20700	0.8	mc	Instrumental	<NULL>	<NULL>
29	1980-04-10T22:33:15.7	Mercer	1980	04	10	22	33	15.7	37.48700	-81.08600	0.7	mc	Instrumental	<NULL>	<NULL>
30	1980-09-21T10:02:46.3	Pocahontas	1980	09	21	10	02	46.3	38.17500	-80.07000	1.4	mc	Instrumental	<NULL>	<NULL>
31	1980-10-16T03:48:07.6	Pocahontas	1980	10	16	03	48	07.6	38.06600	-80.21500	1.1	mc	Instrumental	<NULL>	<NULL>
32	1980-11-05T21:48:14.2	Pocahontas	1980	11	05	21	48	14.2	38.18800	-79.93600	3.0	ml	Instrumental	<NULL>	<NULL>
33	1980-11-25T07:44:04	Pocahontas	1980	11	25	07	44	04	38.09500	-80.12300	0.6	md	Instrumental	<NULL>	<NULL>
34	1981-11-30T17:33:11	Mingo	1981	11	30	17	33	11	37.63000	-82.20000	2.5	mc	Instrumental	<NULL>	<NULL>
35	1982-06-23T16:17:34.1	Fayette	1982	06	23	16	17	34.1	37.87000	-80.95700	2.5	md	Instrumental	<NULL>	<NULL>
36	1983-01-21T05:33:20.4	Pocahontas	1983	01	21	05	33	20.4	38.06700	-80.14400	0.4	md	Instrumental	<NULL>	<NULL>
37	1983-05-26T01:04:44.8	Monroe	1983	05	26	01	04	44.8	37.50600	-80.31600	2.2	md	Instrumental	<NULL>	<NULL>
38	1983-06-10T00:18:40.4	Greenbrier	1983	06	10	00	18	40.4	37.94800	-80.16300	1.2	md	Instrumental	<NULL>	<NULL>
39	1983-06-10T00:24:57	Greenbrier	1983	06	10	00	24	57	37.95100	-80.18900	1.2	md	Instrumental	<NULL>	<NULL>
40	1983-06-10T00:31:08.3	Greenbrier	1983	06	10	00	31	08.3	37.93800	-80.16800	0.4	md	Instrumental	<NULL>	<NULL>
41	1983-07-20T04:41:40.9	Greenbrier	1983	07	20	04	41	40.9	37.88500	-80.69100	1.6	md	Instrumental	<NULL>	<NULL>
42	1983-07-25T03:27:00.2	Wyoming	1983	07	25	03	27	00.2	37.49600	-81.35200	0.6	md	Instrumental	<NULL>	<NULL>
43	1983-11-13T16:51:06.7	Summers	1983	11	13	16	51	06.7	37.55600	-80.77500	0.4	md	Instrumental	<NULL>	<NULL>
44	1983-11-13T17:50:50.1	Monroe	1983	11	13	17	50	50.1	37.55900	-80.75300	0.7	md	Instrumental	<NULL>	<NULL>
45	1983-11-25T16:27:47.8	Monroe	1983	11	25	16	27	47.8	37.56800	-80.74500	0.7	md	Instrumental	<NULL>	<NULL>
46	1983-12-23T10:51:21.9	Summers	1983	12	23	10	51	21.9	37.76600	-80.83700	0.3	md	Instrumental	<NULL>	<NULL>
47	1984-02-02T05:10:19.7	Mingo	1984	02	02	05	10	19.7	37.71700	-82.21800	1.9	md	Instrumental	<NULL>	<NULL>
48	1984-03-11T04:01:38.9	Summers	1984	03	11	04	01	38.9	37.47400	-80.90000	1.1	md	Instrumental	<NULL>	<NULL>
49	1984-10-09T05:33:31.5	Summers	1984	10	09	05	33	31.5	37.71300	-80.89100	2.1	md	Instrumental	<NULL>	<NULL>
50	1984-12-21T13:12:21.9	Pocahontas	1984	12	21	13	12	21.9	38.19800	-80.20800	1.6	md	Instrumental	<NULL>	<NULL>
51	1985-06-14T07:57:10.2	Mercer	1985	06	14	07	57	10.2	37.53400	-81.02000	0.8	md	Instrumental	<NULL>	<NULL>
52	1986-02-26T21:53:20.8	Pendleton	1986	02	26	21	53	20.8	38.50700	-79.29200	2.3	md	Instrumental	<NULL>	<NULL>
53	1986-12-20T08:13:12.8	Greenbrier	1986	12	20	08	13	12.8	38.05800	-80.64300	1.2	md	Instrumental	<NULL>	<NULL>
54	1989-03-19T10:07:55.8	Logan	1989	03	19	10	07	55.8	37.73500	-82.06400	1.9	md	Instrumental	<NULL>	<NULL>
55	1991-04-22T01:01:20.270Z	Greenbrier	1991	04	22	01	01	20.270	37.941000	-80.207000	3.50	mblg	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/usp0004qn8/
56	1991-06-28T18:34:51.920Z	Kanawha	1991	06	28	18	34	51.920	38.276000	-81.668000	3.20	mblg	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/usp0004thc/
57	1992-03-29T20:16:48.2	Mercer	1992	03	29	20	16	48.2	37.31400	-81.14900	1.4	md	Instrumental	<NULL>	<NULL>
58	1992-05-06T21:20:23.9	Fayette	1992	05	06	21	20	23.9	38.11800	-81.06900	2.3	md	Instrumental	<NULL>	<NULL>
59	1992-11-24T02:26:50.7	Summers	1992	11	24	02	26	50.7	37.45700	-80.88400	1.2	md	Instrumental	<NULL>	<NULL>
60	1994-02-04T07:40:32.4	Nicholas	1994	02	04	07	40	32.4	38.23600	-80.75900	2.1	md	Instrumental	<NULL>	<NULL>

Map Num	Time (event ID)	County	UTC Year	UTC Month	UTC Day	UTC Hour	UTC Minute	UTC Seconds	Latitude	Longitude	Magnitude	Magnitude Type	Recorded	MMI	Event URL
61	1994-06-19T08:36:41.3	Nicholas	1994	06	19	08	36	41.3	38.33900	-80.64000	1.7	md	Instrumental	<NULL>	<NULL>
62	1995-11-15T10:29:24.8	Raleigh	1995	11	15	10	29	24.8	37.71700	-81.04300	2.6	md	Instrumental	<NULL>	<NULL>
63	1995-12-28T23:48:30.4	Fayette	1995	12	28	23	48	30.4	38.08400	-80.96800	2.5	md	Instrumental	<NULL>	<NULL>
64	1996-08-11T09:11:21.3	Greenbrier	1996	08	11	09	11	21.3	37.73100	-80.62800	2.1	mc	Instrumental	<NULL>	<NULL>
65	1997-02-22T14:32:33.1	Fayette	1997	02	22	14	32	33.1	37.92100	-81.02700	2.0	mc	Instrumental	<NULL>	<NULL>
66	1997-03-15T05:56:36.4	Webster	1997	03	15	05	56	36.4	38.34700	-80.48400	1.8	md	Instrumental	<NULL>	<NULL>
67	1998-10-02T10:01:06.9	Kanawha	1998	10	02	10	01	06.9	38.06800	-81.46600	2.5	md	Instrumental	<NULL>	<NULL>
68	2000-10-16T17:56:13.8	Braxton	2000	10	16	17	56	13.8	38.63600	-80.92000	2.5	md	Instrumental	<NULL>	<NULL>
69	2001-12-04T21:15:13.9	Summers	2001	12	04	21	15	13.9	37.72600	-80.75200	3.1	mb	Instrumental	<NULL>	<NULL>
70	2002-03-27T08:25:03.3	Mingo	2002	03	27	08	25	03.3	37.75300	-82.17100	2.1	md	Instrumental	<NULL>	<NULL>
71	2006-07-11T12:01:43.100Z	Greenbrier	2006	07	11	12	01	43.100	37.882167	-80.641333	2.60	md	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/se606219/
72	2008-01-29T01:04:20.700Z	Monroe	2008	01	29	01	04	20.700	37.544833	-80.509833	2.40	mlg	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/se606830/
73	2009-04-11T18:11:09.070Z	Summers	2009	04	11	18	11	09.070	37.513333	-80.895667	2.40	md	Instrumental	<NULL>	https://earthquake.usgs.gov/earthquakes/eventpage/se607139/
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89	2012-03-16T15:05:53.570Z	Kanawha	2012	03	16	15	05	53.570	38.234000	-81.748000	2.60	mblg	Instrumental	3	https://earthquake.usgs.gov/earthquakes/eventpage/usp000jgbk/
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105	2019-03-04T07:41:54.780Z	Greenbrier	2019	03	04	07	41	54.780	37.838167	-80.704167	2.61	md	Instrumental	2	https://earthquake.usgs.gov/earthquakes/eventpage/se60076828/
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Data as of 2/16/2024. For a more detailed listing, please download the West Virginia Earthquake spreadsheet/workbook from http://www.wvgs.wvnet.edu/www/earthquakes/seismic.html.

If you view this map and data as a PDF, you can click any of the blue hyperlinked text to view further infromation on a website.

Some definition of terms are provided with this map. Please consult the West Virginia Earthquake Catalog 202402.xlsx spreadsheet/workbook for complete definitions.

WVGES GEOLOGY UNDERLIES IT ALL

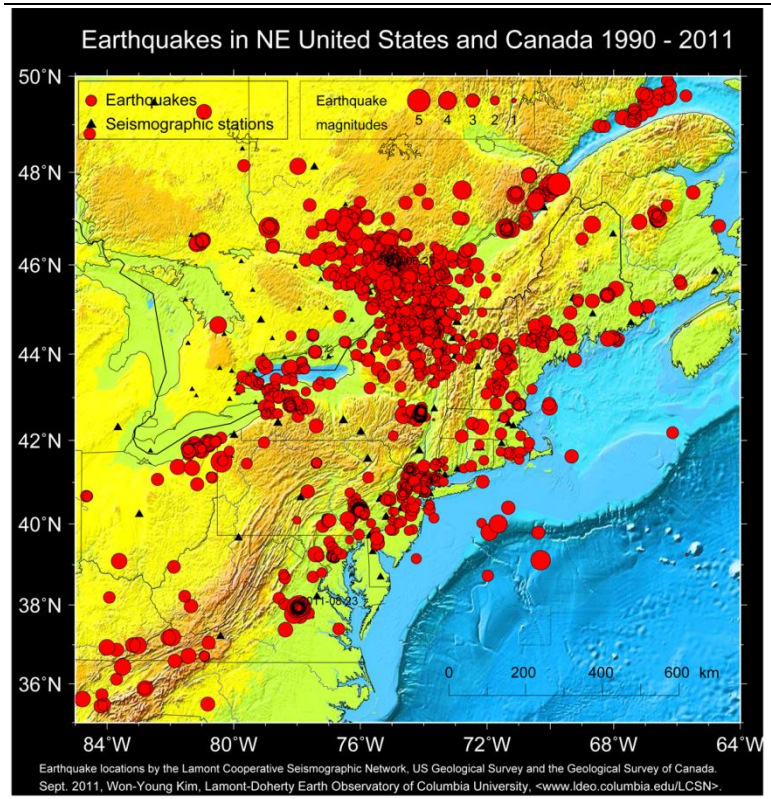
Some Definitions and Explanations:

• **County**: the name of the county where the epicenter was located, derived from spatial selection.
• Dates and times are in Coordinated Universal Time (UTC) for Year, Month, Day, Hours (HH), Minutes (MM) and Seconds (SS). (For Eastern Standard Time, the offset is - 5 hours).
• **Magnitude (Mag)**: Magnitude numbers indicative of an earthquake's relative size and is the measured maximum motion as recorded by a seismograph. The numbers are pulled from various sources; the primary source whenever possible.
• **Recorded**: refers to the means by which magnitudes were recorded: if they were reported as "felt" (Historical) or recorded via scientific instrumentation (Instrumental) as retrieved from Source1 or Source2.
• **Latitude** and **Longitude** values are expressed in decimal degrees for the northern and western hemispheres, respectively.
• **MMI**: The Modified Mercalli Intensity scale for epicenter intensity, usually designated with Roman numerals. Visit USGS at https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale for further information.
• **MagnitudeType**: Magnitude type code; the method used in measuring magnitudes (e.g., *Mb* for "body-wave", *Mc* for "coda amplitude", *Md* for "coda duration").

For other or more detailed earthquake and seismological definitions, please visit the USGS (https://earthquake.usgs.gov/learn/glossary/).

Sources (Source1 and Source2):

• USGS ENS – United States Geological Survey, Earthquake Hazards (A Primary Source)
• VTSO – Virginia Tech Seismological Observatory (A Secondary Source)
• ANSS – Advanced National Seismic System
• CERI – Center for Earthquake Research and Information
• LDEO – Lamont-Doherty Earth Observatory
• Wheeler I-2737 – Wheeler, Russell L., *Earthquakes In and Near the Northeastern United States, 1638-1998* (Used only as reference here)



Northeastern United States and southeastern Canadian earthquakes from 1990 to 2011.
Image courtesy of the Lamont-Doherty Earth Observatory (Won-Young Kim)
of Columbia University, New York. Used by permission.

West Virginia Geological and Economic Survey
https://www.wvgs.wvnet.edu/

Kaufman Field Study 1967

RESERVOIR STUDY OF THE WILLIAM KAUFMAN LEASE CLOVER-RUSH RUN OILFIELD, ROANE COUNTY, W. VA.

By Karl-Heinz Frohne

* * * * * * * * * * * report of investigations 6992

UNITED STATES DEPARTMENT OF THE INTERIOR
Stewart L. Udall, Secretary

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Walter R. Hibbard, Jr., Director

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RESERVOIR STUDY OF THE WILLIAM KAUFMAN LEASE, CLOVER-RUSH RUN OILFIELD, ROANE COUNTY, W. VA.

by

Karl-Heinz Frohne[1]

ABSTRACT

This report presents the findings of a study of a portion of the Clover-Rush Run oilfield located in Roane County, W. Va. The study was made to investigate the possibilities of secondary oil recovery in the Big Injun sandstone underlying the William Kaufman lease. Reservoir properties, original reserves, and primary oil recovery are also presented.

The investigation is based on a core analysis and related labortory tests, well records, field production data, and subsurface information from the Kaufman property. A theoretical primary oil recovery of 9.7 percent of original oil in place is predicted for the reservoir.

A waterflood performance prediction of a hypothetical pilot area was made by use of a computer. The prediction showed that, based on laboratory oil-water relative permeability curves, the water-injection time needed to initiate oil production is excessive and that the stabilized water-injection and corresponding oil-production rates are very low. This precludes waterflooding the reservoir on an economic basis.

A prediction for secondary oil recovery by gas injection was attempted but could not be completed because essential reservoir data were not available. In July 1965, the lease operator initiated, and is currently conducting, a gas-injection program, but there had been no increase in oil production up to November 1966.

INTRODUCTION

Production records and well logs show that primary oil production from the Big Injun sand has been by solution-gas drive in the Clover-Rush Run oilfield. Solution gas is the most inefficient of natural drives and can be

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expected to recover only 5 to 25 percent (2)[a] of oil in place. Primary oil recovery from Appalachian area reservoirs is usually in the lower end of this range because of the very low permeability of the hydrocarbon-bearing formations, thus a large part of the oil is unrecovered.

In order to aid the reclamation of this valuable resource, the Bureau of Mines is currently engaged in evaluating methods of increasing the secondary recovery of oil from selected Appalachian area reservoirs. The work, of which this report is a part, is being carried out under the Bureau's Reservoir Evaluation Project by utilizing detailed core analyses and other field data to perform reservoir evaluations and provide secondary recovery recommendations. The plans and objectives of the project have been described in detail in another publication (7).

Even though one of the older Kaufman wells produced from the Big Lime formation, the only zone of consequence underlying the lease is the Big Injun sandstone which is the main area of interest of this report. At the present time, the lease operator is injecting natural gas into the Big Injun formation in order to stimulate oil recovery. This project is described in more detail later in the report.

A preliminary report on the Kaufman lease and the well cored by the Bureau has been published (6).

ACKNOWLEDGMENTS

The cooperation of the Pennzoil Co., operator of the William Kaufman lease, in providing well records, logs, and other data for this report is acknowledged.

GENERAL GEOLOGY

Location and Topography

The Clover-Rush Run oilfield is located in Smithfield and Spencer Districts, Roane County, W. Va. (fig. 1). The area topography is typical of the Appalachian Plateau. Outcropping rocks belong to either the Dunkard Series of the Lower Permian Period or the Monongahela Series of the Pennsylvania Period (5). The rugged terrain, formed by stream erosion of the plateau, consists mainly of narrow V-shaped valleys and steep ridges, although a few bottom lands and flat-topped hills can be found. Maximum elevation differences are on the order of 600 feet.

Area Structure and Stratigraphy

The Clover-Rush Run oilfield lies on the western flank of the Arches Fork anticline, and the Big Injun sand strikes north 30° east (4). In the Kaufman lease area, the sand dips to the northwest at about 70 feet per mile.

[a]Underlined numbers in parentheses refer to items in the list of references at the end of this report.

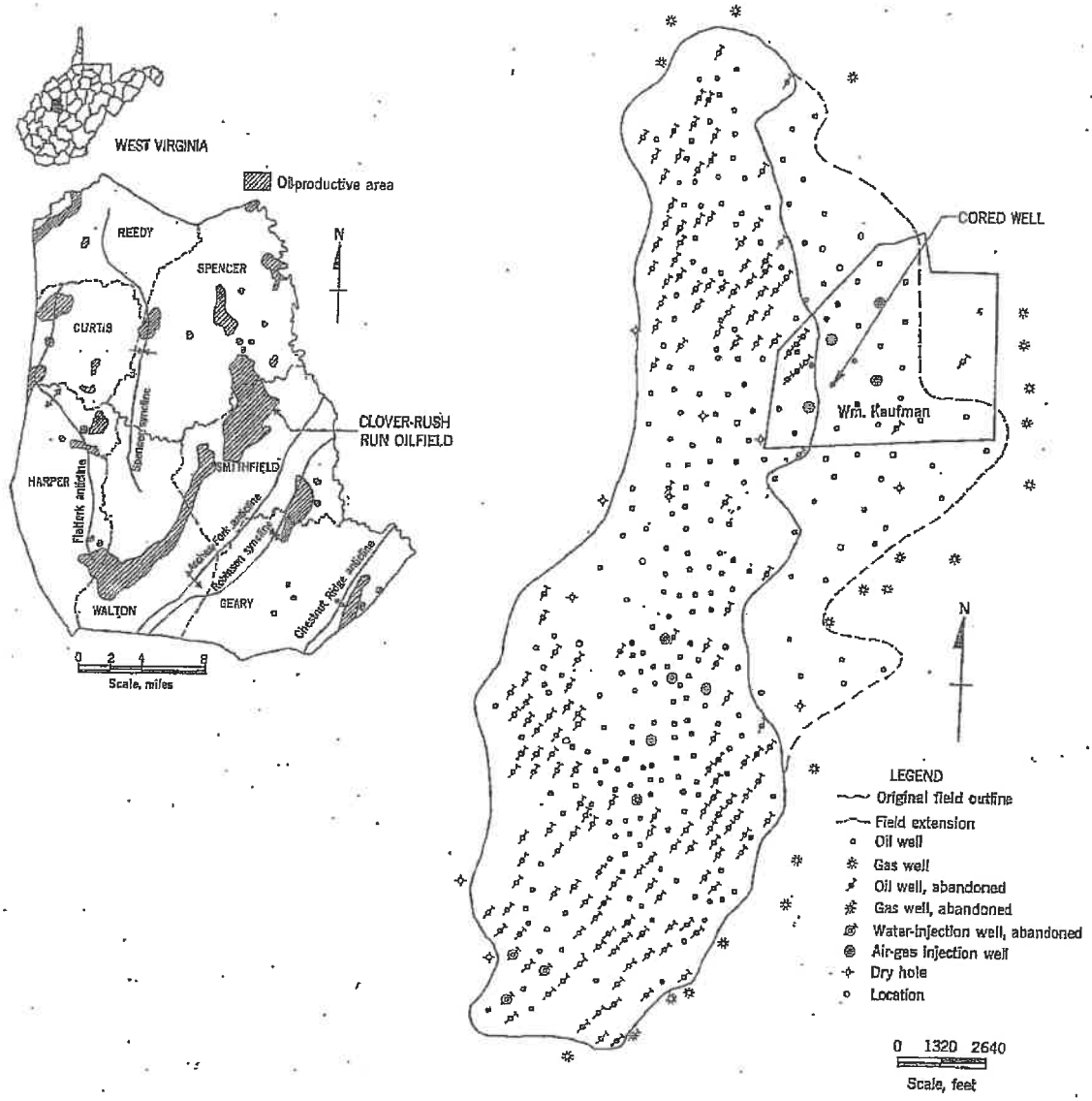

FIGURE 1. - Oil-Productive Areas in Roane County, W. Va., and the William Kaufman Lease in the Clover-Rush Run Oilfield.

A generalized geologic column for Roane County illustrates the stratigraphy of the area (fig. 2). Below the outcropping Dunkard and Monongahela formations lie the intermingled sandstones, limestones, shales, and coal seams of the Pennsylvanian Period. Next come the limestones, sands, and shales of the Mississippian Period, including the basal Greenbrier limestone and dolomite and the Keener and Big Injun sandstones which were cored in well P-7 on the William Kaufman lease.

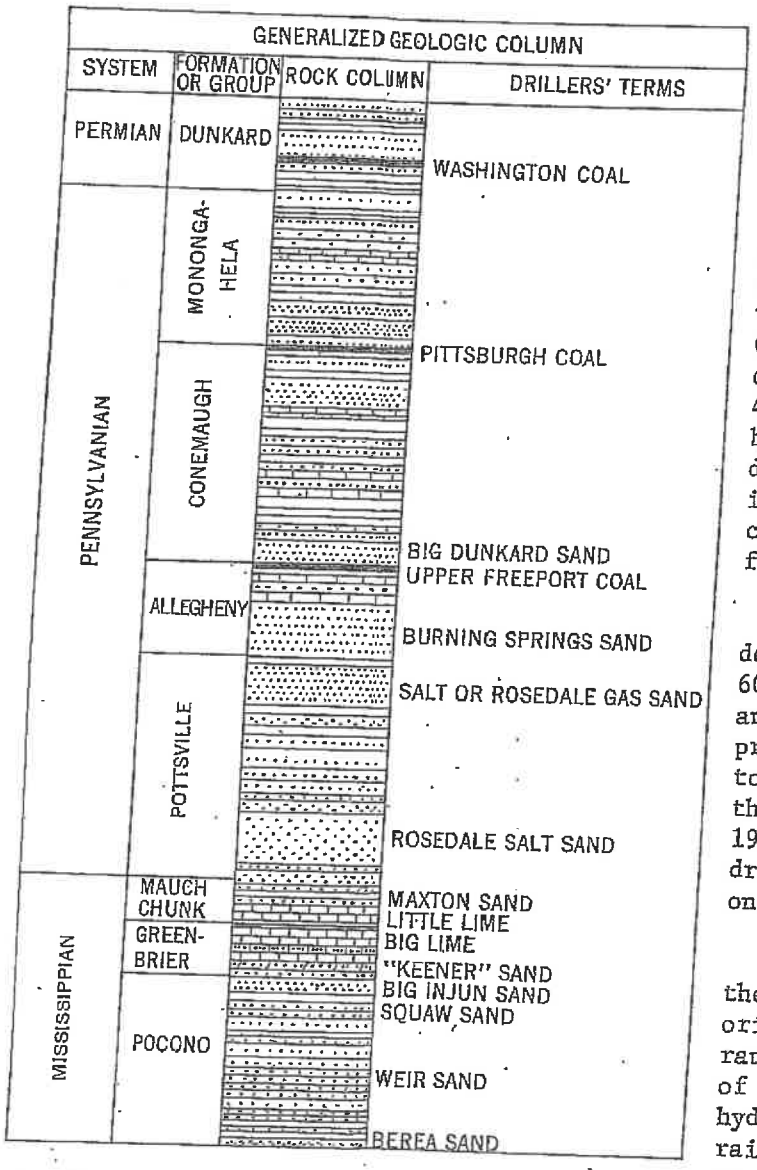

FIGURE 2. - Generalized Geologic Column of Subsurface Formations, Clover-Rush Run Oilfield.

FIELD DEVELOPMENT AND LEASE HISTORY

Development of Clover-Rush Run Oilfield

The original discovery well for the Clover-Rush Run oilfield was Heasley and Co. well 1, drilled on the L. D. Chambers lease in 1909. An oil-productive area of about 4,200 acres had been outlined by 1926 through development drilling, and by 1961 approximately 350 wells had been completed within the original field limits (fig. 1).

In the summer of 1961 a development boom began; about 60 new wells were drilled, and approximately 1,600 new productive acres were added to the northeastern side of the field by the summer of 1964. A large part of this drilling activity took place on the Kaufman lease.

Initial production from the old wells within the original field boundaries ranged from 2 to 40 barrels of oil per day. The use of hydraulic fracturing then raised the initial oil-production rates of the new development wells to a range of 15 to 250 barrels per day.

History of William Kaufman Lease

The present Kaufman lease (fig. 3) consists of 700 acres and was originally part of a larger Heasley and Co. holding. Sometime between 1909 and 1918, three oil wells were drilled within the lease area. About 1918, the Carter Oil Co. bought the lease and drilled three more producing wells. Next, the Hope Construction and Refining Co. leased the property. By 1920, Hope had also drilled three wells, each of which initially produced less than five barrels of oil per day. Finally the South Penn Oil Co., now the Pennzoil Co., bought the Kaufman lease from Hope in 1943 and completed two new oil wells by 1962.

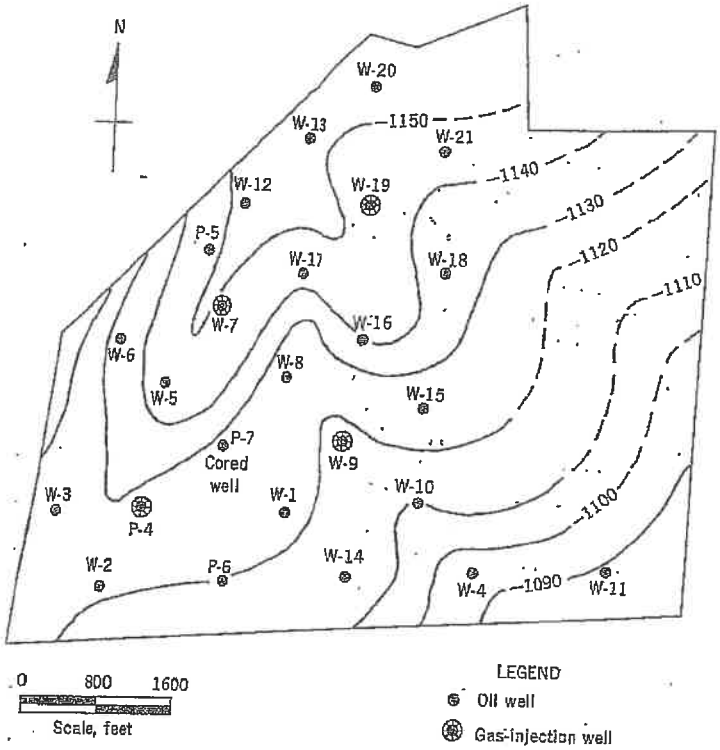

FIGURE 3. - Structure Contour Map on Top of Big Injun Sand, William Kaufman Lease, Clover-Rush Run Oilfield.

All of the producing wells on the Kaufman lease except one of the wells drilled by South Penn had been abandoned by the summer of 1962 when a new flurry of development activity hit the lease. This drilling program produced 24 new oil wells in the Big Injun sandstone by July 1964 when development was stopped. A permeability pinchout in the formation to the northeast limits the new field addition. The Kaufman property is situated in this area of low to zero permeability, and lease wells had only slight shows of oil on initial completion. After fracturing, however, the wells produced 15 to 50 barrels of oil per day.

CORING AND LOGGING OPERATIONS

Kaufman lease well P-7 was cored in September 1963 by personnel of the Pennzoil Co. and the Bureau of Mines. The 3½-inch-diameter core was taken with rotary tools using a low-water-loss bentonite water-base mud. The cored interval extended from 2,131 to 2,212 feet with 100-percent recovery.

A group of well logs, including guard, spontaneous potential, 16- and 64-inch normals, continuous velocity, gamma ray-neutron, and caliper, was run after coring operations were completed. The log curves covering the cored interval have been previously published (6).

RESERVOIR DATA

Structure

The Big Injun sandstone underlying the Kaufman lease is at an average depth of 2,200 feet. The reservoir is bounded on the downdip western edge of the field by water and updip by a permeability pinchout which cuts across the northeastern corner of the Kaufman property. The sand ranges in gross thickness from 50 feet on the downdip side of the field to 15 feet updip, and averages 24 feet under the Kaufman lease. Structure and isopachous maps of the Big Injun sand are shown in figures 3 and 4, respectively.

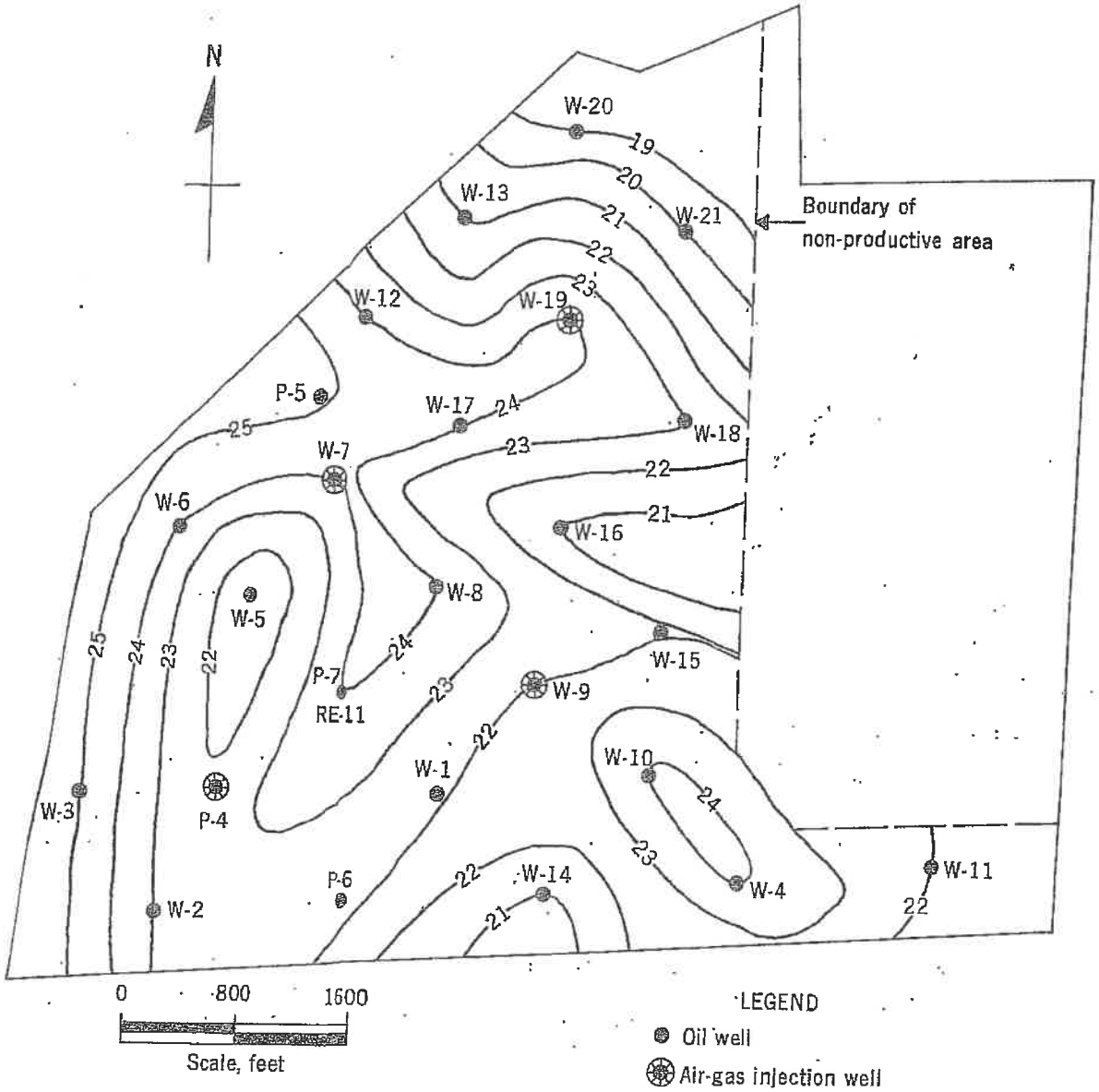

FIGURE 4. - Isopachous Map of the Big Injun Sand, William Kaufman Lease, Clover-Rush Run Oilfield.

Lithology

The cored interval in Kaufman well P-7 included the basal Greenbrier limestone and the Keener and Big Injun sandstone formations. The Greenbrier, locally called Big Lime, is light gray to gray brown, is slightly sandy and oölitic, and contains traces of glauconite (6). The basal section consists of light gray to tan, granular, calcareous, and glauconitic dolomite bottomed by a conglomerate of calcium carbonate, cemented quartz pebbles, and pieces of limestone.

The conglomerate grades into what is known locally as the Keener sandstone which extends from 2,168 to 2,182 feet. This is a white, medium- to coarse-grained, calcareous sandstone with a quartz pebble, limestone fragment, and clay material conglomerate at the bottom.

The Keener is immediately followed by the oil-productive Big Injun, a light-gray, fine-grained, subgraywacke sandstone that covers the interval 2,182 to 2,206 feet. The formation is glauconitic, very slightly calcareous, and contains traces of mica and argillaceous material. The argillaceous matter consists of illite and kaolinite which, together with montmorillonite, coat the quartz grains and occupy some of the pore spaces. The quartz grains are poorly sorted and loosely bonded, primarily by the coating clay material.

Core Analysis

The Kaufman lease contains 800 acres, 567 of which are considered oil productive based on logs and production records of wells. Kaufman well P-7, located near the center of the productive area and one of the best producers on the lease, has a total sand thickness of 24 feet for the Big Injun.

Using 0.1 millidarcy as a limiting minimum permeability, only 12.5 feet, or 52 percent of the total interval of well P-7, are considered effective net sand. This factor has been applied to the effective area gross sand volume of the lease, as determined from the isopachous map, to give an areally weighted average net sand thickness of 12.7 feet.

Core data for the Big Injun sand in Kaufman well P-7 are summarized below:

	Interval	
	Effective	Total
Thickness.....feet..	12.5	24.0
Air permeability..... millidarcy..	.8	.5
Porosity.....percent..	15.2	12.7
Saturation:		
Oil.....do..	8.7	7.4
Water.....do..	65.1	68.0

Complete core analysis data for the portion of the cored interval, which includes the Keener and Big Injun sands, are presented in table A-1.

Log Analysis

Quantitative analyses of the logs run in Kaufman well P-7 gave no conclusive results for the Big Injun reservoir. Water saturations calculated from guard log resistivities and core porosities gave an average value of 25 percent for the gross sand interval. This is much lower than the established area saturation of approximately 50 percent. A possible explanation for the low reading is that fresh-water-mud filtrate may have invaded the logged interval.

Porosities for the Big Injun sandstone were calculated from both neutron and velocity logs. The average neutron log value of 9.5 percent is lower than the core analysis figure of 12.7 percent, which may be due to the presence of free gas saturation in the formation. The velocity log, however, gave a value of 21.7 percent. This high porosity may be the result of velocity log signal attenuation, or cycle skipping; also due to a free-gas saturation.

The caliper log showed that the borehole was very uniform and in-gage through the Big Injun interval, indicating a uniformly hard formation.

Reservoir Limits

As mentioned previously, only 567 acres of the 800-acre Kaufman property are considered commercially oil productive. The remaining 233 acres (fig. 4) have not been assigned reserves. This is based on Kaufman well P-3, the only well drilled on this part of the lease. The exact location of this well is not known, but its approximate position is shown in figure 1. No formal records are available for well P-3, but operating personnel believe that the well was plugged and abandoned shortly after completion. Only a few quarts of oil were bailed out after the well was shot with nitroglycerin.

The eastern side of the commercially nonproductive area is formed arbitrarily by the lease line, and the western and southern sides are based on one-half well spacing from the adjacent row of Kaufman lease wells. During 1964 and 1965, the M & M Drilling Co. of Spencer, W. Va., drilled and completed four gas wells (fig. 1) about 900 feet east of the Kaufman lease. The wells had estimated initial open flows of 1 million cubic feet per day, and oil production ranged from a show to 20 barrels per day.

In view of this production to the east, only a test well, completed with modern techniques in the portion of the lease now considered nonproductive, will determine if the formation underlying this part of the Kaufman property contains any producible oil reserves.

Reservoir Temperature and Pressure

On May 1, 1964, several bottom-hole surveys were taken in Kaufman well P-7. One of the measurements was a reservoir temperature survey which recorded a formation temperature of 74° F for the Big Injun sand.

Leasewide bottom-hole pressure surveys were conducted on three occasions on wells on the Kaufman property. Tests run in November 1963, gave an areally weighted average pressure of 462 psig for the Big Injun sand; in June 1964, the pressure was 379 psig; and in May 1965, it had dropped to 268 psig.

Since the formation in the lease area had been tapped as early as 1909 when reservoir-pressure surveys were unheard of, an original formation pressure had to be estimated. Using established area pressure gradients applicable to the Big Injun sandstone, the original formation pressure was estimated as 700 psig. The original crude oil is assumed to have been saturated at the initial reservoir pressure of 700 psig.

Permeability

Permeability measurements were made in the laboratory on sample plugs cut at 1-foot intervals from the core material from Kaufman well P-7. The average air permeabilities of the gross and net effective intervals of the Big Injun sandstone are 0.5 and 0.8 millidarcy, respectively. These values illustrate the extreme tightness of the sand, especially since well P-7 is considered the best oil producer on the lease. Core analysis results, including a complete list of permeabilities, are given in table A-1.

Reservoir-Fluid Saturations

Oil and water saturations were also measured at 1-foot intervals along the core. Average oil and water saturations of the effective net interval are 8.7 and 65.1 percent, respectively. These values cannot be considered representative since the well was cored with a fresh-water-base drilling mud, and because filtrate invasion and solution-gas expansion undoubtedly took place during coring.

Analysis of the electric log gave an average water saturation of 25 percent over the gross sand interval. This value, also, may be too low because of mud filtrate invasion of the logged formation.

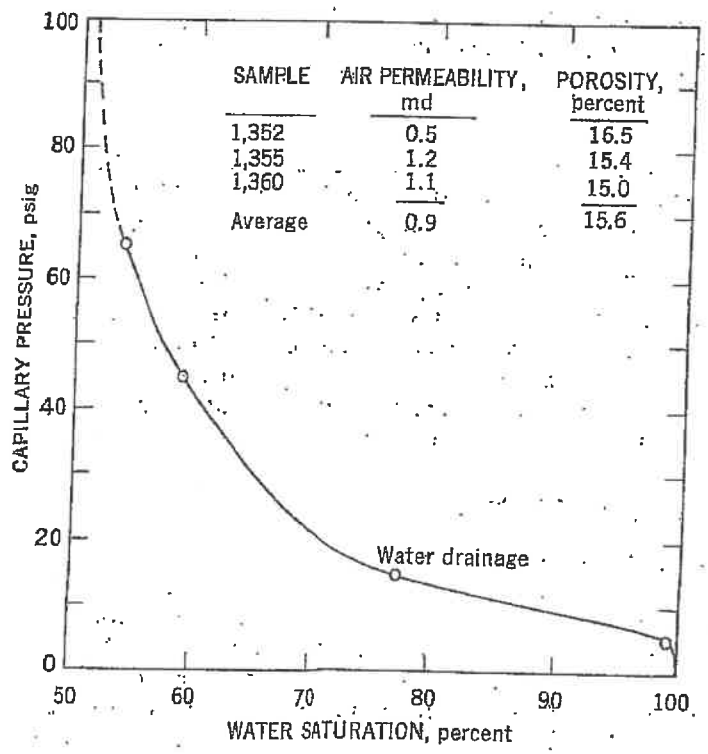

FIGURE 5. - Capillary Pressure Versus Water Saturation for the Big Injun Sand in Kaufman Well P-7, Clover-Rush Run Oilfield.

Finally, a graph of capillary pressure versus water saturation (fig. 5) prepared from laboratory test data shows an irreducible water saturation of 51 percent. This value is in agreement with established saturations of the Big Injun sandstone in the area and is used in this report.

To date, no water has been produced from the Kaufman lease, and the 51-percent saturation is considered immobile and equal to the original reservoir water saturation. The original oil saturation would then be 49 percent, based on the assumption that the reservoir was initially 100 percent liquid filled.

Reservoir-Fluid Properties

Because the area under study has been produced since 1909, no direct analysis of the original reservoir fluids is available. However, a reservoir-fluid sample taken from Kaufman well P-7 in May 1964, when the bottom-hole sampling pressure of the well was 483 psig, was analyzed. By using a technique reported by Clark (1), and several assumed factors, this fluid analysis has been adjusted to represent the original reservoir fluid.

An outline for pressure-volume-temperature analysis tests necessary to fully utilize the above adjustment procedure is given in appendix B. The outline applies where the fluid sampling pressure is lower than the original reservoir pressure. The adjustment procedure and original and adjusted PVT analysis data for Kaufman well P-7 are given in appendix C.

In May 1964, the stock-tank crude oil gravity was 48.3° API at 60° F and the crude oil viscosity was 2.43 centipoises at 77° F.

RESERVOIR PERFORMANCE

Primary-Performance Prediction

The primary-recovery mechanism of the Big Injun sandstone under the Kaufman property is a dissolved-gas or depletion drive. This production method is inherently the most inefficient natural drive and, in the Appalachian area, will usually produce only about 5 to 25 percent of the oil in the reservoir.

The crude oil originally in place was calculated volumetrically, using core, electric log, and fluid analysis data, and was found to be 3,291,000 stock-tank barrels, or 457 barrels per acre-foot. A prediction of primary recovery was then made by analysis (3) of the production-decline curve (fig. 6) for the Kaufman lease. Overall primary recovery over the producing life from the original reservoir pressure of 700 psig to theoretical lease abandonment conditions--10 barrels of oil per day--was calculated to be 319,000 stock-tank barrels of oil. This represents a recovery of 9.7 percent of the oil in place, or 44 barrels per acre-foot, by primary solution-gas drive. Theoretical abandonment conditions would be reached in April 1970.

Secondary Recovery

Waterflood Prediction

A computer prediction for theoretical secondary oil recovery by waterflooding the Big Injun sandstone under the Kaufman property was made. The hypothetical pilot area consisted of a pattern of four 5-spots totaling 23 acres. An essential part of the prediction is based on the oil-water relative permeability curves obtained in the laboratory (fig. 7). As can be seen from the curves, the relative permeability to oil at initial conditions is good. This may explain the initial completion gages of 15 to 50 barrels of oil per day after fracturing. The relative permeability to water, however, stays very low through the laboratory test range of water saturations.

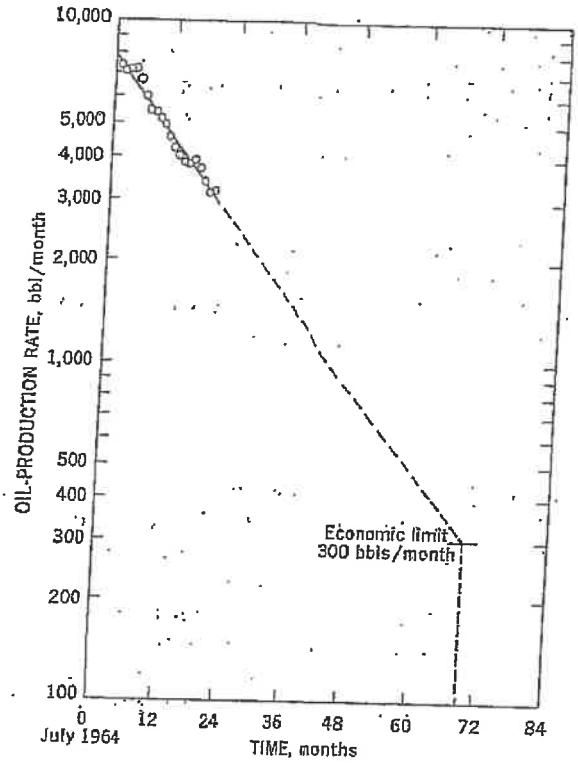

FIGURE 6. - Production Decline Curve for the William Kaufman Lease, Clover-Rush Run Oilfield.

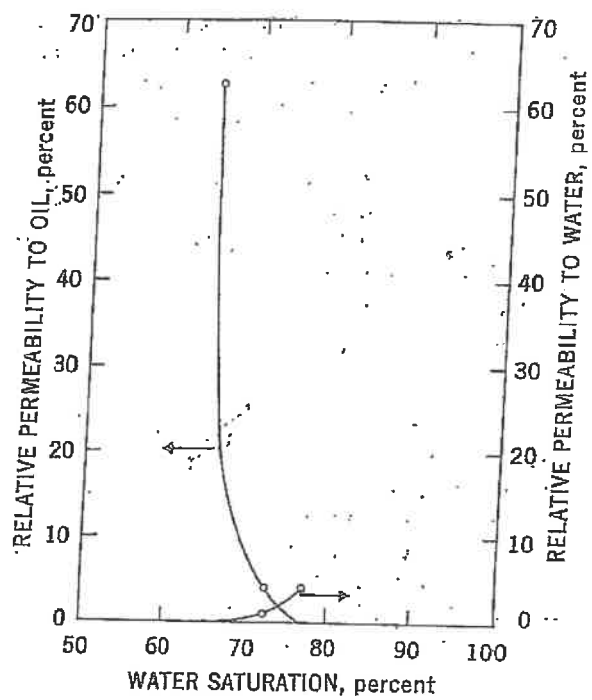

FIGURE 7. - Oil and Water Relative Permeability Curve for the Big Injun Sand in Kaufman Well P-7, Clover-Rush Run Oilfield.

Due to this low relative water permeability, the predicted time required to fill the initial gas saturation space in the pilot area with water and for oil production to begin is 17 years. After fill-up, the stabilized water-injection rate reached was less than one-half barrel per well per day, and the oil-production rates were correspondingly low. These low water-injection and oil-production rates preclude waterflooding the lease on an economic basis under present-day reservoir technology.

Gas-Injection Project

A prediction of secondary-recovery performance by gas injection could not be made because of the absence of essential data, such as a gas-oil relative permeability relationship. Several attempts to determine a K_g/K_o curve in the laboratory failed because of the tightness of the core samples. Reasonable theoretical K_g/K_o curves could not be estimated for the same reason.

At the present time, the lease operator is conducting a gas-injection program on the property. The project was started July 1, 1965, with the reinjection of lease-produced gas into four wells (fig. 3). Lease injection volumes have averaged 400,000 to 500,000 cubic feet per day since the project was begun.

To date, there has been gas breakthrough in several producing wells, including well P-7. The rapidity with which breakthrough occurred in some wells seems to indicate at least partial communication between injection and producing wells. The communication may possibly be through joints or hydraulically induced fractures. An east-west trend in the direction of communication has also been observed.

After 14 months of gas injection, no production increase was noted. In the last few months, however, the rate of decline of oil production has been partially arrested. A program to decrease the high producing gas-oil ratios in order to conserve reservoir energy was recently initiated by selectively choking back some producers.

SUMMARY

Because of the inherent inefficiency of the solution-gas drive, primary recovery will be only a fraction of the oil reserves in the Big Injun sand, and more than 90 percent of the oil will be left behind in the reservoir. Secondary recovery by waterflooding is precluded by the relative oil-water permeability characteristics of the sand, and a prediction of secondary recovery by gas injection could not be made because essential reservoir data were not available. In order to stimulate oil production, the Kaufman lease operator is currently reinjecting natural gas into the producing formation.

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APPENDIX A.--CORE ANALYSIS DATA FOR KAUFMAN WELL P-7

TABLE A-1. - Core analysis results, Kaufman well P-7

Sample	Depth, ft	Air permeability, md	Porosity, pct	Fluid saturation, percent pore space		Oil content, bbl/acre-ft	Salinity, equivalent NaCl, ppm
				Oil	Water		
1,304	2,140.0	<0.1	0.1	(1)	(1)	(1)	(1)
1,305	2,141.0	<.1	.6	-	-	-	-
1,306	2,142.0	<.1	.6	-	-	-	-
1,307	2,148.9	<.1	.1	-	-	-	-
1,308	2,150.4	<.1	4.9	-	-	-	-
1,309	2,151.0	<.1	5.1	-	-	-	-
1,310	2,151.4	<.1	4.5	-	-	-	200,000
1,311	2,152.6	<.1	6.3	-	-	-	-
1,312	2,161.0	<.1	5.4	-	-	-	194,000
1,313	2,165.0	<.1	.4	-	-	-	200,000
1,314	2,165.6	.5	1.7	-	-	-	159,000
1,315	2,166.0	<.1	1.5	-	-	-	-
1,316	2,166.4	<.1	1.5	-	-	-	-
1,317	2,167.0	<.1	2.1	-	-	-	-
1,318	2,167.4	<.1	1.6	-	-	-	-
1,319	2,168.0	<.1	1.9	-	-	-	-
1,320	2,168.5	<.1	.6	-	-	-	146,000
1,321	2,169.0	.2	3.2	8.8	17.1	23	-
1,322	2,169.6	.3	3.5	-	-	-	-
1,323	2,170.2	.2	5.4	4.3	27.8	18	-
1,324	2,170.9	.2	6.3	1.8	16.9	9	13,000
1,325	2,171.5	.1	6.1	4.0	31.8	19	-
1,326	2,172.0	.5	8.1	-	-	-	-
1,327	2,172.5	.3	5.7	-	-	-	-
1,328	2,173.0	.3	5.3	21.4	12.8	90	317,000
1,329	2,174.0	.2	5.3	-	-	-	-
1,330	2,175.0	<.1	4.0	4.9	75.1	-	-
1,331	2,175.5	<.1	2.6	-	-	-	-
1,332	2,177.0	.5	2.4	-	-	-	116,000
1,333	2,177.8	<.1	1.8	-	-	-	-
1,334	2,178.2	.1	11.6	-	-	-	-
1,335	2,179.0	.8	11.6	5.7	63.5	52	-
1,336	2,179.4	1.7	11.9	.1	52.0	1	-
1,337	2,180.0	<.1	3.5	-	-	-	178,000
1,338	2,180.5	.6	12.7	-	-	-	-
1,339	2,181.0	<.1	2.9	-	-	-	-
1,340	2,182.0	.1	12.4	3.5	70.1	35	-
1,341	2,182.5	.4	14.8	-	-	-	-
1,342	2,183.0	.2	11.9	-	-	-	176,000
1,343	2,184.0	<.1	7.8	-	-	-	-
1,344	2,185.0	.1	13.3	2.1	73.9	22	-
1,345	2,186.0	.1	11.5	2.1	85.2	20	188,000
1,346	2,187.0	<.1	2.6	-	-	-	-
1,347	2,188.0	<.1	2.6	-	-	-	-
1,348	2,189.0	.2	13.5	3.1	69.9	34	190,000
1,349	2,190.0	<.1	12.0	3.2	77.0	31	-
1,350	2,191.0	.4	14.3	14.3	56.7	160	-
1,351	2,192.0	<.1	5.2	4.6	80.7	19	200,000
1,352	2,193.0	.5	16.5	9.6	61.3	124	-
1,353	2,194.0	1.0	16.5	11.0	61.5	142	-
1,354	2,195.0	.6	16.5	8.7	61.4	113	188,000
1,355	2,196.0	1.2	15.4	8.6	67.2	104	-
1,356	2,197.0	1.1	15.5	8.8	67.9	106	-
1,357	2,198.0	1.0	15.6	9.4	64.8	115	184,000
1,358	2,199.0	.5	15.2	9.2	68.5	109	-
1,359	2,200.0	.8	16.4	8.9	61.9	115	-
1,360	2,201.0	1.1	15.0	10.3	63.9	120	183,000
1,361	2,201.7	1.8	15.5	8.0	64.6	97	-
1,362	2,209.0	.1	13.1	-	-	-	-
1,363	2,212.0	.1	10.2	-	-	-	-
Average	-	.4	9.3	7.1	58.1	70	159,000

[1]No test run.

APPENDIX B.--RECOMMENDED ANALYSES FOR PRESSURE-VOLUME-TEMPERATURE SAMPLES AT PRESSURES BELOW ORIGINAL RESERVOIR PRESSURE

The following tests are considered necessary for maximum use of pressure-volume-temperature (PVT) data in reservoir calculations:

(If the PVT sample is saturated, record test data relative to oil at reservoir temperature and pressure at sampling time; if not saturated, relate the data to oil at saturation pressure and reservoir temperature.)

1. Differential liberation at reservoir temperature at different pressures, including liberated gas, gas specific gravity and compressibility, and oil shrinkage factors.

2. Flash separation of sample oil in 0, 25, 50, and 100 psig separators, recording separator GOR, oil shrinkage, and oil API gravity.

3. Pressure-volume relationship at reservoir temperature, including thermal expansion.

4. Oil viscosity at various pressures, and oil compressibility over several pressure ranges.

The foregoing PVT analysis data can then be adjusted to original reservoir conditions for use in reservoir calculations (1).

APPENDIX C.--PRESSURE-VOLUME-TEMPERATURE ANALYSIS ADJUSTMENT PROCEDURE

Given a PVT analysis taken at a pressure lower than initial conditions, the procedure and equations outlined below (1) can be used to adjust the PVT data to original reservoir conditions.

Given

p_i = estimated original reservoir pressure = 700 psig,

p_s = reservoir pressure at PVT sampling time = 468 psig,

p = some lower pressure = 400 psig,

T_r = reservoir temperature = 74° F,

G_{1s} = differentially liberated gas from p_s to p = 25 scf per bbl of saturated oil at p_s, T_r,

G_1 = adjusted gas value, scf per bbl of saturated oil at p_i, T_r,

B_o/B_{os} = differential shrinkage factor, bbl saturated oil at p per bbl saturated oil at p_s, T_r,

B_o/B_{oi} = adjusted differential shrinkage factor, bbl saturated oil at p per bbl saturated oil at p_i, T_r,

B_o = adjusted formation volume factor, bbl saturated oil at p per bbl stock-tank oil,

SF = adjusted flash shrinkage factor, stb oil per bbl initial reservoir oil,

CGV = corrective gas volume, cu ft gas per bbl oil at p_s, T_r,

COV = corrective oil volume, bbl oil at p_i, T_r per bbl oil at p_s, T_r.

Find

$$CGV = \frac{p_i - p}{p_s - p}(G_{1s}) \qquad (1)$$

$$= \frac{700 - 468}{468 - 400}(25)$$

$$= 85 \text{ scf,}$$

$$COV = 1 + \left[\left(\frac{p_i - p_s}{p_s - p}\right) \left[(B_o/B_{os} \text{ at } p_s) - (B_o/B_{os} \text{ at } p)\right]\right] \quad (2)$$

$$= 1 + \left[\left(\frac{700 - 468}{468 - 400}\right) \left[1.0000 - 0.9920\right]\right]$$

$$= 1.027 \text{ bbl at } p_i, T_r/\text{bbl at } p_s, T_r,$$

$$G_1 = \frac{G_{1s} + CGV}{COV}, \quad (3)$$

$$B_o/B_{oi} = \frac{B_o/B_{os}}{COV}, \quad (4)$$

$$B_o = \frac{B_o/B_{oi}}{SF}. \quad (5)$$

This adjustment procedure is applied to Kaufman well P-7 in table C-1.

TABLE C-1. - Original and adjusted pressure-volume-temperature analyses data, Kaufman well P-7

Reservoir pressure, psig[1]	G_{1s}[1]	G_1[2]	B_o/B_{os}[1]	B_o/B_{oi}[2]	B_o[2]
700.....	-	0	-	1.000	1.264
468.....	4	87	1.0000	.974	1.231
450.....	10	92	.9976	.971	1.228
400.....	29	111	.9920	.966	1.221
300.....	68	149	.9752	.950	1.201
200.....	112	192	.9556	.930	1.176
100.....	166	244	.9306	.906	1.145
0.....	340	414	.8193	.798	1.009

[1] Original PVT analysis data.
[2] Adjusted values.

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Section 9

Operating Requirements

Section No. 9

The current operating conditions of this disposal well are:

Average daily volume – 2 bbl.

Maximum daily rate- 50 bbl.

Average daily injection pressure 380 psig

Maximum injection pressure – 686 psig

2. The attached Appendix G lists the wells served by this disposal well

3. The injection fluid was sampled and analyzed for the required constituents. A copy of the analysis is enclosed in Fig No. 10.

4. Currently no additives are utilized in the injection fluid.

5. The tubing / casing annulus is filled with fresh water and packer fluid (corrosion inhibitor (1 gal /1000 gal fresh water)). The MSDS for Baker CRW 1321 (packer fluid) is attached in Fig No. 11.

6. In the event of the discovery of a well failure the injection well will immediately be shut in. The surface casing in this injection well is set at 466' and cemented to surface. The depth of this casing is well below any USDW in the area. If there is a failure in the injection string (tubing) there will still be three levels of protection between the injection fluid and any USDW. These three layers are the 4 ½" casing, 8 5/8" casing, and the cement outside of the 8 5/8" casing. The tubing / casing annulus is shut in with approximately 25 psig held. The well tender checks this pressure when he visits the well. Any failure will be quickly noticed and the well shut in. In the event of a mechanical integrity failure that cannot be repaired immediately the produced water will either be disposed of in a commercial disposal well or the producing wells shut in until the well can be repaired.

NOT APPLICABLE

APPENDIX F

Area Permit Wells

API #	Well Type (Injection, Production, Observation, Monitoring)	Well Status (Active, Abandoned, Shut-in, Plugged)	Northing (UTM NAD 83 Meters)	Easting (UTM NAD 83 Meters)
N/A	N/A	N/A	N/A	N/A

Make as many copies as necessary and include page numbers as appropriate.

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	Appendix G		
	Wells Serviced by Injection Wells		
API #	Operator	Well No.	Producing Formation
47-087-03022	Delta Helix Energy, LLC	1	Big Injun
47-087-01955	Delta Helix Energy, LLC	6	Big Injun
47-087-04492	Delta Helix Energy, LLC	601	Big Injun
47-087-02435	Delta Helix Energy, LLC	4	Devonian Shale
47-087-03050	Delta Helix Energy, LLC	1	Big Injun
47-087-02436	Delta Helix Energy, LLC	5	Big Injun
47-087-02994	Delta Helix Energy, LLC	6	Big Injun
47-087-03032	Delta Helix Energy, LLC	7	Big Injun
47-087-03247	Delta Helix Energy, LLC	8	Big Injun
47-087-03035	Delta Helix Energy, LLC	10	Big Injun
47-087-03033	Delta Helix Energy, LLC	11	Big Injun
47-087-02993	Delta Helix Energy, LLC	15	Big Injun
47-087-02438	Delta Helix Energy, LLC	17	Big Injun
47-087-02439	Delta Helix Energy, LLC	18	Big Injun
47-087-00913	Delta Helix Energy, LLC	21	Big Injun
47-087-01076	Delta Helix Energy, LLC	23	Big Injun
47-087-03076	Delta Helix Energy, LLC	2	Big Injun
47-087-02980	Delta Helix Energy, LLC	3	Big Injun
47-087-03075	Delta Helix Energy, LLC	4	Big Injun
47-087-02995	Delta Helix Energy, LLC	14	Big Injun
47-087-01872	Delta Helix Energy, LLC	16	Big Injun
47-087-01927	Delta Helix Energy, LLC	17	Big Injun
47-087-01962	Delta Helix Energy, LLC	18	Big Injun
47-087-01953	Delta Helix Energy, LLC	19	Big Injun
47-087-00970	Delta Helix Energy, LLC	W-2	Big Injun
47-087-00971	Delta Helix Energy, LLC	W-3	Big Injun
47-087-00978	Delta Helix Energy, LLC	W-4	Big Injun
47-087-00984	Delta Helix Energy, LLC	W-5	Big Injun
47-087-00987	Delta Helix Energy, LLC	W-6	Big Injun
47-087-00988	Delta Helix Energy, LLC	W-8	Big Injun
47-087-00992	Delta Helix Energy, LLC	W-10	Big Injun
47-087-00993	Delta Helix Energy, LLC	W-11	Big Injun
47-087-00994	Delta Helix Energy, LLC	W-12	Big Injun
47-087-00995	Delta Helix Energy, LLC	W-13	Big Injun
47-087-00996	Delta Helix Energy, LLC	W-14	Big Injun
47-087-01004	Delta Helix Energy, LLC	W-15	Big Injun
47-087-01032	Delta Helix Energy, LLC	W-16	Big Injun
47-087-01053	Delta Helix Energy, LLC	W-17	Big Injun
47-087-01055	Delta Helix Energy, LLC	W-18	Big Injun
47-087-01068	Delta Helix Energy, LLC	W-20	Big Injun

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	Appendix G		
	Wells Serviced by Injection Wells		
API #	Operator	Well No.	Producing Formation
47-087-01079	Delta Helix Energy, LLC	W-21	Big Injun
47-087-02981	Delta Helix Energy, LLC	4	Big Injun
47-087-00894	Delta Helix Energy, LLC	5	Big Injun
47-087-00909	Delta Helix Energy, LLC	6	Big Injun
47-087-00963	Delta Helix Energy, LLC	7	Big Injun
47-087-01923	Delta Helix Energy, LLC	29	Big Injun
47-087-04489	Delta Helix Energy, LLC	604	Big Injun
47-087-04490	Delta Helix Energy, LLC	605	Big Injun
47-087-04491	Delta Helix Energy, LLC	606	Big Injun
47-087-02578	Delta Helix Energy, LLC	3	Devonian Shale
47-087-03040	Delta Helix Energy, LLC	1	Big Injun
47-087-00027	Delta Helix Energy, LLC	2	Big Injun
47-087-03041	Delta Helix Energy, LLC	3	Big Injun
47-087-01026	Delta Helix Energy, LLC	5	Big Injun
47-087-01095	Delta Helix Energy, LLC	6	Big Injun
47-087-01096	Delta Helix Energy, LLC	7	Big Injun
47-087-04493	Delta Helix Energy, LLC	602	Big Injun
47-087-00565	Delta Helix Energy, LLC	2	Big Injun
47-087-02743	Delta Helix Energy, LLC	3	Big Injun
47-087-03061	Delta Helix Energy, LLC	6	Big Injun
47-087-03030	Delta Helix Energy, LLC	10	Big Injun
47-087-03047	Delta Helix Energy, LLC	11	Big Injun
47-087-02988	Delta Helix Energy, LLC	12	Big Injun
47-087-03013	Delta Helix Energy, LLC	13	Big Injun
47-087-03053	Delta Helix Energy, LLC	14	Big Injun
47-087-03048	Delta Helix Energy, LLC	15	Big Injun
47-087-03045	Delta Helix Energy, LLC	17	Big Injun
47-087-03029	Delta Helix Energy, LLC	19	Big Injun
47-087-03031	Delta Helix Energy, LLC	23	Big Injun
47-087-02986	Delta Helix Energy, LLC	24	Big Injun
47-087-00889	Delta Helix Energy, LLC	26	Big Injun
47-087-01027	Delta Helix Energy, LLC	27	Big Injun
47-087-01072	Delta Helix Energy, LLC	28	Big Injun
47-087-01086	Delta Helix Energy, LLC	29	Big Injun
47-087-01873	Delta Helix Energy, LLC	31	Big Injun
47-087-01954	Delta Helix Energy, LLC	32	Big Injun
47-087-02082	Delta Helix Energy, LLC	33	Big Injun

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Kaufman W-7 & W-19 Injection / Production Facility Quarterly Inspection

To be performed first day of each calendar quarter

Date 10-23-24

Person performing inspection Dakota C.

Produced water tanks

Gas vents ✓ Gas Blanket supply, regulator, piping N/A

Produced water Injection Pump

Suction/discharge piping ✓ Bypass Regulator & line ✓

Water meter ✓ Pressure recorder ✓

Separator

Vessel ✓ Piping ✓ Dump Valves ✓ Regulator ✓

Oil Storage tanks

Tanks ✓ Piping ✓

Items needing attention:

Copies to Forman and Parkersburg office

STEP RATE TEST
1987

RECEIVED
JAN 04 1988
DIVISION OF OIL & GAS
DEPARTMENT OF ENERGY

UIC PERMIT UIC2DO870985

WELLHEAD PRESSURE INCREASE JUSTIFICATION

W. M. KAUFMAN NO. W-7

CLOVER FIELD - BIG INJUN RESERVOIR

PENNZOIL PRODUCTS COMPANY

EXPLORATION & PRODUCTION DIVISION

NOEL W. PUTSCHER

DECEMBER 29, 1987

INTRODUCTION

The purpose of this report is to provide test data to the West Virginia Department of Energy, Division of Oil & Gas, which justifies increasing wellhead injection pressure on Roane 0985 from 694 psig to 1000 psig. The West Virginia Department of Energy recently issued an Underground Injection Control permit for Roane 0985 which limited surface pressure to 694 psig. Pennzoil Products Company, operator of subject well, performed a step-rate test to determine the pressure at which the Big Injun would part in the subject well.

DISCUSSION

A step-rate injectivity test is normally used to estimate fracture pressure in an injection well.[1] Fluid is injected at a series of increasing rates, with each rate preferably lasting the same length of time. In relatively low permeability formations (k <5md) each injection rate should last about 1 hour; 30 minute injection times are adequate for formations with permeability exceeding 10 md. As few as four rates may be used, but normally six, seven or eight rates are preferred. The analysis consists of plotting injection pressure at the end of each rate vs injection rate. It is preferable to plot bottom-hole pressure, but surface pressure may be used if it is positive throughout the test and friction effects are not significant. The plot should have two straight line segments. The break in the line indicates formation fracture pressure.

TEST RESULTS

On December 16, 1987, a step-rate test was run on Roane 0985. The initial pressure was 545 psi and was increased to 1160 psig, with five points in between. With each rate increase the pressure was read after at least one hour had passed. The results of this test are attached and the parting pressure was found to be 1104 psig. Pennzoil is requesting permission to inject into subject well at a wellhead pressure of 1000 psig.

1 Robert C. Earlougher, Jr., Advances in Well Test Analysis Monograph Series, Society of Petroleum Engineers of AIME, Dallas (1977), Vol. 5, Chapter 7.

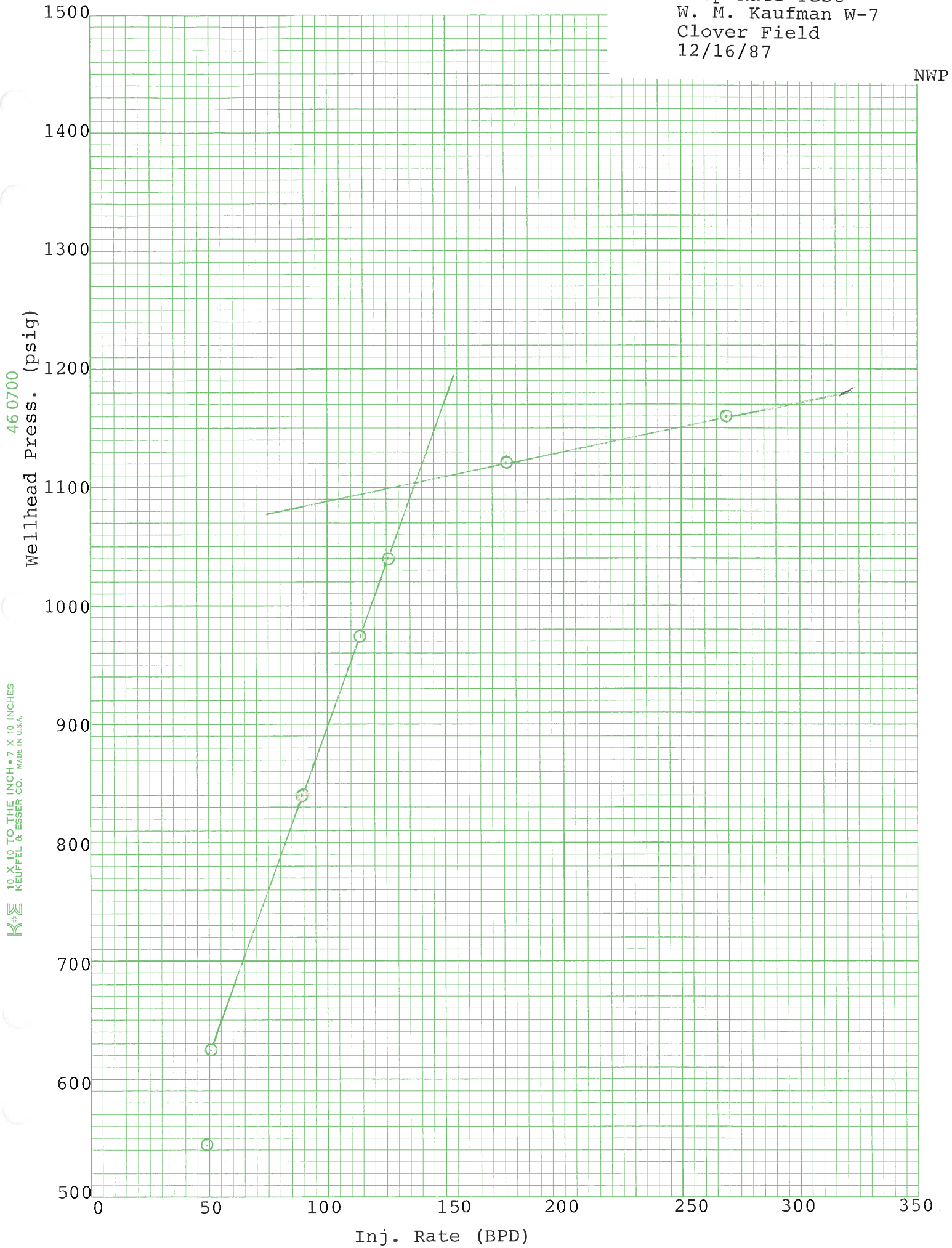
STEP RATE TEST

W. M. Kaufman W-7
Clover Field
12/16/87

WHP Press. (psig)	Rate (BPD)
545	49
625	51
840	89
975	114
1040	126
1120	176
1160	269

Step Rate Test
W. M. Kaufman W-7
Clover Field
12/16/87

NWP



4708701056

WR-37
12/23/19

WV DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS
PRE-OPERATION CERTIFICATE FOR LIQUID INJECTION
MECHANICAL INTEGRITY TEST RECORD

MIT Date: 7/29/20
Operator's Well Name / #: W M Kaufman W-19
API#: 47- 087 - 01056
UIC Permit #: 2D08701056002
Field Name (2R only):

WELL OPERATOR H G Energy LLC
Address: 5260 Dupont Rd
Parkersburg, WV 26101

DESIGNATED AGENT Diane White
Address: 5260 Dupont Rd
Parkersburg, WV 26101

INJECTION FORMATION Big Injun Depth 2202 feet (top) to 2235 feet (bottom)
Perforation Interval 2209'-2220 or Open Hole Interval

INJECTION PERMIT TYPE
☐ 2D Commercial Disposal ☑ 2D Non-Commercial Disposal ☐ 2R Area Permit (EOR) ☐ 3S Solution Mining

INJECTATE TYPE (Check all that apply):
☑ Produced Water ☐ Fresh Water ☐ Completion Flowback Water ☐ Tank & Pipeline Residuals
☐ Drilling Waste Liquids ☐ Solution Mining Waste ☐ Gas (2R) ☐ Other (Specify)
Additives (ie. biocides, inhibitors, etc.) Bactericides and other chemicals necessary to maintain water quality or improve recovery

WELL CONSTRUCTION / CASING PROGRAM

CASING OR TUBING TYPE	SIZE	GRADE	WEIGHT PER FT.	NEW	USED	FOOTAGE USED IN DRILLING	FOOTAGE LEFT IN WELL	CEMENT USED
CONDUCTOR	10 3/4					9	9	CTS
FRESH WATER	8 5/8	H-40	28			466	466	CTS
COAL								
INTERMEDIATE								
PRODUCTION	4 1/2	K-55	9.5	X		2272	2272	45 sks
TUBING	2 3/8	K-55	4.6	X		2103	2103	
LINERS								

PACKER	TYPE: Tension	SIZE: 4" x 2"	DEPTH: 2103'

MECHANICAL INTEGRITY TEST TYPE
☑ Standard Annulus Pressure Test
Is Test Annulus Filled? ☑ Yes ☐ No If Yes, Specify Fluid Type? fresh water and packer fluid
☐ Pump Line Test ☐ Other (Specify)

MAXIMUM PERMITED WELLHEAD INJECTION PRESSURE 686 psi **MIT PRESSURE** 1029 psi

MECHANICAL INTEGRITY TEST DESCRIPTION
Pressure tested tubing / casing annulus to 1200 psig for 32 minutes. Chart Attached

(2R Area Permits: If multiple pump lines are tested together, please list wells serviced by the tested pump lines.)

4708701056

WR-37
12/23/19

API#: 47-087 - 01056

NOTE:

- If the well and the pump line are tested together the MIT pressure must be 1.5 times the maximum permitted injection pressure held for a minimum of 20 minutes with no more than a 5% loss.
- If the well is tested separately, the MIT pressure must be 1.5 times the maximum permitted injection pressure held for a minimum of 20 minutes with no more than a 5% loss.
- If the pump line is tested separately, the MIT pressure shall be the maximum permitted injection pressure plus 100 psi held for a minimum of 20 minutes with no more than a 5% loss. Multiple pump lines can be tested together.
- All MITs must be witnessed by a state inspector. A valid recording chart containing the inspector's signature must accompany this completed form.
- All MITs that fail must be submitted using this form and chart.
- Submit all MIT required documentation to OOG within 30 days of test.
- The mechanical integrity of this well must be demonstrated at least 5 years from this test date and each time work is completed on the well or pump line to continue injection.

The undersigned certify:

The MIT was performed on 7/29/20
The well and/or pump line:
☑ demonstrated mechanical integrity or ☐ failed to demonstrate mechanical integrity.

The MIT was witnessed by Joe Taylor, Inspector WVDEP - Office of Oil and Gas.

H G Energy LLC
Permit Holder Company Name

7/31/20
Date

Roger Heldman
Agent or Responsible Party (Print Name)

Signature

Operations Manager
Title

----------**Office of Oil and Gas Use Only:**----------

THIS WELL IS AUTHORIZED FOR INJECTION
UP TO A MAXIMUM WELLHEAD INJECTION PRESSURE OF _____ psi

Special Conditions:

_____

_____

_____

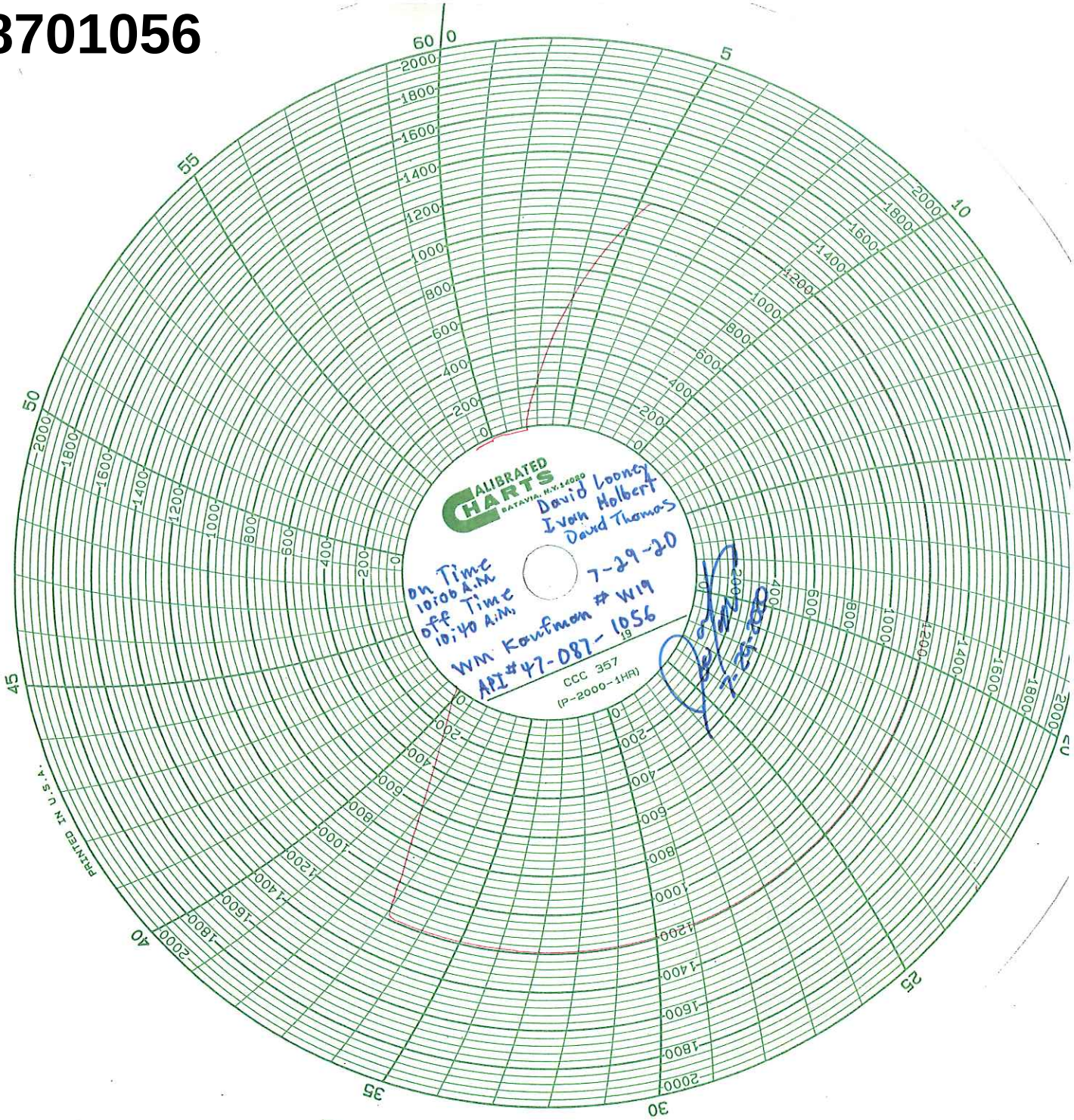
_____

_____

UIC Program Manager
WVDEP-Office of Oil and Gas

Date

4708701056


CALIBRATED CHARTS
BATAVIA, N.Y. 14020
David Looney
Ivan Holbert
David Thomas
On Time
10:00 A.M.
Off Time
10:40 A.M.
7-29-20
WM Kaufman # W19
API #47-087-1056
19
CCC 357
(P-2000-1HR)
7-29-2020
PRINTED IN U.S.A.

Section 10

Monitoring

Section No. 10

Pressure and injection volumes are monitored daily for this injection well. These volumes and pressure are recorded by the well tender and reported to his supervisor weekly. In the event the well tender discovers an issue with the injection well or any of the associated facilities he will contact his supervisor immediately to get the issue resolved. The injection information is reported to the WVDEP monthly on Form WR-40. This process has worked successfully for the 30 years this well has been utilized as a disposal well.

Currently the vast majority of the fluid injected at this well is transported by pipeline to the storage tank that serves this injection well. A small portion of the fluid is transported by a small truck with a 500 gal tank from some of the more remote producing wells in this field to the storage tank that serves this injection well. The volumes are recorded and reported weekly. The only fluids injected at this well are those transported via pipeline or small truck from Company operated wells in this field.

INJECTATE ANALYSES
4708701056

FIGURE # 10

W M Kaufman W-7 (2D0870095) & W M Kaufman W-19 (2D08701056)
Injection fluid

Paramater	units	
Chloride	mg/L	125,000
Bromide	mg/L	1,030
Strontium	mg/L	515
Barium	mg/L	174
Iron	mg/L	45.3
Total Dissolved Solids	mg/L	202,000
pH	SI Units	5.62
Specific Gravity		1.132
Manganese	mg/L	1.8
Aluminum	mg/L	0.29
Arsenic	mg/L	0.20
Sodium	mg/L	46,100
Calcium	mg/L	15,300
Sulfate	mg/L	5,000
Radium 226	pCi/L	2.54
Radium 228	pCi/L	11
Gross Alpha	pCi/L	1,685
Gross Beta	pCi/L	1,067

TABLE 1B. Chemical water quality for station (KPW) associated with ~~HG~~ Delta Helix Energy's Kaufman Water. Kirk Environmental, LLP., October 31, 2024.

PARAMETER	SAMPLING STATION KAUFMAN WATER (KPW)
Field Water Temperature (°C)	18.5
Field Dissolved Oxygen (mg/L)	2.44
Field pH (SI Units)	5.62
Field Conductivity (mS)	> 150
DRO (C10-C28)	6.4
ORO (C20-C40)	< 4.0
TPH (C06-C10)	1420
Aluminum (mg/L)	0.29
Arsenic (mg/L)	< 0.20
Barium (mg/L)	174
Calcium (mg/L)	15300
Total Iron (mg/L)	45.3
Manganese (mg/L)	1.8
Sodium (mg/L)	46100
Strontium (mg/L)	515
Benzene (ug/L)	157
Toluene (ug/L)	79.9
Ethylbenzene (ug/L)	3.3
Xylene Total (ug/L)	53.6
TDS (mg/L)	202000
TSS (mg/L)	90.0
Chloride (mg/L)	125000
Bromide (mg/L)	1030
Sulfate (mg/L)	< 5000
TOC (mg/L)	66.7
Gross Alpha (pCi/L)	1,685
Gross Beta (pCi/L)	1,067
Radium-226 (pCi/L)	2.54
Radium-228 (pCi/L)	11.0
56	1,132

Kaufman W-7 & W19 Injectate

GEOCHEMICAL TESTING
Environmental and Energy Analysis

2005 N. Center Ave.
Somerset, PA 15501

814/443-1671
814/445-6666
FAX: 814/445-6729

Thursday, November 7, 2024

Beth Johnson
REIC A DIVISION OF PACE ANALYTICAL
SERVICES LLC
PO BOX 286
225 INDUSTRIAL PARK ROA
BEAVER, WV 25813

Order No.: G2411144

Dear Beth Johnson:

Geochemical Testing received 1 sample(s) on 11/5/2024 for the analyses presented in the following report.

There were no problems with sample receipt protocols and analyses met the TNI/NELAC, EPA, and laboratory specifications except where noted in the Case Narrative or Laboratory Results.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Joelle Streczywilk
Environmental Laboratory Manager

Leslie A. Nemeth
Project Manager

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306PA DEP

Glossary (continued)

1 Spike recovery limits are not applicable when the sample concentration exceeds the spike concentration by a factor of four or greater.

B1 Dilution water blank exceeded method criterion.

C1 CCV recovery above the acceptance limits. Results may be biased high.

C2 CCV recovery below the acceptance limits. Results may be biased low.

C3 ICV recovery above the acceptance limits. Results may be biased high.

C4 ICV recovery below the acceptance limits. Results may be biased low.

C5 Positive values verified by second column confirmation.

C6 Confirmation analysis by another detector or chromatographic column was not performed.

D1 The analysis did not meet the minimum DO depletion of at least 2 mg/L.

D2 The analysis did not meet the minimum residual DO of at least 1 mg/L.

D3 Sample required dilution due to a matrix interference.

D4 Sample was diluted in the extraction steps due to marked matrix interferences.

D5 Sample required dilution due to a chloride interference.

D6 Sample was diluted and the reporting limits were raised to achieve method compliant internal standard recovery.

D7 Sample was digested at a dilution due to the formation of a post-digestion precipitate.

8 Sample was digested at a dilution to achieve method compliant matrix spike recovery.

D9 Sample was digested at a dilution to meet method compliant digestion criteria.

E2 Unable to obtain a stable weight within specified limits due to sample matrix. Value is estimated.

F1 Fecal sample tested positive for residual chlorine.

H1 Due to under-depletion from the initial dilutions for BOD, the sample was reanalyzed outside the hold time.

H2 Due to over-depletion from the initial dilutions for BOD, the sample was reanalyzed outside the hold time.

H3 Sample was re-analyzed outside of hold time due to error during original analysis.

H4 The Nitrite result used to report Nitrate was analyzed past the 48-hour holding time.

I1 Internal standard recovery above method acceptance limits. Results are estimated.

I2 Internal standard recovery was below method acceptance limits. Results are estimated.

IP One of the instrument performance checks ( ) did not meet the acceptance criteria.

L1 LCS above the acceptance limits. Result may be biased high.

L2 LCS below the acceptance limits. Result may be biased low.

L3 Analyte was spiked into the LCS, but was not recovered.

M1 Matrix Spike recovery above the acceptance limits.

M2 Matrix Spike recovery below the acceptance limits.

4 The matrix spike failed high for the surrogate.

M5 The matrix spike failed low for the surrogate.

M6 The reporting limits were raised due to sample matrix interference.

M7 Recovery for matrix spike could not be quantified due to matrix interference.

M8 Analyte was spiked into the MS, but was not recovered.

M9 Analyte concentration was determined by the method of standard addition (MSA).

N1 The lab does not hold accreditation from PA-DEP for this parameter by this method

N2 PADEP does not accredit labs for this analyte by this method.

N3 The lab is accredited for this method in West Virginia, but not in PA (its primary accrediting body).

N4 PADEP does not accredit labs for this analyte by this method in drinking water.

O1 The flashpoint tester cannot detect below 50 degrees F.

O2 Result is temperature of the sample when flame observed. No flash observed. Result qualified.

O3 The reporting limits were raised due to the high concentration of non-target compounds.

O4 Sample was received with headspace.

O5 Sample was received in incorrect container and is not compliant with 40CFR136 Table II.

O6 Insufficient sample volume was received to comply with the method.

P1 The pH of the sample was >2 and is not compliant with 40CFR136 Table II.

P2 Sample contained residual chlorine and is not compliant with 40CFR136 Table II

P3 The pH of the sample was <10 and is not compliant with 40CFR136 Table II.

P4 Field preservation does not meet EPA or method recommendations for this analysis.

P5 Acid preservation may not be appropriate for the analysis of 2-Chloroethylvinyl ether.

P6 Sample required additional preservative upon receipt.

P7 The sample was received unpreserved.

P8 The pH of the sample was < 9 and is not compliant with 40 CFR136 Table II.

R Relative Percent Difference (RPD) was above the control limit.

R1 RPD above control limits between matrix spike and MS duplicates.

R2 RPD above the control limit between duplicates.

R3 RSD above the control limit between replicates.

R4 RPD above control limits between Inorganic Carbon check and spike.

R5 RPD above control limits between control sample and control sample duplicates.

S2 Surrogate recovery in the blank was below the control limit.

S3 Surrogate recovery in the blank was above the control limit.

S4 Surrogate recovery in the LCS is above the control limit.

S5 Surrogate recovery in the LCS is below the control limit.

SR Analyte recovery was outside the accepted recovery limits and above the control limit for RPD.

T3 Target analyte found in trip/field blank.

TC The MS tune check (tailing factor) did not meet the acceptance criteria.

Geochemical Testing

Date: *07-Nov-24*

CLIENT: REIC A DIVISION OF PACE ANALYTIC
Project:
Lab Order: G2411144

CASE NARRATIVE

No problems were encountered during analysis of this workorder, except if noted in this report.

Under West Virginia's Laboratory Certification Program, Geochemical Testing's Laboratory Certificate I.D. is 141.

Glossary:

H - Method Hold Time exceeded and is not compliant with 40CFR136 Table II.
U - The analyte was not detected at or above the listed concentration, which is below the laboratory quantitation limit.
B - Analyte detected in the associated Method Blank
Q1 - See case narrative ND - Not Detected
MCL - Contaminant Limit J - Indicates an estimated value.
Q - Qualifier QL -Quantitation Limit DF - Dilution Factor

S - Surrogate Recovery outside accepted recovery limits
T - Sample received above required temperature and is not compliant with 40CFR136 Table II.
T1 - Sample received above required temperature
MDA - Minimum Detectable Activity.
** - Value exceeds Action Limit
TICs - Tentatively Identified Compounds.
E - Value above quantitation range

ACCREDITED IN ACCORDANCE WITH nelac
I.D. 56-00306 PA DEP

Laboratory Results

Geochemical Testing

Date: *07-Nov-24*

CLIENT:	REIC A DIVISION OF PACE ANALYTIC	**Client Sample ID:**	30730511003
Lab Order:	G2411144		KPW
Project:		**Collection Date:**	10/31/2024 10:50:00 AM
Lab ID:	G2411144-001	**Sampled By:**	Pace
Matrix:	AQUEOUS	**DateReceived:**	11/5/2024 9:50:34 AM

Analyses	Result	Q	MDL	PQL	Units	DF	Date Prepared	Date Analyzed
SPECIFIC GRAVITY			Analyst: **MAG**					**ASTM D1429-08**
Specific Gravity	1.132		0.3000	0.300		1		11/06/24 8:07 AM

I.D. 56-00306 PA DEP

Delta Helix

TABLE 1C. Chemical water quality for stations (UKS) and (LKS) associated with ~~HG~~ Energy's Kaufman Sites. Kirk Environmental, LLP., October 31, 2024.

PARAMETER	SAMPLING STATION UKS	LKS
Field Water Temperature (°C)	13.0	12.8
Field Dissolved Oxygen (mg/L)	6.16	2.24
Field pH (SI Units)	7.32	6.54
Field Conductivity (µS)	632.4	351.5
Stream Flow (ft^3/s)	< 1 gpm	0.0
DRO (C10-C28)	< 0.19	< 0.20
ORO (C20-C40)	< 0.38	< 0.40
TPH (C06-C10)	< 200	< 200
Aluminum (mg/L)	0.087	< 0.020
Arsenic (mg/L)	< 0.020	< 0.020
Barium (mg/L)	0.19	0.22
Calcium (mg/L)	54.6	28.5
Total Iron (mg/L)	0.13	0.17
Manganese (mg/L)	0.16	0.40
Sodium (mg/L)	20.1	10.3
Strontium (mg/L)	0.35	0.21
Benzene (ug/L)	< 1.0	< 1.0
Toluene (ug/L)	< 1.0	< 1.0
Ethylbenzene (ug/L)	< 1.0	< 1.0
Xylene Total (ug/L)	< 3.0	< 3.0
TDS (mg/L)	247	150
TSS (mg/L)	15.0	15.0
Chloride (mg/L)	13.4	35.7
Bromide (mg/L)	< 0.10	0.13
Sulfate (mg/L)	28.8	10.9
TOC (mg/L)	4.2	4.0

UKS - upper Steam Sample

LKS - lower Steam Sample

Pace Analytical Services, LLC
225 Industrial Park RD
Beaver, WV 25813
(800)999-0105

Sample: KPW Injectate **Lab ID: 30730511003** Collected: 10/31/24 10:50 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 200.7	Arsenic	ND	mg/L	0.20	11/05/24 13:38	
EPA 200.7	Barium	**174**	mg/L	0.50	11/05/24 13:40	
EPA 200.7	Calcium	**15300**	mg/L	50.0	11/05/24 13:40	
EPA 200.7	Iron	**45.3**	mg/L	0.50	11/05/24 13:38	
EPA 200.7	Manganese	**1.8**	mg/L	0.050	11/05/24 13:38	
EPA 200.7	Sodium	**46100**	mg/L	500	11/06/24 18:23	
EPA 200.7	Strontium	**515**	mg/L	10.0	11/06/24 18:23	N2
SM 2540C-2015	Total Dissolved Solids	**202000**	mg/L	1000	11/01/24 18:20	
SM 2540D-2015	Total Suspended Solids	**90.0**	mg/L	5.0	11/01/24 11:16	
EPA 300.0, Rev 2.1	Bromide	**1030**	mg/L	100	11/20/24 22:08	
EPA 300.0, Rev 2.1	Chloride	**125000**	mg/L	1000	11/20/24 22:08	
EPA 300.0, Rev 2.1	Sulfate	ND	mg/L	5000	11/20/24 22:08	D3
SM 5310B-2014	Total Organic Carbon	**66.7**	mg/L	1.0	11/05/24 21:44	
	Collected By	**EK**			11/01/24 10:04	
	Field pH	**5.62**	Std. Units		11/01/24 10:04	
	Field Temperature, C	**18.5**	deg C		11/01/24 10:04	
	Field Specific Conductance	**>150 ms**	umhos/cm		11/01/24 10:04	
	Oxygen, Dissolved	**2.44**	mg/L		11/01/24 10:04	
EPA 8015C	TPH (C10-C28)	**6.4**	mg/L	2.0	11/11/24 21:14	
EPA 8015C	TPH (C28-C40)	ND	mg/L	4.0	11/11/24 21:14	CH
EPA 8015C	TPH (C06-C10)	**1420**	ug/L	200	11/04/24 17:16	
EPA 8260D	Benzene	**157**	ug/L	1.0	11/04/24 15:48	
EPA 8260D	Ethylbenzene	**3.3**	ug/L	1.0	11/04/24 15:48	
EPA 8260D	Toluene	**79.9**	ug/L	1.0	11/04/24 15:48	
EPA 8260D	Xylene (Total)	**53.6**	ug/L	3.0	11/04/24 15:48	

Sample: UKS Upper Steam **Lab ID: 30730511004** Collected: 10/31/24 11:20 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 200.7	Aluminum	**0.087**	mg/L	0.020	11/04/24 17:14	
EPA 200.7	Arsenic	ND	mg/L	0.020	11/04/24 17:14	
EPA 200.7	Barium	**0.19**	mg/L	0.0050	11/04/24 17:14	
EPA 200.7	Calcium	**54.6**	mg/L	0.50	11/04/24 17:14	
EPA 200.7	Iron	**0.13**	mg/L	0.050	11/04/24 17:14	
EPA 200.7	Manganese	**0.16**	mg/L	0.0050	11/04/24 17:14	
EPA 200.7	Sodium	**20.1**	mg/L	0.50	11/04/24 17:14	
EPA 200.7	Strontium	**0.35**	mg/L	0.010	11/04/24 17:14	N2
SM 2540C-2015	Total Dissolved Solids	**247**	mg/L	10.0	11/01/24 20:10	
SM 2540D-2015	Total Suspended Solids	**15.0**	mg/L	2.5	11/01/24 11:16	
EPA 300.0, Rev 2.1	Bromide	ND	mg/L	0.10	11/20/24 22:28	
EPA 300.0, Rev 2.1	Chloride	**13.4**	mg/L	1.0	11/20/24 22:28	
EPA 300.0, Rev 2.1	Sulfate	**28.8**	mg/L	5.0	11/20/24 22:28	
SM 5310B-2014	Total Organic Carbon	**4.2**	mg/L	1.0	11/05/24 22:35	
	Collected By	**EK**			11/01/24 10:07	
	Field pH	**7.32**	Std. Units		11/01/24 10:07	
	Field Temperature, C	**13.0**	deg C		11/01/24 10:07	
	Field Specific Conductance	**632.4**	umhos/cm		11/01/24 10:07	
	Oxygen, Dissolved	**6.16**	mg/L		11/01/24 10:07	
	Flow	**<1 gpm**			11/01/24 10:07	
EPA 8015C	TPH (C10-C28)	ND	mg/L	0.19	11/07/24 04:55	
EPA 8015C	TPH (C28-C40)	ND	mg/L	0.38	11/07/24 04:55	
EPA 8015C	TPH (C06-C10)	ND	ug/L	200	11/04/24 17:52	
EPA 8260D	Benzene	ND	ug/L	1.0	11/04/24 14:57	
EPA 8260D	Ethylbenzene	ND	ug/L	1.0	11/04/24 14:57	
EPA 8260D	Toluene	ND	ug/L	1.0	11/04/24 14:57	
EPA 8260D	Xylene (Total)	ND	ug/L	3.0	11/04/24 14:57	

Pace Analytical Services, LLC
225 Industrial Park RD
Beaver, WV 25813
(800)999-0105

Sample: LKS Lower Steam **Lab ID: 30730511005** Collected: 10/31/24 12:20 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 200.7	Aluminum	ND	mg/L	0.020	11/04/24 17:16	
EPA 200.7	Arsenic	ND	mg/L	0.020	11/04/24 17:16	
EPA 200.7	Barium	**0.22**	mg/L	0.0050	11/04/24 17:16	
EPA 200.7	Calcium	**28.5**	mg/L	0.50	11/04/24 17:16	
EPA 200.7	Iron	**0.17**	mg/L	0.050	11/04/24 17:16	
EPA 200.7	Manganese	**0.40**	mg/L	0.0050	11/04/24 17:16	
EPA 200.7	Sodium	**10.3**	mg/L	0.50	11/04/24 17:16	
EPA 200.7	Strontium	**0.21**	mg/L	0.010	11/04/24 17:16	N2
SM 2540C-2015	Total Dissolved Solids	**150**	mg/L	10.0	11/01/24 20:11	
SM 2540D-2015	Total Suspended Solids	**15.0**	mg/L	2.5	11/01/24 11:16	
EPA 300.0, Rev 2.1	Bromide	**0.13**	mg/L	0.10	11/20/24 12:55	
EPA 300.0, Rev 2.1	Chloride	**35.7**	mg/L	1.0	11/20/24 12:55	
EPA 300.0, Rev 2.1	Sulfate	**10.9**	mg/L	5.0	11/20/24 12:55	
SM 5310B-2014	Total Organic Carbon	**4.0**	mg/L	1.0	11/05/24 22:52	
	Collected By	**EK**			11/01/24 10:08	
	Field pH	**6.54**	Std. Units		11/01/24 10:08	
	Field Temperature, C	**12.8**	deg C		11/01/24 10:08	
	Field Specific Conductance	**351.5**	umhos/cm		11/01/24 10:08	
	Oxygen, Dissolved	**2.24**	mg/L		11/01/24 10:08	
	Flow	**0.0**			11/01/24 10:08	
EPA 8015C	TPH (C10-C28)	ND	mg/L	0.20	11/07/24 05:19	
EPA 8015C	TPH (C28-C40)	ND	mg/L	0.40	11/07/24 05:19	
EPA 8015C	TPH (C06-C10)	ND	ug/L	200	11/04/24 18:10	
EPA 8260D	Benzene	ND	ug/L	1.0	11/04/24 15:22	
EPA 8260D	Ethylbenzene	ND	ug/L	1.0	11/04/24 15:22	
EPA 8260D	Toluene	ND	ug/L	1.0	11/04/24 15:22	
EPA 8260D	Xylene (Total)	ND	ug/L	3.0	11/04/24 15:22	

Sample: TRIP BLANK **Lab ID: 30730511006** Collected: 10/31/24 00:00 Matrix: Water

Method	Parameters	Results	Units	Report Limit	Analyzed	Qualifiers
EPA 8015C	TPH (C06-C10)	ND	ug/L	200	11/04/24 18:28	
EPA 8260D	Benzene	ND	ug/L	1.0	11/04/24 14:31	
EPA 8260D	Ethylbenzene	ND	ug/L	1.0	11/04/24 14:31	
EPA 8260D	Toluene	ND	ug/L	1.0	11/04/24 14:31	
EPA 8260D	Xylene (Total)	ND	ug/L	3.0	11/04/24 14:31	

Sample: KPW **Lab ID: 30730511003** Collected: 10/31/24 10:50 Matrix: Water

PWS: Site ID: Sample Type:

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Gross Alpha	EPA 900.0	**329 ± 886 (1,685)** **C:NA T:NA**	pCi/L	11/21/24 19:12	12587-46-1	
Gross Beta	EPA 900.0	**670 ± 606 (1,067)** **C:NA T:NA**	pCi/L	11/21/24 19:12	12587-47-2	
Radium-226	EPA 903.1	**490 ± 70.7 (2.54)** **C:NA T:100%**	pCi/L	11/21/24 15:14	13982-63-3	
Radium-228	EPA 904.0	**347 ± 65.1 (11.0)** **C:84% T:93%**	pCi/L	11/18/24 15:11	15262-20-1	

SAMPLE QUALIFIERS

Sample: 3441786

[1] Post-analysis pH measurement indicates pH > 2.

Sample: 3441787

[1] Post-analysis pH measurement indicates pH > 2.

ANALYTE QUALIFIERS

CH The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.

D3 Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

Pace Analytical Services, LLC
225 Industrial Park RD
Beaver, WV 25813
(800)999-0105

ANALYTE QUALIFIERS

N2	The lab does not hold NELAC/TNI accreditation for this parameter but other accreditations/certifications may apply. A complete list of accreditations/certifications is available upon request.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.

Reviewed by: Beth Johnson

Beth Johnson
(800)999-0105
beth.johnson@pacelabs.com

Pace Analytical Services Pennsylvania

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601
ANAB DOD-ELAP Rad Accreditation #: L2417
ANABISO/IEC 17025:2017 Rad Cert#: L24170
Alabama Certification #: 41590
Arizona Certification #: AZ0734
Arkansas Certification
California Certification #: 2950
Colorado Certification #: PA01547
Connecticut Certification #: PH-0694
EPA Region 4 DW Rad
Florida/TNI Certification #: E87683
Georgia Certification #: C040
Guam Certification
Hawaii Certification
Idaho Certification
Illinois Certification
Indiana Certification
Iowa Certification #: 391
Kansas Certification #: E-10358
Kentucky Certification #: KY90133
KY WW Permit #: KY0098221
KY WW Permit #: KY0000221
Louisiana DHH/TNI Certification #: LA010
Louisiana DEQ/TNI Certification #: 04086
Maine Certification #: 2023021
Maryland Certification #: 308
Massachusetts Certification #: M-PA1457
Michigan/PADEP Certification #: 9991
Missouri Certification #: 235
Montana Certification #: Cert0082
Nebraska Certification #: NE-OS-29-14
Nevada Certification #: PA014572023-03
New Hampshire/TNI Certification #: 297622
New Jersey/TNI Certification #: PA051
New Mexico Certification #: PA01457
New York/TNI Certification #: 10888
North Carolina Certification #: 42706
North Dakota Certification #: R-190
Ohio EPA Rad Approval: #41249
Oregon/TNI Certification #: PA200002-015
Pennsylvania/TNI Certification #: 65-00282
Puerto Rico Certification #: PA01457
Rhode Island Certification #: 65-00282
South Dakota Certification
Tennessee Certification #: TN02867
Texas/TNI Certification #: T104704188-22-18
Utah/TNI Certification #: PA014572223-14
USDA Soil Permit #: 525-23-67-77263
Vermont Dept. of Health: ID# VT-0282
Virgin Island/PADEP Certification
Virginia/VELAP Certification #: 460198
Washington Certification #: C868
West Virginia DEP Certification #: 143
West Virginia DHHR Certification #: 9964C
Wisconsin Approve List for Rad

Pace Analytical Services Beaver

225 Industrial Park Road, Beaver, WV 25813
Virginia VELAP 460148
West Virginia DEP 060
West Virginia DHHR 00412CM
North Carolina DEQ 466
Kentucky Wastewater Certification KY90039
Pennsylvania DEP 68-00839

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CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: Kirk Environmental

Address:

Billing Information:

Report To: Ed J. Kirk

Email To:

Copy To: Crystal Bennett

Site Collection Info/Address:

Customer Project Name/Number: Kaufman sites

State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET

Phone:
Email:

Site/Facility ID #:

Compliance Monitoring? [X] Yes [ ] No

Collected By (print): Ed J. Kirk

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature): Ed J. Kirk

Turnaround Date Required: normal

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: ____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Container Preservative Type **: 4 | 1 | 2 | 3

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____

Lab Project Manager:

Analyses

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Chloride, Bromide, Strontium, Barium	Fe, Mn, Al, As, Na, Cu, Sulfate	spec grav, TPH GRO, DRO & ORO	BETX, TDS, TSS, TDC	Rad 226, Rad 228	Gross Alpha, Gross Beta			
KPW	GW	grab	10/31/24	1050					X	X	X	X	X	X			

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips:	
Sample pH Acceptable	Y N NA
pH Strips:	
Sulfide Present	Y N NA
Lead Acetate Strips:	

LAB USE ONLY:
Lab Sample # / Comments:

NON-CONFORMANCE
# of ctns not filled out

Customer Remarks / Special Conditions / Possible Hazards:
DO 2.44 mg/L temp 18.5°C
Cond > 150 mS
pH 5.62

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2959226

Samples received via: FEDEX UPS Client Courier: Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 26
Cooler 1 Temp Upon Receipt: 1.4 oC
Cooler 1 Therm Corr. Factor: 0 oC
Cooler 1 Corrected Temp: 1.4 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Ed J. Kirk	10/31/24 1530	10-31-24	1548
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Pace Analytical®

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-in Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: Kirk Environmental

Address:

Billing Information:

Report To: Ed Kirk

Email To:

Copy To: Crystal Bennett

Site Collection Info/Address:

Customer Project Name/Number: Kaufman Sites

State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET

Phone:
Email:

Site/Facility ID #:

Compliance Monitoring? [X] Yes [ ] No

Collected By (print): Ed J. Kirk

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Collected By (signature): Ed J. Kirk

Turnaround Date Required: normal

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: ____

Container Preservative Type **: 4 | 1 | 2 | 3

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Chloride, Bromide, Nitrate, Fe	Mn, Al, As, Na, Ca, Sulfate	TPH-GRO, DRO + ORO	BETX	TDS, TSS, TOC							
UKS	GW	grab	10/31/24	1120					X	X	X	X	X							
LKS	GW	grab	10/31/24	1220					X	X	X	X	X							
☒ Trip Blank								6			X	X								

NON CONFORMANCE
Bottles not filled out

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact Y N NA
Custody Signatures Present Y N NA
Collector Signature Present Y N NA
Bottles Intact Y N NA
Correct Bottles Y N NA
Sufficient Volume Y N NA
Samples Received on Ice Y N NA
VOA - Headspace Acceptable Y N NA
USDA Regulated Soils Y N NA
Samples in Holding Time Y N NA
Residual Chlorine Present Y N NA
Cl Strips: ____
Sample pH Acceptable Y N NA
pH Strips: ____
Sulfide Present Y N NA
Lead Acetate Strips: ____

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:
UKS: DO 6.16; pH 7.32; cond 632.4 temp 13.0 flow < 1 gpm
LKS: DO 2.24; pH 6.54; cond 351.5 temp 12.8 flow 0.0

Type of Ice Used: (Wet) Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2959227

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 20
Cooler 1 Temp Upon Receipt: 1.6 oC
Cooler 1 Therm Corr. Factor: 0 oC
Cooler 1 Corrected Temp: 1.6 oC
Comments: ☒ pr cont 2< 11/1/24

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Ed J. Kirk	10/31/24 1530	[signature] 10-31-24	1530
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Non Conformance(s): YES / NO

WO#: 30730511
PM: BMJ Due Date: 12/13/24
CLIENT: BV-KIRKENV

LIMS30 Lab Sample Condition Upon Receipt (West Virgin

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ 3rd Party Courier ☐ Pace ☐ Other _____

Tracking #: _____

Custody Seal on Cooler/Box/Containers Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Thermometer Used 26 **Type of Ice:** (Wet) Blue None

Cooler Temperature **Observed Temp** 0.4 °C Correction Factor: 0 °C Final Temp: 0.4 °C

Thermal Preservation Requirement Met Yes ☑ No ☐

pH paper Lot#	Date and Initials of person examining contents:
204524	10/31/24 (J-NP)

	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓	✓		2. # of ctns missing on 2 COCs
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:	✓			4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT	✓			5.
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used:	✓			10.
-Pace Containers Used:	✓			
Containers Intact:	✓			11.
Orthophosphate field filtered:			✓	12.
Hex Cr Aqueous sample field filtered:			✓	13.
-pH adjusted within 24 hours? (If yes, indicate acid lot #)			✓	
Filtered volume received for Dissolved tests:			✓	14.
All containers have been checked for chemical preservation: exceptions: VOA, coliform, O&G, LLMercury, Non-aqueous matrix	✓			15.
All containers meet method/chemical preservation requirements:	✓			Initial when completed: ZC Date: 11/1/24
				Tests not preserved:
Headspace in VOA Vials:		✓		16.
Trip Blank Present:	✓			17.
				Initial when completed: ZC Date: 11/1/24

Comments: _____

*PM review is documented electronically in LIMS, when the Project Manager closes the SRF Review schedule in LIMS. The status may be reviewed in the Status section of the Workorder Edit Screen.

Pace Analytical

CHAIN-OF-CUSTODY Analytical Request Document

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevent fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-In Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: Kirk Environmental

Address:

Report To: Ed J. Kirk

Copy To: Crystal Bennett

Customer Project Name/Number: Kaufman sites

Billing Information:

Email To:

Site Collection Info/Address:

State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET

Phone:
Email:

Site/Facility ID #:

Compliance Monitoring? [X] Yes [ ] No

Collected By (print): Ed J. Kirk

Collected By (signature): Ed J. Kirk

Purchase Order #:
Quote #:

DW PWS ID #:
DW Location Code:

Turnaround Date Required: normal

Immediately Packed on Ice: [X] Yes [ ] No

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: ____ [ ] Hold: ____

Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply)

Field Filtered (if applicable): [ ] Yes [X] No

Analysis: ____

Lab Project Manager:

Container Preservative Type **: U | 1 | 2 | 3

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other ____

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Collected (or Composite Start) Time	Composite End Date	Composite End Time	Res Cl	# of Ctns	Chloride, Bromide, Strontium, Barium	Fe, Mn, Al, As, Na, Cu, Sulfate	spec grav, TPH GRO, DRO & ORO	BETX, TDS, TSS, TDL	Rad 226, Rad 228	Gross Alpha, Gross Beta
KPW	GW	grab	10/31/24	1050					X	X	X	X	X	X

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips: ____	
Sample pH Acceptable	Y N NA
pH Strips: ____	
Sulfide Present	Y N NA
Lead Acetate Strips: ____	

LAB USE ONLY:
Lab Sample # / Comments:

NON-CONFORMANCE
# of Ctns not filled out

Customer Remarks / Special Conditions / Possible Hazards:
DO 2.44 mg/L temp 18.5°C
Cond > 150 mS
pH 5.62

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2959226

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 26
Cooler 1 Temp Upon Receipt: 1.4 oC
Cooler 1 Therm Corr. Factor: 0 oC
Cooler 1 Corrected Temp: 1.4 oC
Comments:

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Ed J. Kirk	10/31/24 1520	10-31-24	1548
Relinquished by/Company: (Signature) Nicely's Del. Service	Date/Time: 11-1-24 23:00	Received by/Company: (Signature) Jay Pace	Date/Time: 11-1-24 23:00
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____

Pace Analytical

CHAIN-OF-CUSTODY Analytical Request Document

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LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-In Number Here

ALL SHADED AREAS are for LAB USE ONLY

Company: Kirk Environmental	Billing Information:
Address:	
Report To: Ed Kirk	Email To:
Copy To: Crystal Bennett	Site Collection Info/Address:
Customer Project Name/Number: Kaufman Sites	State: / County/City: Time Zone Collected: [ ] PT [ ] MT [ ] CT [ ] ET
Phone: Email:	Site/Facility ID #: Compliance Monitoring? [X] Yes [ ] No
Collected By (print): Ed J. Kirk	Purchase Order #: Quote #: DW PWS ID #: DW Location Code:
Collected By (signature): Ed J Kirk	Turnaround Date Required: normal Immediately Packed on Ice: [X] Yes [ ] No
Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: [ ] Hold:	Rush: [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [ ] 5 Day (Expedite Charges Apply) Field Filtered (if applicable): [ ] Yes [X] No Analysis:

Container Preservative Type **: 0 1 2 3

Lab Project Manager:

** Preservative Types: (1) nitric acid, (2) sulfuric acid, (3) hydrochloric acid, (4) sodium hydroxide, (5) zinc acetate, (6) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate, (C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Time	Composite End Date	Time	Res Cl	# of Ctns	Chloride, Bromide, Fluoride, Sulfate, Barium	Mn, Al, Ba, Na, Ca, Sulfate	TPH-GRO, DRO, & ORO	BETX	TDS, TSS, TOC						Lab Sample # / Comments
UKS	GW	grab	10/31/24	1120					X	X	X	X	X						
LKS	GW	grab	10/31/24	1220					X	X	X	X	X						
Trip Blank								6			X	X							

NON CONFORMANCE
# of ctns not filled out

Lab Profile/Line:

Lab Sample Receipt Checklist:

Custody Seals Present/Intact	Y N NA
Custody Signatures Present	Y N NA
Collector Signature Present	Y N NA
Bottles Intact	Y N NA
Correct Bottles	Y N NA
Sufficient Volume	Y N NA
Samples Received on Ice	Y N NA
VOA - Headspace Acceptable	Y N NA
USDA Regulated Soils	Y N NA
Samples in Holding Time	Y N NA
Residual Chlorine Present	Y N NA
Cl Strips:	
Sample pH Acceptable	Y N NA
pH Strips:	
Sulfide Present	Y N NA
Lead Acetate Strips:	

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:
UKS: DO 6.16; pH 7.32; cond 632.4 temp 13.0 flow < 1gpm
LKS: DO 3.24; pH 6.54; cond 351.5 temp 12.8 flow 0.0

Type of Ice Used: Wet Blue Dry None

Packing Material Used:

Radchem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A

Lab Tracking #: 2959227

Samples received via: FEDEX UPS Client Courier Pace Courier

Lab Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 28
Cooler 1 Temp Upon Receipt: 1.6 oC
Cooler 1 Therm Corr. Factor: 0 oC
Cooler 1 Corrected Temp: 1.6 oC
Comments: *Percent 2C 11/1/24

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO

Page: ____ of: ____

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Ed J. Kirk	10/31/24 1530	[signature] 10-31-24	1530
Relinquished by/Company: (Signature) Nicely's Del. Service	11-1-24 23:00	Received by/Company: (Signature) [signature] Pace	11-1-24 23:00
Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Page 11 of 27

Pace ANALYTICAL SERVICES	DC#_Title: ENV-FRM-GBUR-0088 v07_Sample Condition Upon Receipt-Greensburg
	Effective Date: 01/04/2024

Client Name: Kirk Env. **Project #:** 30703051

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☒ Other Nicely's

Tracking Number: Drop-Off

Initial / Date
Examined By: LB 11-4-24
Labeled By:
Temped By: LB 11-4-24

Custody Seal on Cooler/Box Present: ☒ Yes ☐No **Seals Intact:** ☒ Yes ☐No

Thermometer Used: 14 **Type of Ice:** (Wet) Blue None

Cooler Temperature: Observed Temp 2.9 °C Correction Factor: -0.5 °C Final Temp: 2.4 °C

Temp should be above freezing to 6°C

Comments:	Yes	No	NA	pH paper Lot# 10004	D.P.D. Residual Chlorine Lot #
Chain of Custody Present	X			1.	
Chain of Custody Filled Out:	X			2.	
-Were client corrections present on COC		X			
Chain of Custody Relinquished	X			3.	
Sampler Name & Signature on COC:	X			4.	
Sample Labels match COC:	X			5.	
-Includes date/time/ID					
Matrix: WT					
Samples Arrived within Hold Time:	X			6.	
Short Hold Time Analysis (<72hr remaining):		X		7.	
Rush Turn Around Time Requested:		X		8.	
Sufficient Volume:	X			9.	
Correct Containers Used:	X			10.	
-Pace Containers Used		X			
Containers Intact:	X			11.	
Orthophosphate field filtered:			X	12.	
Hex Cr Aqueous samples field filtered:			X	13.	
Organic Samples checked for dichlorination			X	14:	
Filtered volume received for dissolved tests:			X	15:	
All containers checked for preservation:	X			16.	
exceptions: VOA, coliform, TOC, O&G, Phenolics, Radon, non-aqueous matrix				pH<2	
All containers meet method preservation requirements:	X			Initial when completed LB	Date/Time of Preservation
				Lot# of added Preservative	
8260C/D: Headspace in VOA Vials (> 6mm)			X	17.	
624.1: Headspace in VOA Vials (0mm)			X	18.	
Radon: Headspace in RAD Vials (0mm)			X	19.	
Trip Blank Present:			X	Trip blank custody seal present? YES or NO	
Rad Samples Screened <.05 mrem/hr.	X			Initial when completed LB	Date: 11-4-24 Survey Meter SN: 2004380

Comments:

Note: For NC compliance samples with discrepancies, a copy of this form must be sent to the DEHNR Certification office.
PM Review is documented electronically in LIMS through the SRF Review schedule in the Workorder Edit Screen.

Qualtrax ID: 55680

WO#: 30730511
PM: BMJ Due Date: 12/13/24
CLIENT: BV-KIRKENV

LIMS30 Lab Sample Condition Upon Receipt (West Virgin

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ 3rd Party Courier ☐ Pace ☐ Other _____

Tracking #: _____

Custody Seal on Cooler/Box/Containers Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Thermometer Used 26 Type of Ice: (Wet) Blue None

Cooler Temperature Observed Temp 0.4 °C Correction Factor: 0 °C Final Temp: 0.4 °C

Thermal Preservation Requirement Met Yes ☑ No ☐

pH paper Lot#	Date and Initials of person examining contents:
204524	10/31/24 (J-NP)

	Yes	No	N/A	
Chain of Custody Present:	✓			1.
Chain of Custody Filled Out:	✓	✓		2. # of ctns missing on 2 COCs
Chain of Custody Relinquished:	✓			3.
Sampler Name & Signature on COC:	✓			4.
Sample Labels match COC: -Includes date/time/ID Matrix: WT	✓			5.
Samples Arrived within Hold Time:	✓			6.
Short Hold Time Analysis (<72hr remaining):		✓		7.
Rush Turn Around Time Requested:		✓		8.
Sufficient Volume:	✓			9.
Correct Containers Used: -Pace Containers Used:	✓			10.
Containers Intact:	✓			11.
Orthophosphate field filtered:			✓	12.
Hex Cr Aqueous sample field filtered: -pH adjusted within 24 hours? (If yes, indicate acid lot #)			✓	13.
Filtered volume received for Dissolved tests:			✓	14.
All containers have been checked for chemical preservation: exceptions: VOA, coliform, O&G, LLMercury, Non-aqueous matrix	✓			15.
All containers meet method/chemical preservation requirements:	✓			Initial when completed: ZC Date: 11/1/24
				Tests not preserved:
Headspace in VOA Vials:		✓		16.
Trip Blank Present:	✓			17.
				Initial when completed: ZC Date: 11/1/24

Comments: _____

*PM review is documented electronically in LIMS, when the Project Manager closes the SRF Review schedule in LIMS. The status may be reviewed in the Status section of the Workorder Edit Screen.

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Certificate of Analysis
4113738

Beth Johnson
Pace Analytical Services LLC Beaver
225 Industrial Park Rd
Beaver, WV 25813

Customer ID: 44-102122
Report Printed: 11/20/2024 15:12

Project Name: WV SDWA Beth Johnson Workorder: 4113738

Dear Beth Johnson

Enclosed are the analytical results for samples received by the laboratory 11/12/2024 10:58.

The results relate to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services LLC Kentucky - Madisonville

If you have any questions concerning this report, please feel free to contact me.

#460210 Madisonville, KY
#460291 Pikeville, KY
#E871136 Englewood, OH

This page is included as part of the Analytical Report and must be retained as a permanent record thereof.

Melissia Brown, Project Coordinator

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SAMPLE SUMMARY

Lab ID	Client Sample ID/Alias	Matrix	Date Collected	Date Received	Sampled By
4113738-01	DBP Sample/30732801001 48 Union Camp Rd	Drinking Water	11/08/2024 10:03	11/12/2024 10:58	Julia Childers
4113738-02	DBP Sample/30732801002 48 Union Camp Rd	Drinking Water	11/08/2024 10:03	11/12/2024 10:58	Julia Childers
4113738-03	DBP Sample/30732801003 292 Koons Run Rd	Drinking Water	11/08/2024 10:53	11/12/2024 10:58	Julia Childers
4113738-04	DBP Sample/30732801004 292 Koons Run Rd	Drinking Water	11/08/2024 10:53	11/12/2024 10:58	Julia Childers
4113738-05	DBP Sample/30732801005 Trip Blank	Drinking Water	11/08/2024 10:03	11/12/2024 10:58	Julia Childers

Work Order Comments:

The individual THM / HAA components are rounded then reported.

The total THM / HAA values are calculated from the sum of actual values for the individual analytes. This value is then rounded. It is possible for the total value not to match the sum of the individual components.
If this data is used for regulatory purposes, the total values will be the actual sum of the individual analytes.

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ANALYTICAL RESULTS

Lab Sample ID: **4113738-01**
Description: **DBP Sample 30732801001 48 Union Camp Rd**

Sample Collection Date Time: 11/08/2024 10:03
Sample Received Date Time: 11/12/2024 10:58

Matrix: Drinking Water
Discharge/Site No:
Regulatory ID: WV3301706

Volatile Organic Compounds Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Trihalomethanes	**0.071**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 09:45	CLM
Bromodichloromethane	**0.012**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 09:45	CLM
Bromoform	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 09:45	CLM
Chloroform	**0.058**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 09:45	CLM
Dibromochloromethane	**0.002**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 09:45	CLM

ANALYTICAL RESULTS

Lab Sample ID: **4113738-02**
Description: **DBP Sample 30732801002 48 Union Camp Rd**

Sample Collection Date Time: 11/08/2024 10:03
Sample Received Date Time: 11/12/2024 10:58

Matrix: Drinking Water
Discharge/Site No:
Regulatory ID: WV3301706

Gas Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Bromoacetic Acid	ND	U	mg/L	0.001		EPA 552.3	11/14/2024 08:45	11/14/2024 22:55	CDD
Dibromoacetic Acid	ND	U	mg/L	0.001		EPA 552.3	11/14/2024 08:45	11/14/2024 22:55	CDD
Dichloroacetic Acid	**0.006**		mg/L	0.001	0.0005	EPA 552.3	11/14/2024 08:45	11/14/2024 22:55	CDD
Monochloroacetic Acid	ND	U	mg/L	0.001		EPA 552.3	11/14/2024 08:45	11/14/2024 22:55	CDD
Trichloroacetic Acid	**0.018**		mg/L	0.001	0.0005	EPA 552.3	11/14/2024 08:45	11/14/2024 22:55	CDD
Total HAA5	**0.024**		mg/L	0.001	0.0005	EPA 552.3	11/14/2024 08:45	11/14/2024 22:55	CDD

Surrogate: 2,3-Dibromopropionic aci *107 %* *70-130* *11/14/2024 08:45* *11/14/2024 22:55* *CDD* *EPA 552.3*

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ANALYTICAL RESULTS

Lab Sample ID: **4113738-03**
Description: **DBP Sample 30732801003 292 Koons Run Rd**

Sample Collection Date Time: 11/08/2024 10:53
Sample Received Date Time: 11/12/2024 10:58

Matrix: Drinking Water
Discharge/Site No:
Regulatory ID: WV3301706

Volatile Organic Compounds Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Trihalomethanes	**0.048**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:17	CLM
Bromodichloromethane	**0.010**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:17	CLM
Bromoform	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:17	CLM
Chloroform	**0.037**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:17	CLM
Dibromochloromethane	**0.001**		mg/L	0.001	0.0005	EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:17	CLM

ANALYTICAL RESULTS

Lab Sample ID: **4113738-04**
Description: **DBP Sample 30732801004 292 Koons Run Rd**

Sample Collection Date Time: 11/08/2024 10:53
Sample Received Date Time: 11/12/2024 10:58

Matrix: Drinking Water
Discharge/Site No:
Regulatory ID: WV3301706

Gas Chromatography Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Bromoacetic Acid	ND	U	mg/L	0.001		EPA 552.3	11/14/2024 08:45	11/14/2024 23:13	CDD
Dibromoacetic Acid	ND	U	mg/L	0.001		EPA 552.3	11/14/2024 08:45	11/14/2024 23:13	CDD
Dichloroacetic Acid	**0.012**		mg/L	0.001	0.0005	EPA 552.3	11/14/2024 08:45	11/14/2024 23:13	CDD
Monochloroacetic Acid	ND	U	mg/L	0.001		EPA 552.3	11/14/2024 08:45	11/14/2024 23:13	CDD
Trichloroacetic Acid	**0.015**		mg/L	0.001	0.0005	EPA 552.3	11/14/2024 08:45	11/14/2024 23:13	CDD
Total HAA5	**0.027**		mg/L	0.001	0.0005	EPA 552.3	11/14/2024 08:45	11/14/2024 23:13	CDD

Surrogate: 2,3-Dibromopropionic aci *104 %* *70-130* *11/14/2024 08:45* *11/14/2024 23:13* *CDD* *EPA 552.3*

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ANALYTICAL RESULTS

Lab Sample ID: **4113738-05**
Description: **DBP Sample 30732801005 Trip Blank**

Sample Collection Date Time: 11/08/2024 10:03
Sample Received Date Time: 11/12/2024 10:58

Matrix: Drinking Water
Discharge/Site No:
Regulatory ID: WV3301706

Volatile Organic Compounds Madisonville

Analyte	Result	Flag	Units	MRL	MDL	Method	Prepared	Analyzed	Analyst
Total Trihalomethanes	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:49	CLM
Bromodichloromethane	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:49	CLM
Bromoform	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:49	CLM
Chloroform	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:49	CLM
Dibromochloromethane	ND	U	mg/L	0.001		EPA 524.2 REV 4.1	11/14/2024 11:15	11/15/2024 10:49	CLM

Notes for work order 4113738
- Samples collected by PACE personnel are done so in accordance with procedures set forth in PACE field services SOPs.
- Results contained in this report are only representative of the samples received.
- PACE does not provide interpretation of these results unless otherwise stated.
- All Waste Water analyses comply with methodology requirements of 40 CFR Part 136.
- All Drinking Water analyses comply with methodology requirements of 40 CFR Part 141.
- Unless otherwise noted, all quantitative results for soils are reported on a dry weight basis.
- The Chain of Custody document is included as part of this report.
- All Library Search analytes should be regarded as tentative identification based on the presumptive evidence of the mass spectra. Concentrations reported are estimated values.

Qualifiers

M1	Matrix spike recovery was high; the method control sample recovery was acceptable.
U	Target analyte was analyzed for, but was below detection limit (the value associated with the qualifier is the laboratory method detection limit in our LIMS system).
Y5	MS/MSD RPD exceeded the method control limit.

Standard Qualifiers/Acronyms

MDL	Method Detection Limit
MRL	Minimum Reporting Limit
ND	Not Detected
LCS	Laboratory Control Sample
MS	Matrix Spike
MSD	Matrix Spike Duplicate
DUP	Sample Duplicate
% Rec	Percent Recovery
RPD	Relative Percent Difference
>	Greater than
<	Less than

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Volatile Organic Compounds Madisonville - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BDK1449 - VOC - Prep										
Blank (BDK1449-BLK1)										
Prepared: 11/14/2024 11:15, Analyzed: 11/15/2024 7:38										
Total Trihalomethanes	ND	0.001	mg/L							U
Total Trihalomethanes	ND	0.001	mg/L							U
Bromodichloromethane	ND	0.001	mg/L							U
Bromodichloromethane	ND	0.001	mg/L							U
Bromoform	ND	0.001	mg/L							U
Bromoform	ND	0.001	mg/L							U
Chloroform	ND	0.001	mg/L							U
Chloroform	ND	0.001	mg/L							U
Dibromochloromethane	ND	0.001	mg/L							U
Dibromochloromethane	ND	0.001	mg/L							U
Surrogate: Bromofluorobenzene	*0.0251*		mg/L	*0.0250*		*101*	*70-130*			
Surrogate: Bromofluorobenzene	*0.0251*		mg/L	*0.0250*		*101*	*70-130*			
Surrogate: Toluene-d8	*0.0254*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: Toluene-d8	*0.0254*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0254*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0254*		mg/L	*0.0250*		*102*	*70-130*			
LCS (BDK1449-BS1)										
Prepared: 11/14/2024 11:15, Analyzed: 11/15/2024 7:06										
Bromodichloromethane	0.025	0.001	mg/L	0.0250		100	70-130			
Bromodichloromethane	0.025	0.001	mg/L	0.0250		100	70-130			
Bromoform	0.025	0.001	mg/L	0.0250		98.1	70-130			
Bromoform	0.025	0.001	mg/L	0.0250		98.1	70-130			
Chloroform	0.024	0.001	mg/L	0.0250		97.7	70-130			
Chloroform	0.024	0.001	mg/L	0.0250		97.7	70-130			
Dibromochloromethane	0.024	0.001	mg/L	0.0250		96.0	70-130			
Dibromochloromethane	0.024	0.001	mg/L	0.0250		96.0	70-130			
Surrogate: Bromofluorobenzene	*0.0255*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: Bromofluorobenzene	*0.0255*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: Toluene-d8	*0.0256*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: Toluene-d8	*0.0256*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0250*		mg/L	*0.0250*		*99.8*	*70-130*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0250*		mg/L	*0.0250*		*99.8*	*70-130*			

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Volatile Organic Compounds Madisonville - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BDK1449 - VOC - Prep										
Matrix Spike (BDK1449-MS1)	**Source: 4113747-01**									
Prepared: 11/14/2024 11:15, Analyzed: 11/15/2024 18:18										
Bromodichloromethane	0.032	0.001	mg/L	0.0250	0.006	106	65-135			
Bromodichloromethane	0.032	0.001	mg/L	0.0250	0.006	106	65-135			
Bromoform	0.025	0.001	mg/L	0.0250	ND	98.8	65-135			
Bromoform	0.025	0.001	mg/L	0.0250	ND	98.8	65-135			
Chloroform	0.060	0.001	mg/L	0.0250	0.033	105	65-135			
Chloroform	0.060	0.001	mg/L	0.0250	0.033	105	65-135			
Dibromochloromethane	0.026	0.001	mg/L	0.0250	ND	102	65-135			
Dibromochloromethane	0.026	0.001	mg/L	0.0250	0.0006	99.8	65-135			
Surrogate: Bromofluorobenzene	*0.0257*		mg/L	*0.0250*		*103*	*65-135*			
Surrogate: Bromofluorobenzene	*0.0257*		mg/L	*0.0250*		*103*	*65-135*			
Surrogate: Toluene-d8	*0.0255*		mg/L	*0.0250*		*102*	*65-135*			
Surrogate: Toluene-d8	*0.0255*		mg/L	*0.0250*		*102*	*65-135*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0254*		mg/L	*0.0250*		*102*	*70-130*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0254*		mg/L	*0.0250*		*102*	*70-130*			
Matrix Spike Dup (BDK1449-MSD1)	**Source: 4113747-01**									
Prepared: 11/14/2024 11:15, Analyzed: 11/15/2024 18:50										
Bromodichloromethane	0.033	0.001	mg/L	0.0250	0.006	109	65-135	2.48	30	
Bromodichloromethane	0.033	0.001	mg/L	0.0250	0.006	109	65-135	2.48	30	
Bromoform	0.024	0.001	mg/L	0.0250	ND	97.8	65-135	1.02	30	
Bromoform	0.024	0.001	mg/L	0.0250	ND	97.8	65-135	1.02	30	
Chloroform	0.061	0.001	mg/L	0.0250	0.033	108	65-135	1.53	30	
Chloroform	0.061	0.001	mg/L	0.0250	0.033	108	65-135	1.53	30	
Dibromochloromethane	0.026	0.001	mg/L	0.0250	ND	104	65-135	1.40	30	
Dibromochloromethane	0.026	0.001	mg/L	0.0250	0.0006	101	65-135	1.40	30	
Surrogate: Bromofluorobenzene	*0.0259*		mg/L	*0.0250*		*104*	*65-135*			
Surrogate: Bromofluorobenzene	*0.0259*		mg/L	*0.0250*		*104*	*65-135*			
Surrogate: Toluene-d8	*0.0257*		mg/L	*0.0250*		*103*	*65-135*			
Surrogate: Toluene-d8	*0.0257*		mg/L	*0.0250*		*103*	*65-135*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0251*		mg/L	*0.0250*		*100*	*70-130*			
Surrogate: 1,2-Dichlorobenzene-d4	*0.0251*		mg/L	*0.0250*		*100*	*70-130*			

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Gas Chromatography Madisonville - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BDK1272 - 552.3 Extraction HAA										
Blank (BDK1272-BLK1)										
Prepared: 11/14/2024 8:45, Analyzed: 11/14/2024 18:26										
Bromoacetic Acid	ND	0.001	mg/L							U
Dibromoacetic Acid	ND	0.001	mg/L							U
Dichloroacetic Acid	ND	0.001	mg/L							U
Monochloroacetic Acid	ND	0.001	mg/L							U
Trichloroacetic Acid	ND	0.001	mg/L							U
Total HAA5	ND	0.001	mg/L							U
Surrogate: 2,3-Dibromopropionic acid	*0.00973*		mg/L	*0.0100*		*97.3*	*70-130*			
LCS (BDK1272-BS1)										
Prepared: 11/14/2024 8:45, Analyzed: 11/14/2024 19:02										
Bromoacetic Acid	0.023	0.001	mg/L	0.0250		92.2	70-130			
Dibromoacetic Acid	0.025	0.001	mg/L	0.0250		98.1	70-130			
Dichloroacetic Acid	0.023	0.001	mg/L	0.0250		92.0	70-130			
Monochloroacetic Acid	0.023	0.001	mg/L	0.0250		93.8	70-130			
Trichloroacetic Acid	0.024	0.001	mg/L	0.0250		97.6	70-130			
Total HAA5	0.118	0.001	mg/L	0.125		94.7	70-130			
Surrogate: 2,3-Dibromopropionic acid	*0.0100*		mg/L	*0.0100*		*100*	*70-130*			
Matrix Spike (BDK1272-MS1)	**Source: 4113713-01**									
Prepared: 11/14/2024 8:45, Analyzed: 11/15/2024 1:53										
Bromoacetic Acid	0.064	0.001	mg/L	0.0250	ND	255	70-130			M1, Y5
Dibromoacetic Acid	0.024	0.001	mg/L	0.0250	ND	96.6	70-130			
Dichloroacetic Acid	0.059	0.001	mg/L	0.0250	0.035	98.9	70-130			
Monochloroacetic Acid	0.029	0.001	mg/L	0.0250	0.001	113	70-130			
Trichloroacetic Acid	0.079	0.001	mg/L	0.0250	0.053	106	70-130			
Total HAA5	0.256	0.001	mg/L	0.125	0.089	134	70-130			M1
Surrogate: 2,3-Dibromopropionic acid	*0.00995*		mg/L	*0.0100*		*99.5*	*70-130*			
Matrix Spike (BDK1272-MS2)	**Source: 4113714-01**									
Prepared: 11/14/2024 8:45, Analyzed: 11/15/2024 2:29										
Bromoacetic Acid	0.032	0.001	mg/L	0.0250	ND	126	70-130			
Dibromoacetic Acid	0.025	0.001	mg/L	0.0250	ND	98.6	70-130			
Dichloroacetic Acid	0.042	0.001	mg/L	0.0250	0.017	97.5	70-130			
Monochloroacetic Acid	0.030	0.001	mg/L	0.0250	ND	122	70-130			
Trichloroacetic Acid	0.045	0.001	mg/L	0.0250	0.021	98.4	70-130			
Total HAA5	0.174	0.001	mg/L	0.125	0.038	108	70-130			
Surrogate: 2,3-Dibromopropionic acid	*0.0103*		mg/L	*0.0100*		*103*	*70-130*			

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Gas Chromatography Madisonville - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch BDK1272 - 552.3 Extraction HAA										
Matrix Spike Dup (BDK1272-MSD1) **Source: 4113713-01**										
Prepared: 11/14/2024 8:45, Analyzed: 11/15/2024 2:11										
Bromoacetic Acid	0.023	0.001	mg/L	0.0250	ND	93.7	70-130	92.5	30	Y5
Dibromoacetic Acid	0.026	0.001	mg/L	0.0250	ND	104	70-130	7.69	30	
Dichloroacetic Acid	0.061	0.001	mg/L	0.0250	0.035	106	70-130	2.91	30	
Monochloroacetic Acid	0.030	0.001	mg/L	0.0250	0.001	117	70-130	3.14	30	
Trichloroacetic Acid	0.082	0.001	mg/L	0.0250	0.053	118	70-130	3.91	30	
Total HAA5	0.223	0.001	mg/L	0.125	0.089	108	70-130	13.6	30	
Surrogate: 2,3-Dibromopropionic acid	*0.0107*		mg/L	*0.0100*		*107*	*70-130*			
Matrix Spike Dup (BDK1272-MSD2) **Source: 4113714-01**										
Prepared: 11/14/2024 8:45, Analyzed: 11/15/2024 2:47										
Bromoacetic Acid	0.033	0.001	mg/L	0.0250	ND	131	70-130	4.07	30	M1
Dibromoacetic Acid	0.025	0.001	mg/L	0.0250	ND	98.5	70-130	0.0406	30	
Dichloroacetic Acid	0.042	0.001	mg/L	0.0250	0.017	99.8	70-130	1.40	30	
Monochloroacetic Acid	0.032	0.001	mg/L	0.0250	ND	127	70-130	4.46	30	
Trichloroacetic Acid	0.045	0.001	mg/L	0.0250	0.021	99.1	70-130	0.398	30	
Total HAA5	0.177	0.001	mg/L	0.125	0.038	111	70-130	1.97	30	
Surrogate: 2,3-Dibromopropionic acid	*0.0106*		mg/L	*0.0100*		*106*	*70-130*			

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Certified Analyses included in this Report

Analyte	Certifications
EPA 524.2 REV 4.1 in Water	
Total Trihalomethanes	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Total Trihalomethanes	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Bromodichloromethane	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Bromodichloromethane	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Bromoform	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Bromoform	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Chloroform	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Chloroform	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Dibromochloromethane	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
Dibromochloromethane	KY Drinking Water Mdv (00030) IN Drinking Water Mdv (C-KY-02) VA NELAC MDV (460210) WV Drinking Water Mdv (9959 M) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880)
EPA 552.3 in Water	
Bromoacetic Acid	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Bromoacetic Acid [2C]	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Dibromoacetic Acid	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Dibromoacetic Acid [2C]	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Dichloroacetic Acid	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Dichloroacetic Acid [2C]	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Monochloroacetic Acid	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Monochloroacetic Acid [2C]	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Trichloroacetic Acid	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Trichloroacetic Acid [2C]	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Total HAA5	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV
Total HAA5 [2C]	KY Drinking Water Mdv (00030) VA NELAC MDV (460210) TN Drinking Water (02819) ADEM Drinking Water Mdv (41880) NC Drinking Water (21706) IN Drinking Water Mdv (C-KY-02) FL Drinking Water Mdv (E871159) WV Drinking Water Mdv (9959 M) MS Drinking Water MADV

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Sample Acceptance Checklist for Work Order 4113738

Shipped By: UPS

Temperature: 2.80° Celcius

Condition	
Check if Custody Seals are Present/Intact	☐
Check if Custody Signatures are Present	☑
Check if Collector Signature Present	☑
Check if bottles are intact	☑
Check if bottles are correct	☑
Check if bottles have sufficient volume	☑
Check if samples received on ice	☑
Check if VOA headspace is acceptable	☑
Check if samples received in holding time.	☑
Check if samples are preserved properly	☑

Internal Transfer Chain of Custody

4113738

☐ Rush Multiplier_____X
☐ Samples Pre-Logged into eCOC

State Of Origin: WV
Cert. Needed: [X] Yes ☐ No
Owner Received Date: 11/8/2024 Results Requested By: 11/25/2024

Workorder: 30732801 Workorder Name: WV3301706

Report To

Beth Johnson
Pace Beaver West Virginia
225 Industrial Park RD
Beaver, WV 25813
Phone (800)999-0105

Subcontract To

Pace Analytical Madisonville
825 Industrial Rd
Madisonville, KY 42431
Phone (270)824-2211

Requested Analysis

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Other	Preserved Containers: MeOH					Trip Blank	WV DW HAA5	WV DW TTHM										LAB USE ONLY
1	48 UNION CAMP RD	PS	11/8/2024 10:03	30732801001	Drinking		3							X									X	S2THM1
2	48 UNION CAMP RD	PS	11/8/2024 10:03	30732801002	Drinking	3							X										X	S2HAA1
3	292 KOONS RUN RD	PS	11/8/2024 10:53	30732801003	Drinking		3							X									X	S2THM2
4	292 KOONS RUN RD	PS	11/8/2024 10:53	30732801004	Drinking	3							X										X	S2HAA2
5	TRIP BLANK	PS	11/8/2024 00:00	30732801005	Water		1					X											X	

Transfers	Released By	Date/Time	Received By	Date/Time
1	11-11-24	1431		11-12-24
2				1058
3				

Comments
WV3301706
RT
DS001
EM

Cooler Temperature on Receipt °C | Custody Seal Y or N | Received on Ice Y or N | Samples Intact Y or N

***In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.*

Thermometer Serial Number
230753815
240381205
Temperature 5.8 °C

INTER_LABORATORY WORK ORDER # 30732801

(To be completed by sending lab)

Ship To:
Pace Analytical Madisonville
825 Industrial Rd
Madisonville, KY 42431
Phone (270)824-2211

Sending Project No:	30732801
Receiving Project No:	
Check Box for Consolidated Invoice:	☐
Date Prepared:	11/11/24
REQUESTED COMPLETION DATE:	**11/25/2024**

Sending Region	IR30-Pittsburgh	Sending Project Mgr.	Beth Johnson
Receiving Region	IR44-Madisonville	External Client	GREATER HARRISON COUNTY PSD
State of Sample Origin	WV	QC Deliverable	PACKAGEEDD

All questions should be addressed to sending project manager.

Requested Reportable Units _____ Report Wet or Dry Weight? Wet _____ Cert. Needed _____

WORK REQUESTED

Method Description	Container Type	Quantity of containers	Preservative	Quantity of Samples	Acode	Acode Desc
WV DW HAA5	DG74		Other	2	SI-30MSSV	SUB PASI MSS
Trip Blank	VG9C		MeCl	1	SI-34MSV	SUB PASI MSV
WV DW TTHM	VG9C		MeCl	2	SI-34MSV	SUB PASI MSV

Special Requirements: Report F,QC Lmts,MDLs,Reg Lmts (F),West Virginia CMDP (1667)

FOR ANALYTICAL WORK COMPLETED THIS SECTION ALSO

Return Samples to Sending Region: ☐ Yes ☒ No

DISPOSITION of FORM

Original sent to the receiving lab - Copy kept at the sending lab.

When work completed: Original sent to the ABM at the receiving laboratory. Copies are made to corporate as needed.

Pace Analytical

CHAIN-OF-CUSTODY Analytical Request Document

Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

Chain-of-Custody is a LEGAL DOCUMENT - Complete all relevant fields

LAB USE ONLY- Affix Workorder/Login Label Here or List Pace Workorder Number or MTJL Log-In Number Here

WO# : 30732801

30732801

ALL BO

Container Pre

** Preservative Types: (1) nitric a
(5) methanol, (7) sodium bisulfate, (8) sodium thiosulfate, (9) hexane, (A) ascorbic acid, (B) ammonium sulfate,
(C) ammonium hydroxide, (D) TSP, (U) Unpreserved, (O) Other _____

Company: Greater Harrison Co. PSD
Address: PO BOX 190 West Milford WV 26451
Report To: Julia Childers jchilders@ghpsd.com
Copy To: Brenda Louk brenda.ghpsd@gmail.com
Customer Project Name/Number:

Billing Information: 151 Peninsula Park Ave West Milford WV 26451
Email To: jchilders@ghpsd.com
Site Collection Info/Address:
State: County/City: Time Zone Collected: [ ]PT [ ]MT [ ]CT [X]ET

Phone: 304-745-3463
Email: jchilders@ghpsd.com
Julia Childers

Site/Facility ID #:
Purchase Order # :
Quote #:
Collected By (signature): Julia Childers
Turnaround Date Required: November 12, 2024

Compliance Monitoring? [X] Yes [ ] No
DW PWS ID #: 3301706
DW Location Code:
Immediately Packed on Ice: [X] Yes [ ] No
Field Filtered (if applicable): [ ] Yes [X] No
Analysis: _____

Sample Disposal: [X] Dispose as appropriate [ ] Return [ ] Archive: _____ [ ] Hold:

Rush: (Expedite Charges Apply) [ ] Same Day [ ] Next Day [ ] 2 Day [ ] 3 Day [ ] 4 Day [x] 5 Day

* Matrix Codes (Insert in Matrix box below): Drinking Water (DW), Ground Water (GW), Wastewater (WW), Product (P), Soil/Solid (SL), Oil (OL), Wipe (WP), Air (AR), Tissue (TS), Bioassay (B), Vapor (V), Other (OT)

Customer Sample ID	Matrix *	Comp / Grab	Collected (or Composite Start) Date	Time	Composite End Date	Time	Res Cl	# of Ctns	Container Type: Plastic (P) or Glass (G)	TTHM &HAA5
48 Union Camp Rd	DW	Grab	11/8/2024	1003A	11/8/2024	1003A		1	G	x
292 Koons Run Rd	DW	Grab	11/8/2024	1053A	11/8/2024	1053A		1	G	x
* Trip Blank								1		

Analyses

Lab Profile/Line:

Lab Sample Receipt Checklist:
Custody Seals Present/Intact Y N NA
Custody Signatures Present Y N NA
Collector Signature Present Y N NA
Bottles Intact Y N NA
Correct Bottles Y N NA
Sufficient Volume Y N NA
Samples Received on Ice Y N NA
VOA - Headspace Acceptable Y N NA
USDA Regulated Soils Y N NA
Samples in Holding Time Y N NA
Residual Chlorine Present Y N NA
Cl Strips: _____
Sample pH Acceptable Y N NA
pH Strips: _____
Sulfide Present Y N NA
Lead Acetate Strips: _____

LAB USE ONLY:
Lab Sample # / Comments:

Customer Remarks / Special Conditions / Possible Hazards:

Type of Ice Used: Wet Blue Dry None
Packing Material Used:
Radichem sample(s) screened (<500 cpm): Y N NA

SHORT HOLDS PRESENT (<72 hours): Y N N/A
Lab Tracking #:
Samples received via: FEDEX UPS Client Courier Pace Courier

LAB Sample Temperature Info:
Temp Blank Received: Y N NA
Therm ID#: 5
Cooler 1 Temp Upon Receipt: 1.0C
Cooler 1 Therm Corr. Factor: 0.1C
Cooler 1 Corrected Temp: 1.1C
Comments: PR Recat. 2C 11/8/24

Relinquished by/Company: (Signature)	Date/Time:	Received by/Company: (Signature)	Date/Time:
Julia Childers GHCPSD	11-8-24 1222pm	BMM / PACE	11/8/24 13:22
BMM / PACE	11/8/24 14:00		11-8-24 1400
	11-8-24 1600	TB TB	11 8 24 1600 11 8 24 1800

MTJL LAB USE ONLY
Table #:
Acctnum:
Template:
Prelogin:
PM:
PB:

Trip Blank Received: Y N NA
HCL MeOH TSP Other

Non Conformance(s): YES / NO
Page: ____ of: ____

11-8-24 1800

MSDS SHEETS

CHEMICAL ADDITIVES

Rig No 11

Baker Hughes

SAFETY DATA SHEET

Packer Fluid

Section 1. Identification

Product name : CRW132 CORROSION INHIBITOR
Product code : CRW132

Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Corrosion Inhibitor.

Print date : 1/16/2020
Validation date : 1/16/2020
Version : 4.01

Supplier's details : Baker Petrolite LLC
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/SDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. CST, Monday - Friday) 281-276-5400

Emergency telephone number (with hours of operation) : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606
(001)281-276-5400
CHEMTREC Int'l 01-703-527-3887 (International 24 hour)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture : FLAMMABLE LIQUIDS - Category 3
ACUTE TOXICITY (oral) - Category 4
ACUTE TOXICITY (dermal) - Category 4
ACUTE TOXICITY (inhalation) - Category 4
SKIN IRRITATION - Category 2
SERIOUS EYE DAMAGE - Category 1
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (optic nerve) - Category 1
AQUATIC HAZARD (ACUTE) - Category 2

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : Flammable liquid and vapor.
Harmful if swallowed, in contact with skin or if inhaled.
Causes serious eye damage.
Causes skin irritation.
Causes damage to organs. (optic nerve)
Toxic to aquatic life.

Precautionary statements

Section 2. Hazards identification

Prevention : Wear protective gloves: > 8 hours (breakthrough time): Nitrile or Neoprene gloves. 4H gloves.. Wear eye or face protection. Wear protective clothing. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Do not breathe vapor. Do not eat, drink or smoke when using this product. Wash hands thoroughly after handling.

Response : IF exposed: Call a POISON CENTER or physician. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Call a POISON CENTER or physician if you feel unwell. Rinse mouth. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Call a POISON CENTER or physician if you feel unwell. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or physician.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

Supplemental label elements : Avoid contact with skin and clothing. Wash thoroughly after handling.

Hazards not otherwise classified : Prolonged or repeated contact may dry skin and cause irritation.

Section 3. Composition/information on ingredients

Substance/mixture : Mixture

Ingredient name	%	CAS number
Methanol	20 - 30	67-56-1
Quaternary ammonium compounds	5 - 10	Trade secret.
Alkylpyridine salts	5 - 10	Trade secret.
Ammonium bisulfite	1 - 5	10192-30-0

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Get medical attention immediately. Call a poison center or physician. Immediately flush the eye(s) continuously with lukewarm, gently flowing water for at least 20-60 minutes while holding the eyelid(s) open. Check for and remove any contact lenses. Chemical burns must be treated promptly by a physician.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Skin contact : Get medical attention immediately. Call a poison center or physician. Wash affected area with soap and mild detergent for at least 20 - 60 minutes. Wash skin thoroughly with soap and water or use recognized skin cleanser. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Chemical burns must be treated promptly by a physician. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Section 4. First aid measures

Ingestion : Wash out mouth with water. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway.

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Harmful if inhaled.

Skin contact : Harmful in contact with skin. Causes skin irritation. Defatting to the skin.

Ingestion : Harmful if swallowed.

Over-exposure signs/symptoms

Eye contact : pain,watering,redness

Inhalation : No specific data.

Skin contact : pain or irritation,redness,dryness,cracking,blistering may occur

Ingestion : stomach pains

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : Use dry chemical, CO_2, alcohol-resistant foam or water spray (fog).

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : Flammable liquid and vapor. Runoff to sewer may create fire or explosion hazard. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. The vapor/gas is heavier than air and will spread along the ground. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. This material is toxic to aquatic life. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Hazardous thermal decomposition products : carbon dioxide,carbon monoxide,nitrogen oxides,sulfur oxides,halogenated compounds

Section 5. Fire-fighting measures

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material. May be harmful to the environment if released in large quantities.

Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Avoid release to the environment. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use only non-sparking tools. Take precautionary measures against electrostatic discharges. Empty containers retain product residue and can be hazardous. Do not reuse container.

Section 7. Handling and storage

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Methanol	**ACGIH TLV (United States, 3/2018). Absorbed through skin.** STEL: 328 mg/m³, 0 times per shift, 15 minutes. STEL: 250 ppm, 0 times per shift, 15 minutes. TWA: 262 mg/m³, 0 times per shift, 8 hours. TWA: 200 ppm, 0 times per shift, 8 hours. **NIOSH REL (United States, 10/2016). Absorbed through skin.** STEL: 325 mg/m³, 0 times per shift, 15 minutes. STEL: 250 ppm, 0 times per shift, 15 minutes. TWA: 260 mg/m³, 0 times per shift, 10 hours. TWA: 200 ppm, 0 times per shift, 10 hours. **OSHA PEL (United States, 5/2018).** TWA: 260 mg/m³, 0 times per shift, 8 hours. TWA: 200 ppm, 0 times per shift, 8 hours. **OSHA PEL 1989 (United States, 3/1989). Absorbed through skin.** STEL: 325 mg/m³, 0 times per shift, 15 minutes. STEL: 250 ppm, 0 times per shift, 15 minutes. TWA: 260 mg/m³, 0 times per shift, 8 hours. TWA: 200 ppm, 0 times per shift, 8 hours.
Quaternary ammonium compounds	None.
Alkylpyridine salts	None.
Ammonium bisulfite	None.

Consult local authorities for acceptable exposure limits.

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

Appropriate engineering controls : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Section 8. Exposure controls/personal protection

Individual protection measures

Hygiene measures	: Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.
Eye/face protection	: Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles. If inhalation hazards exist, a full-face respirator may be required instead.
Hand protection	: Chemical-resistant gloves: Nitrile or Neoprene gloves. 4H gloves.
Skin protection	: Wear long sleeves and chemical resistant apron to prevent repeated or prolonged skin contact.
Respiratory protection	: If a risk assessment indicates it is necessary, use a properly fitted supplied air respirator complying with an approved standard. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Section 9. Physical and chemical properties

Appearance

Physical state	: Liquid.
Color	: Amber. [Dark]
Odor	: Pungent. Amine-like.
Odor threshold	: Not available.
pH	: 4 to 5
	: Neat - without dilution.
Melting/freezing point	: Not available.
Boiling point	: Not available.
Initial Boiling Point	: Not available.
Flash point	: Closed cup: 31.1°C (88°F) [PMCC]
Burning time	: Not applicable.
Burning rate	: Not applicable.
Evaporation rate	: Not available.
Flammability (solid, gas)	: Highly flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.
Lower and upper explosive (flammable) limits	: Not available.
Vapor pressure	: 45.5 kPa (341.3 mm Hg, 6.6 psig) @ 54.4°C, 130 F (Reid)
Vapor density	: >1 [Air = 1]
Relative density	: 0.97 (15.6°C)
Density	: 8.08 (lbs/gal)
Solubility in water	: Soluble
Partition coefficient: n-octanol/water	: Not available.
Auto-ignition temperature	: Not available.
Decomposition temperature	: Not available.
Viscosity	: Dynamic (15.6°C): 8 cP
VOC	: Not available.
Pour Point	: -40°C (-40°F)

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions to avoid : Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition. Do not allow vapor to accumulate in low or confined areas.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials and reducing materials.
Methanol is incompatible and may react with acetyl bromide, alkyl aluminum solutions, beryllium hydride, boron trichloride, nitric acid, cyanuric chloride, dichloromethane, diethylzinc, metals (granulated forms of aluminum and magnesium – including aluminum and zinc salts), phosphorus III oxide, and potassium tert-butoxide.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Methanol	LC50 Inhalation Gas.	Rat	145000 ppm	1 hours
	LC50 Inhalation Gas.	Rat	64000 ppm	4 hours
	LD50 Dermal	Rabbit	15800 mg/kg	-
	LD50 Oral	Human	500 mg/kg	-
	LD50 Oral	Rat	5600 mg/kg	-

Irritation/Corrosion

No applicable toxicity data

Sensitization

No applicable toxicity data

Mutagenicity

No applicable toxicity data

Carcinogenicity

No applicable toxicity data

Reproductive toxicity

No applicable toxicity data

Teratogenicity

No applicable toxicity data

Specific target organ toxicity (single exposure)

Name	Category	Route of exposure	Target organs
Methanol	Category 1	Oral	optic nerve

Section 11. Toxicological information

Specific target organ toxicity (repeated exposure)

Not applicable.

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Dermal, Inhalation.

Potential acute health effects

Eye contact : Causes serious eye damage.

Inhalation : Harmful if inhaled.

Skin contact : Harmful in contact with skin. Causes skin irritation. Defatting to the skin.

Ingestion : Harmful if swallowed.

Potential chronic health effects

General : Prolonged or repeated contact can defat the skin and lead to irritation, cracking and/or dermatitis.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

Route	ATE value
Oral	321.6 mg/kg
Dermal	1003.3 mg/kg
Inhalation (vapors)	10.03 mg/l

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Methanol	Acute EC50 16.912 mg/l Marine water	Algae - Ulva pertusa	96 hours
	Acute EC50 10000000 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 2500000 µg/l Marine water	Crustaceans - Crangon crangon	48 hours
	Acute LC50 100 mg/l Fresh water	Fish - Pimephales promelas	96 hours
	Chronic NOEC 9.96 mg/l Marine water	Algae - Ulva pertusa	96 hours
CRW132 CORROSION INHIBITOR	Acute LC50 2.61 mg/l	Daphnia	48 hours
	Acute LC50 3 ppm	Daphnia	48 hours
	Acute LC50 2.3 mg/l	Fish - Fathead minnow	96 hours
	Acute LC50 2.3 mg/l	Fish - Sheepshead minnow	96 hours

Persistence and degradability

Not available.

Section 12. Ecological information

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	TDG Classification	IMDG	IATA
UN number	UN1992	UN1992	UN1992	UN1992
UN proper shipping name	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Methanol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Methanol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Methanol)	FLAMMABLE LIQUID, TOXIC, N.O.S. (Contains: Methanol)
Transport hazard class(es)	3 (6.1) 	3 (6.1) 	3 (6.1) 	3 (6.1) 
Packing group	III	III	III	III
Environmental hazards	No.	No.	No.	No.

Additional information

DOT Classification : **Reportable quantity** 16722.2 lbs / 7591.9 kg [2067.6 gal / 7826.7 L]. Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

TDG Classification : Product classified as per the following sections of the Transportation of Dangerous Goods Regulations: 2.18-2.19 (Class 3), 2.26-2.36 (Class 6).

IMDG : **Emergency schedules** F-E S-D

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to Annex II of MARPOL and the IBC Code : Not available.

DOT Reportable Quantity Methanol, 2070 gal of this product.
Ammonium bisulfite, 24752 gal of this product.

Marine pollutant Not available.

Section 14. Transport information

North-America NAERG : 131

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 12(b) one-time export:** No products were found.
TSCA 12(b) annual export notification: No products were found.
United States inventory (TSCA 8b): All components are listed or exempted.
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: ammonium hydrogensulphite

United States - Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs):

List name	Status	Ingredient name	Name on list	Conc.
United States - Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)	Listed	Methanol	Methanol	20 - 30

SARA 302/304 : No products were found.

SARA 311/312

Classification : Fire hazard
Immediate (acute) health hazard

SARA 313

	Product name	CAS number	%
Supplier notification	Methanol Ammonium bisulfite	67-56-1 10192-30-0	20 - 30 1 - 5

California Prop. 65

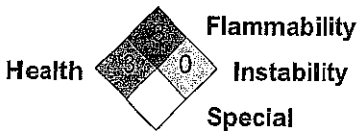
⚠ **WARNING:** This product can expose you to methanol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Canada

Canada (CEPA DSL): : All components are listed or exempted.

Section 16. Other information

National Fire Protection Association (U.S.A.)



History

Date of printing : 1/16/2020

Indicates information that has changed from previously issued version.

Notice to reader

NOTE: The information on this SDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This SDS was prepared and is to be used for this product. If the product is used as a component in another product, this SDS information may not be applicable.

Section 11

Groundwater Protection Plan

Section No. 11

Please see APPENDIX H for Ground Water Protection Plan for this facility.

4708701056

APPENDIX H

GROUNDWATER PROTECTION PLAN

Facility Name: Clover Produced Water Disposal

County: Roane

Facility Location:

Postal Service Address:	Kaufman Rd, Spencer, WV 25276		
Latitude :	38 Degrees 45' 32"	Longitude:	81 Degrees 15' 45"

Contact Information:

Person:	Brad Morris
Phone Number:	681-229-1558
E-mail Address:	bmorris@topdrilling.com

Date: 12/15/24

1. A list of all operations that may contaminate the groundwater.

Tank failure / leak
Pipeline failure / leak
Fluids (bactericide, corrosion inhibitor, etc) transfer
Stuffing box failure
well completion / work over activities

2. A description of procedures and facilities used to protect groundwater quality from the list of potential contaminant sources above.

Secondary containment is installed around tanks adequate to hold the volume of the largest tank. Pipelines are routinely monitored and patrolled for leaks. Pipelines are registered with the WV 811 to minimize possibility of being damaged by others. Pressure monitoring - Shut down controls on pump. Work over fluids are properly contained and disposed of. The injection well is monitored for mechanical integrity failures and pressure tested ever five years.

3. List procedures to be used when designing and adding new equipment or operations.

Non corrosive materials are utilized as much as possible. Shut down controls installed on injection pump.

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

This facility is currently covered by an existing UIC permit No. 2D0871056. Storage tanks are registered under WV Tank regulations. Any Spills or leaks are reported to WVDEP / EPA.

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

There are no known ground water quality issues in this area. Only two of the residences with in the AOR utilize water wells for domestic use. The analytical results from these two wells are enclosed with this application.

6. Provide a statement that no waste material will be used for deicing or fill material on the property unless allowed by another rule.

No waste material is or will be used for deicing or fill material.

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

The operators of this facility are instructed to routinely monitor tank conditions, secondary containment conditions, and patrol injection lines. They are trained yearly regarding ground water protection. Part of this training involves prevention of oil & chemical spills and the prompt clean up / remediation of any spills. Prior to the release of any storm water from secondary containment it is tested t assure that it meets guidelines for discharge.

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8. Include provisions for inspections of all GPP elements and equipment. Inspections must be made quarterly at a minimum.

Secondary containment, pipelines, and injection equipment are inspected and documented a minimum of every 90 days. The injection well and producing wells are visited several times weekly. The wellheads are inspected for any indication of mechanical integrity. Any issues are addressed when discovered. The majority of the production piplines and the injection lines are located parallel to roadways which are traveled several times weekly.

Signature: Brad J Morris

Date: 12/15/24

Section 12

Plugging and Abandonment

Section No. 12

This injection well has surface casing set at 466' and cemented to surface. The 4 ½" casing is set at 2272' and cemented to approximately 2025'. See schematic – Fig No. 4. The well will be plugged to the standards set by WVDEP at the time it is plugged. If this well was to be plugged today it would be plugged as follows:

Plug No. 1- 2200'-2100'

Free point, cut, & POH w/ 4 1/2" casing – est 1975'

Plug No. 2 -2025'-1925' (adjusted for casing cut above)

Plug No. 3 -1110'-1010'

Plug No. 4 – 515'-415' (base of surface casing)

Plug No. 5 – 100'-0'

6 % gel between cement plugs.

Section 13

Additional Bonding

Section No. 13

An additional $5000 bond was posted at the time Delta Helix Energy LLC purchased these assets, and the bond will remain in place.

Section 14

Financial Responsibility

Section No. 14

See APPENDIX I

APPENDIX I

Requirement for Financial Responsibility to Plug/Abandon an Injection Well

In accordance with WV Code 47CSR13.13.7.g, all UIC permits shall require the permittee to maintain financial responsibility and resources to close, plug, and abandon underground injection wells in a manner prescribed by the Chief. The permittee must show evidence of financial responsibility to the Chief by submission of a surety bond, or other adequate assurance, such as a financial statement or other material acceptable to the Chief. This certification must be signed by one of the following:

1. For a corporation: by a principle corporate officer of at least the level of vice-president;
2. For a partnership or sole proprietorship: by a general partner or the proprietor, respectively;
3. For a municipality, State, Federal, or other public agency: by either a principle executive officer or ranking elected official;
4. Or a duly authorized representative in accordance with 47CSR13.13.11.b.
   (A person may be duly authorized by one of the primary entities (1-3) listed above by submitting a written authorization to the Chief of the WVDEP Office of Oil and Gas designating an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility. A duly authorized representative may thus be either a named individual or any individual occupying a named position.)

Delta Helix Energy, LLC

(Company Name)

2D0871056-002

(UIC Permit Number)

I certify in accordance with 47CSR13.13.7.g., that the company/permit holder cited above will maintain financial responsibility and resources to close, plug, and abandon underground injection wells(s) in a manner prescribed by the Chief of the Office of Oil and Gas and that documents to support this requirement are on record with the same.

B Douglas Haught

(Print Name)

CEO

(Print Title)

(Signature)

12-18-24

(Date)

Section 15

Site Security Plan

Section No. 15

This injection facility is remotely located and accessed via a roadway shared with a few residences. When unattended a locked gate blocks access to this facility. Please see APPENDIX J

APPENDIX J

Site Security for Commercial Facilities

Provide a detailed description of the method(s) utilized at the facility to restrict or prohibit illegal dumping of unauthorized waste or vandalism at the facility.

1. Complete enclosure of all wells, holding tank/pits and manifold assemblies within a chain link or other suitable fencing; and

2. Require that all gates and other entry points be locked when the facility is unattended; or

3. Providing tamper-proof seals for the master valve on each well (a "lock-out" or chain & padlock system would be more secure; however, these devices could create a potential safety hazard if the well needed to be quickly shut in due to an emergency); and

4. Installing locking caps on all valves and connections on holding tanks, unloading racks, and headers.

This is not a commercial facility

Section 16

Additional Information

Section No. 16

See APPENDIX K

APPENDIX K

Identify permit or construction approvals received or applied for under the following programs:

Permit/approvals	ID Number
Hazardous Waste Management Program under RCRA	
NPDES Program	
Prevention of Significant Deterioration (PSD)	
Nonattainment Program	
Dredge or Fill	
NPDES/NPDES – Stormwater	
WVDEP – Office of Waste Management (OWM) – Solid Waste Facility	
WVDEP – OWM – RCRA (Hazardous Waste TSD or Transporter)	
WVDEP – OWM – UST	
CERCLA – Superfund	
WV Voluntary Remediation – Brownfields	
FIFRA – Federal Insecticide, Fungicide and Rodenticide Act	
Well Head Protection Program (WHPP)	
Underground Injection Control (UIC)	2D0871056-002
Toxic Substances Control Act (TSCA)	
Best Management Plans	
Management of Used Oil	
Other Relevant Permits (Specify):	
WV DEP Tank Registrations	See Appendix B

2D08701056

Delta Helix Energy, LLC

Wells in the Area of Review

4708701056

APPENDIX C

Wells within the Area of Review

	API No.	Well No.	Well Type	Well Status	Northing	Easting	Penetrate Injection Zone	Penetrate Confining Zone	Total Vertical Depth	Surface Elevation
1	4708700955	Wines 7	Gas Prod	Active	4290299.5	476794.4	Y	Y	2278	1095
2	4708700988	W-8	Oil Prod	Active	4289673.2	477190.2	Y	Y	2430	1225
3	4708700994	W-12	Oil Prod	Active	4290143.6	476912.3	Y	Y	2380	1152
4	4708700995	W-13	Oil Prod	Active	4290388.4	477106.1	Y	Y	2313	1096
5	4708701032	W-16	Gas Prod	Active	4289685.6	477409.7	Y	Y	2371	1163
6	4708701053	W-17	Oil Prod	Active	4289888.7	477092.4	Y	Y	2190	971
7	4708701055	W-18	Gas Prod	Active	4289919.8	477488.3	Y	Y	2097	875
8	4708701056	W-19	Injector	Active	4290082.0	477216.0	Y	Y	2277	1061
9	4708701068	W-20	Oil Prod	Active	4290470.8	477304.6	Y	Y	2255	1022
10	4708701079	W-21	Oil Prod	Active	4290255.7	477520.7	Y	Y	2260	1046

4708700955

Wines 7

WVGES GEOLOGY UNDERLIES IT ALL "Pipeline"

Select County: (087) Roane
Enter Permit #: 955
Get Data | Reset

Select datatypes: (Check All)
Location | Production | Plugging
Owner/Completion | Stratigraphy | Sample
Pay/Show/Water | Logs | Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 955 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:06:45 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708700955	Roane	955	Spencer	Spencer	Spencer	38.761096	-81.267093	476794.4	4290299.5

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708700955	8/-/1964	Original Loc	Completed	Cora & C H Wine	7					J & B Oil Co.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_AFT
4708700955	8/-/1964	-/-/-	1095	Ground Level	Triplett	Price Fm & equivs	Price Fm & equivs	Development Well	Development Well	Oil and Gas	unknown	Fractured	2278		2278		0	300

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708700955	8/-/1964	Pay	Oil & Gas	Vertical			2238	Big Injun (Price&eq)	0	0			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700955	J & B Drilling Operation	1983	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown Farm	1987	52	0	0	0	0	0	0	0	9	14	12	9	8
4708700955	McKown Farm	1988	445	37	64	52	45	11	0	0	53	48	49	46	40
4708700955	McKown Farm	1989	495	43	32	44	46	47	0	38	58	55	52	51	29
4708700955	McKown Farm	1990	527	50	46	50	46	44	30	19	51	48	48	49	46
4708700955	McKown Farm	1991	466	45	40	47	44	49	33	1	38	42	41	43	43
4708700955	McKown Farm	1992	487	41	36	39	43	44	39	41	46	44	40	31	43
4708700955	McKown Farm	1993	480	39	42	44	25	39	37	65	35	37	41	39	37
4708700955	McKown, C. I. & Son, Inc.	1994	467	19	38	48	42	44	30	35	49	38	46	41	37
4708700955	McKown, C. I. & Son, Inc.	1995	517	46	44	48	40	46	44	43	36	41	45	38	46
4708700955	McKown, C. I. & Son, Inc.	1996	487	34	24	24	36	43	104	45	21	44	41	41	30
4708700955	McKown, C. I. & Son, Inc.	1997	450	34	33	31	43	34	44	39	38	25	37	44	48
4708700955	McKown, C. I. & Son, Inc.	1998	457	30	36	33	46	24	67	36	33	43	38	31	40
4708700955	McKown, C. I. & Son, Inc.	1999	502	24	32	35	32	33	16	40	81	69	73	35	32
4708700955	McKown, C. I. & Son, Inc.	2002	331	31	28	27	30	30	28	29	28	25	27	21	27
4708700955	McKown, C. I. & Son, Inc.	2004	364	29	28	30	38	33	31	30	28	28	31	29	29
4708700955	McKown, C. I. & Son, Inc.	2005	364	27	23	28	34	35	35	28	34	32	32	30	26
4708700955	McKown, C. I. & Son, Inc.	2006	319	27	24	28	24	30	29	28	27	26	28	24	24
4708700955	McKown, C. I. & Son, Inc.	2007	286	20	18	25	26	24	24	24	21	27	30	24	23
4708700955	McKown, C. I. & Son, Inc.	2008	223	21	19	21	18	24	20	21	16	11	10	21	21
4708700955	McKown, C. I. & Son, Inc.	2009	254	17	17	19	20	26	24	21	20	24	23	23	20
4708700955	McKown, C. I. & Son, Inc.	2010	228	18	16	21	22	24	20	19	19	17	20	17	15
4708700955	McKown, C. I. & Son, Inc.	2011	225	12	14	21	21	21	24	21	16	21	21	19	14
4708700955	McKown, C. I. & Son, Inc.	2013	173	11	15	18	20	14	16	7	17	18	11	19	7
4708700955	McKown, C. I. & Son, Inc.	2014	153	13	14	14	16	14	13	11	12	9	12	10	15
4708700955	McKown, C. I. & Son, Inc.	2015	201	16	15	10	15	20	23	20	19	17	19	16	11
4708700955	McKown, C. I. & Son, Inc.	2016	108	13	11	14	14	15	11	6	3	3	3	8	7
4708700955	McKown, C. I. & Son, Inc.	2017	194	14	13	19	62	12	11	12	10	8	11	11	11
4708700955	McKown, C. I. & Son, Inc.	2018	98	3	15	12	12	8	9	9	1	4	6	8	11
4708700955	McKown, C. I. & Son, Inc.	2019	76	9	9	9	9	10	6	7	6	4	0	1	6
4708700955	McKown, C. I. & Son, Inc.	2020	61	6	6	12	15	11	6	0	4	1	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2021	112	0	2	16	16	16	11	14	6	10	6	9	6
4708700955	McKown, C. I. & Son, Inc.	2022	119	6	16	12	5	10	14	12	8	14	8	6	8
4708700955	McKown, C. I. & Son, Inc.	2023	44	8	4	3	2	4	6	6	1	3	3	3	1

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700955	J & B Drilling Operation	1983	177	0	0	60	0	0	0	0	60	0	0	0	57
4708700955	McKown Farm	1987	64	0	0	0	0	0	0	0	12	19	12	11	10
4708700955	McKown Farm	1988	96	7	7	7	7	7	7	9	9	9	9	9	9
4708700955	McKown Farm	1989	74	8	6	6	6	6	6	6	6	6	6	6	6
4708700955	McKown Farm	1990	60	5	5	5	5	5	5	5	5	5	5	5	5
4708700955	McKown Farm	1991	60	5	5	5	5	5	5	5	5	5	5	5	5
4708700955	McKown Farm	1992	120	10	10	10	10	10	10	10	10	10	10	10	10
4708700955	McKown Farm	1993	64	5	5	5	5	5	5	5	5	6	6	6	6
4708700955	McKown, C. I. & Son, Inc.	1994	60	5	5	5	5	5	5	5	5	5	5	5	5
4708700955	McKown, C. I. & Son, Inc.	1995	64	5	5	5	5	5	5	5	5	6	6	6	6
4708700955	McKown, C. I. & Son, Inc.	1996	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	1997	112	10	10	10	10	9	9	9	9	9	9	9	9
4708700955	McKown, C. I. & Son, Inc.	1998													
4708700955	McKown, C. I. & Son, Inc.	1999	65	6	6	6	6	6	5	5	5	5	5	5	5
4708700955	McKown, C. I. & Son, Inc.	2002	55	4	4	4	4	4	5	5	5	5	5	5	5
4708700955	McKown, C. I. & Son, Inc.	2004	33	3	3	3	3	3	3	3	3	3	2	2	2
4708700955	McKown, C. I. & Son, Inc.	2005	49	5	4	4	4	4	4	4	4	4	4	4	4
4708700955	McKown, C. I. & Son, Inc.	2006	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2007	23	2	2	2	2	2	2	2	2	2	2	2	1
4708700955	McKown, C. I. & Son, Inc.	2008	13	2	1	1	1	1	1	1	1	1	1	1	1
4708700955	McKown, C. I. & Son, Inc.	2009	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2010	13	1	1	1	1	1	1	1	1	1	1	1	2
4708700955	McKown, C. I. & Son, Inc.	2011	12	1	1	1	1	1	1	1	1	1	1	1	1
4708700955	McKown, C. I. & Son, Inc.	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2014	32	3	3	3	3	3	3	3	3	2	2	2	2
4708700955	McKown, C. I. & Son, Inc.	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2016	0												
4708700955	McKown, C. I. & Son, Inc.	2017	0												
4708700955	McKown, C. I. & Son, Inc.	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700955	McKown, C. I. & Son, Inc.	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2016	0												
4708700955	McKown, C. I. & Son, Inc.	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

4708700955

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700955	McKown, C. I. & Son, Inc.	2016	0												
4708700955	McKown, C. I. & Son, Inc.	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700955	McKown, C. I. & Son, Inc.	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4708700955	Original Loc	Mahonig Ss/Big Dunk	Past WVGES Staff Geologst	245	Reasonable	35	Reasonable	1095	Ground Level
4708700955	Original Loc	Maxton	Well Record	1940	Reasonable	5	Reasonable	1095	Ground Level
4708700955	Original Loc	Little Lime	Past WVGES Staff Geologst	2028	Reasonable	37	Reasonable	1095	Ground Level
4708700955	Original Loc	Pencil Cave	Well Record	2065	Reasonable	10	Reasonable	1095	Ground Level
4708700955	Original Loc	Greenbrier Group	Past WVGES Staff Geologst	2075	Reasonable	110	Reasonable	1095	Ground Level
4708700955	Original Loc	Big Lime	Well Record	2075	Reasonable	110	Reasonable	1095	Ground Level
4708700955	Original Loc	Big Injun (Price&eq)	Past WVGES Staff Geologst	2185	Reasonable	53	Reasonable	1095	Ground Level
4708700955	Original Loc	Squaw	Well Record	2243	Reasonable	7	Reasonable	1095	Ground Level

Wireline (E-Log) Information:

* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

OG-10

4708700955

1-3-66 WO

Wines 7

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION 10

WELL RECORD

Quadrangle Spencer

Permit No. Renewed ROA 955

Oil or Gas Well Comb' (KIND)

Company J & B Oil Company, Inc.
Address 339½ Market St., Spencer, W. Va.
Farm C. H. & Cora Wines Acres 90.33
Location (waters) Boggs Fork
Well No. 7 Elev. 1094.84'
District Spencer County Roane
The surface of tract is owned in fee by C. H. Wines, etal
Address Spencer, W. Va.
Mineral rights are owned by C. H. Wines, etal
Address Spencer, W. Va.
Drilling commenced June 26, 1964
Drilling completed August 7, 1964
Date Shot From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Insufficient to Test Cu. Ft.
Rock Pressure " lbs. " hrs.
Oil Insufficient to Test bbls., 1st 24 hrs.
WELL ACIDIZED No

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer
13			
10			Size of
8¼			
6⅝			Depth set
5 3/16			
4½	2273	2273	Perf. top
2			Perf. bottom
Liners Used			Perf. top
			Perf. bottom

CASING CEMENTED 4½ SIZE 2273 No. Ft. 7/29/64 Date

COAL WAS ENCOUNTERED AT FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 41,000Gal Water-250 gal Dowell X, 125 lbs J100,35 Gal Detergent 40 Gal Frefloc-1 Gal F33-1 Gal W 9 45,000 Sand

RESULT AFTER TREATMENT 300 Initial in 24 hrs--15 bbls.
ROCK PRESSURE AFTER TREATMENT

Fresh Water Feet Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Sand			0	10			
Red Rock			10	50			
Sand			50	60			
Red Rock			60	100			
Sand			100	165			
Slate & Shells			165	200			
Red Rock			200	220			
Sand		Hard	220	229			
Red Rock			229	245			
Sand, Dunkard			245	280			
Red Rock			280	295			
Slate & Shells			295	325			
Red Rock			325	390			
Slate & Shells			390	415			
Red Rock			415	434			
Slate & Shells			434	450			
Sand			450	465			
Red Rock			465	480			
Slate& Shells			480	540			
Sand			540	575			
Slate	White		575	620			
Slate	Blue		620	685			
Red Rock			685	705			
Slate & Shells			705	730			
Sand			730	750			
Red Rock			750	780			
Slate & Shells			780	790			
Red Rock			790	1010			
Slate	Blue		1010	1065			
Sand			1065	1159			

(over)

4708700955

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth Found	Remarks
			10	0			
Slate & Shells			1159	1250			
Salt Sand			1250	1390			
Slate			1390	1400			
Sand			1400	1510			
Slate	Black		1510	1545			
Sand			1545	1585			
Slate	Black		1585	1630			
Sand			1630	1660			
Slate	Black		1660	1695			
Salt Sand			1695	1730			
Slate			1730	1740			
Sand Salt			1740	1900			
Slate & Shells			1900	1905			
Little Lime			1905	1925			
Slate	Black		1925	1940			
Maxon Sand			1940	1945			
Slate	Black		1945	1985			
Sand			1985	2028			
Lime			2028	2065			
Pencil Cave			2065	2075			
Big Lime			2075	2185			
Injun Sand			2185	2238			
Slate			2238	2243			
Squaw Sand			2243	2250			
Slate	Black		2250	2255			
Lime			2255	2260			
Slate			2260	2278	Total Depth		
			10	0			
			0	10			

Date August, 1964

APPROVED J & B Oil Company, Inc., Owner
Allen Board

By Allen Board (Title)

4708700988

W-8

WVGES
GEOLOGY UNDERLIES IT ALL
"Pipeline"

Select County: (087) Roane
Enter Permit #: 988
Get Data | Reset

Select datatypes: (Check All)
Location, Production, Plugging, Owner/Completion, Stratigraphy, Sample, Pay/Show/Water, Logs, Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 988 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:11:08 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708700988	Roane	988	Smithfield	Spencer	Spencer	38.755462	-81.262517	477190.2	4289673.2

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST
4708700988	1/13/1964	Original Loc	Completed	W Kaufman, E Walbrown		W-8			Alfred M Oppenheimer II	Wolf's Head Oil Refining Co., Inc.			
4708700988	10/26/1972	Worked Over	Completed	W Kaufman, K Miller		W-8			Alfred M Oppenheimer II	Pennzoil Company			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_E
4708700988	1/13/1964	12/17/1963	1225	Ground Level	Clvr-Rsh Rn	Undf PRICE blw INJN	Big Injun (Price&eq)	Development Well	Development Well	Oil and Gas	Rotary	Fractured	2430		2430		
4708700988	10/26/1972	-/-/-	1225	Ground Level	Clvr-Rsh Rn	Undf PRICE blw INJN	Big Injun (Price&eq)	Development Well	Development Well	Oil	unknown	Acid+Frac	2430		0		

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708700988	10/26/1972	Pay	Oil	Vertical	2276	Big Lime	2282	Big Lime	0	4			
4708700988	1/13/1964	Pay	Oil	Vertical	2362	Big Injun (Price&eq)	2379	Big Injun (Price&eq)	0	38			
4708700988	1/13/1964	Pay	Gas	Vertical	2362	Big Injun (Price&eq)	2379	Big Injun (Price&eq)	0	38			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700988	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Company	1984	1,470	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Products Company	1989	1,299	134	94	99	106	136	91	119	94	105	127	99	95
4708700988	Pennzoil Products Company	1990	1,398	103	68	114	91	99	117	157	140	139	145	124	101
4708700988	Pennzoil Products Company	1991	1,046	114	76	62	19	101	100	115	85	80	116	85	93
4708700988	Pennzoil Products Company	1992	918	93	46	67	66	81	78	97	87	70	87	74	72
4708700988	Pennzoil Products Company	1993	696	52	69	69	34	66	68	65	49	46	61	56	61
4708700988	Pennzoil Products Company	1994	645	63	66	49	51	62	57	66	49	32	57	44	49
4708700988	Pennzoil Products Company	1995	514	44	61	49	41	46	41	42	36	44	29	40	41
4708700988	Pennzoil Products Company	1996	413	21	1	52	44	36	38	33	33	43	30	41	41
4708700988	Pennzoil Products Company	1997	446	49	37	35	30	32	31	34	36	30	32	44	56
4708700988	Pennzoil Products Company	1998	410	55	44	43	40	44	46	29	24	21	22	20	22
4708700988	Pennzoil Products Company	1999	239	46	48	27	22	15	0	0	12	12	21	22	14
4708700988	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708700988	East Resources, Inc.	2001	370	7	0	0	0	55	64	66	35	11	62	63	7
4708700988	East Resources, Inc.	2002	590	51	47	49	47	47	50	53	55	57	46	27	61
4708700988	East Resources, Inc.	2003	1,000	33	21	116	295	94	92	82	71	76	86	0	34
4708700988	East Resources, Inc.	2004	936	98	81	56	66	98	122	88	101	113	29	27	57
4708700988	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708700988	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708700988	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708700988	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708700988	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708700988	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708700988	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708700988	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708700988	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708700988	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708700988	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708700988	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708700988	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708700988	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708700988	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708700988	HG Energy, LLC	2021	583	54	41	54	56	57	56	59	0	52	51	48	55
4708700988	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708700988	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28
4708700988	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700988	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Company	1983	445	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Pennzoil Products Company	1989	265	25	24	27	21	22	20	23	22	21	23	20	17
4708700988	Pennzoil Products Company	1990	292	23	19	24	30	30	29	30	24	24	22	22	15
4708700988	Pennzoil Products Company	1991	189	14	4	21	19	20	16	14	20	16	18	17	10
4708700988	Pennzoil Products Company	1992	177	16	16	16	15	17	15	13	17	14	15	10	13
4708700988	Pennzoil Products Company	1993	150	14	10	13	15	14	11	10	13	12	12	12	14
4708700988	Pennzoil Products Company	1994	134	10	12	15	13	13	10	7	12	9	11	9	13
4708700988	Pennzoil Products Company	1995	86	10	8	10	9	9	7	9	6	9	9	0	0
4708700988	Pennzoil Products Company	1996	115	14	12	9	9	7	6	9	10	9	9	12	9
4708700988	Pennzoil Products Company	1997	94	8	8	9	8	9	9	5	7	7	9	9	6
4708700988	Pennzoil Products Company	1998	79	9	8	9	9	3	0	0	0	0	0	25	16
4708700988	Pennzoil Products Company	1999	33	14	15	4	0	0	0	0	0	0	0	0	0
4708700988	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	East Resources, Inc.	2001	128	0	0	0	0	21	20	23	9	3	20	16	16
4708700988	East Resources, Inc.	2002	179	14	18	15	14	15	17	22	15	16	12	6	15
4708700988	East Resources, Inc.	2003	220	15	7	7	38	33	30	20	15	23	21	0	11
4708700988	East Resources, Inc.	2004	277	15	26	20	20	23	29	21	27	29	19	24	24
4708700988	East Resources, Inc.	2005	311	18	31	37	30	32	30	24	32	33	24	10	10
4708700988	East Resources, Inc.	2006	81	9	5	5	9	8	7	7	0	6	9	8	8
4708700988	East Resources, Inc.	2007	131	8	7	10	11	21	16	12	12	8	10	9	7
4708700988	East Resources, Inc.	2008	86	6	8	9	9	8	8	9	8	4	7	5	5
4708700988	East Resources, Inc.	2010	148	11	15	14	18	0	12	19	13	11	16	10	9
4708700988	East Resources, Inc.	2011	113	7	11	12	8	8	10	8	11	8	9	11	10
4708700988	HG Energy, LLC	2012	151	8	11	14	16	16	7	2	10	4	27	20	16
4708700988	HG Energy, LLC	2013	194	20	24	11	9	15	13	13	22	17	21	16	13
4708700988	HG Energy, LLC	2014	152	13	18	14	16	17	14	13	14	9	8	6	10
4708700988	HG Energy, LLC	2015	142	11	9	14	17	11	13	13	11	8	10	11	14
4708700988	HG Energy, LLC	2016	123	9	12	12	10	11	14	9	15	8	7	6	10
4708700988	HG Energy, LLC	2017	33	7								6	5	9	6
4708700988	HG Energy, LLC	2018	76	8	8	7	4	6	8	6	5	4	7	5	8
4708700988	HG Energy, LLC	2019	88	11	5	7	8	10	6	8	4	5	10	7	7
4708700988	HG Energy, LLC	2020	91	8	8	6	10	8	7	10	7	8	5	5	9
4708700988	HG Energy, LLC	2021	93	8	6	7	8	6	10	7	9	8	7	7	10
4708700988	HG Energy, LLC	2022	89	8	6	10	7	9	7	8	8	8	8	5	5
4708700988	Delta Helix Energy, LLC	2023	8	0	0	0	0	0	0	0	0	0	0	4	4
4708700988	HG Energy, LLC	2023	64	6	6	6	7	9	7	7	5	4	7	0	0

4708700988

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700988	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2016	0												
4708700988	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700988	HG Energy, LLC	2016	0												
4708700988	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700988	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4708700988	Original Loc	Little Lime	Well Record	2166	Reasonable	49	Reasonable	1225	Ground Level
4708700988	Original Loc	Greenbrier Group	Past WVGES Staff Geologst	2215	Reasonable	147	Reasonable	1225	Ground Level
4708700988	Original Loc	Big Lime	Well Record	2215	Reasonable	133	Reasonable	1225	Ground Level
4708700988	Original Loc	Keener	Well Record	2348	Reasonable	14	Reasonable	1225	Ground Level
4708700988	Original Loc	Big Injun (Price&eq)	Past WVGES Staff Geologst	2362	Reasonable	17	Reasonable	1225	Ground Level
4708700988	Original Loc	Undf PRICE blw INJN	Well Record	2379	Reasonable	0	Reasonable	1225	Ground Level

Wireline (E-Log) Information:

* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708700988

W-8

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION

WELL RECORD

Quadrangle SPENCER

Permit No. ROA-988

Oil or Gas Well Comb. (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres > 800
Location (waters) Millstone Run
Well No. W-8 Elev. 1,224.85
District Smithfield County Roane
The surface of tract is owned in fee by Eugene Walbrown
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al.
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced December 17, 1963
Drilling completed January 13, 1964
Date Shot - From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Show Oil & Gas (Drilled w/Rotary) Cu. Ft.
Rock Pressure None Taken lbs. hrs.
Oil bbls. 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe-Float Collar Guide Shoe
13			
10			Size of 8 5/8"OD 4½"OD 4½"OD
8 5/8"	266'	266'	
6⅝			Depth set 2389' 2427'
~~XXXX~~ 4½"	2427'	2427'	
3			Perf. top
2 3/8"Tbg.	2379'	2379'	Perf. bottom
Liners Used			Perf. top
			Perf. bottom

CASING CEMENTED 8 5/8" SIZE 266 No. Ft. 12/20/63 Date
4½" 2427 1/14/64

COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 1/22/64 Used: 40,000 Gals. Water, 45,000 Lbs. Sand, 40 Gals. Morflo, 30 Gals. Suds, 300 Gals. Acid 15% MCA and 350 Lbs. WAC-8.
RESULT AFTER TREATMENT Gas - 38,000 Cu. Ft. Oil - 38 Bbls.
ROCK PRESSURE AFTER TREATMENT 500 Lbs.
Fresh Water - Feet Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Shale			0	850			
Red Rock			850	949			
Shale			949	1400			
Sand			1400	1480			
Shale			1480	1485			
Sand			1485	1525			
Sandy Shale			1525	1540			
Sand			1540	1685			
Shale			1685	1725			
Sand			1725	1765			
Shale			1765	1775			
Sand			1775	1875			
Sand & Lime			1875	1910			
Shale			1910	1925			
Lime-Shale			1925	1975			
Sand			1975	2005			
Sand & Chert			2005	2040			
Lime & Sand			2040	2100			
Sandy Shale			2100	2125			
Shale			2125	2166			
Little Lime			2166	2215			
Big Lime			2215	2348			
Keener Sand			2348	2362			
Big Injun			2362	2379	Oil & Gas	2362-2379	Show Only
Shale			2379	2430			
4½" Casing				2427			
TOTAL DEPTH				2430			

(over)

7

4708700988

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth Found	Remarks

Date February 4, 1964

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

4708700988
W-8

NEW WELL REPORT – CONT'D.

INITIAL TORPEDO RECORD	CASING AND TUBING RECORD						
	SIZE	PUT IN WELL			PULLED OUT		
		TRANSFER NO.	FEET	INCH	TRANSFER NO.	FEET	INC
Date of Shot	8-5/8"	8.L.M.	256	0			
Name of Torpedo Co.	4½"OD	3L.M.	2127	0			
No. of Quarts	2-3/8"						
Length of Shell	Tbg.	Tally	2377	0			
Diameter of Shell							
Length of Anchor							
Top of Shot							
Bottom of Shot							
Feet of Fluid in Hole When Shot							
Results:							

INITIAL PRODUCTION FIRST 24 HOURS	PACKER RECORD			
	KIND	SIZE	DEPTH SET	DATE SET
Open Flow /10ths Water in ____ Inch	Steel Shoe	8-5/8" OD	256'	12-20-63
____ /10ths Merc. in ____ Inch	Float Collar	4½" OD	2377'	1-11-64
Volume Show Oil & Gas (Drilled w/Rotary) Cu. Ft.	Guide Shoe	4½" OD	2127'	1-11-64
Rock Pressure None Taken lbs. ____ hrs.				
Oil ____ bbls., First 24 hrs.				

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED ____

DATE WELL FRACTURED 1-22-64

NAME OF COMPANY Halliburton Company

(List below materials used in Acidizing of Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).

Used: 60,000 Gals. Water
Used: 65,000 Lbs. Sand
Used: 40 Gals. Nonfle
Used: 30 Gals. Buds
Used: 500 w 15% Acid 15% HCL
Used: 35 Lbs. WAC-8

BREAKDOWN PRESSURE Good
PUMPING PRESSURE Low to 2500# 20 Min.
AVERAGE PUMPING RATE/MINUTE 15 Bbls.
PUMPING TIME 30,000
RESULT AFTER TREATMENT | GAS 30 Bbls. CU. FT.
OIL Stuff BBLS.
ROCK PRESSURE AFTER TREATMENT ____ LBS.

E-M

CASING CEMENTED

Surface Set

	SIZE	FT.	DATE
8-5/8"	256	12-20-63	
4½"	2127	1-11-64	

USED IN CEMENTING 8-5/8" CASING:
35 - Bags Cement
1 - Bag Calcium Chloride
Cemented by: Well Service, Inc.

USED IN CEMENTING 4½" CASING:
65 - Bags Cement
500 - Gals. Mud Acid
Cemented by: Howell

REMARKS: Drilled 10-5/8" hole from Surface to 256'
Drilled 7-7/8" hole from 256' to 2127'

Note: Rotary Tools Used.
Note: 5 Centralizers Used.

Note: Approx. 80' of 8-5/8" casing was damaged beyond repair by Contractor.

Note: This well drilled according to Rule 11, under Section 13 of Article 4, Chapter 82 of the Code of the Department of Mines, Oil and Gas Division.

APPROVED

C. C. Crouser
SUPERINTENDENT

4708700994

W-12

WVGES GEOLOGY UNDERLIES IT ALL "Pipeline"

Select County: (087) Roane
Enter Permit #: 994
Get Data | Reset

Select datatypes: (Check All)
Location, Production, Plugging, Owner/Completion, Stratigraphy, Sample, Pay/Show/Water, Logs, Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 994 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:05:48 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708700994	Roane	994	Smithfield	Spencer	Spencer	38.759694	-81.265731	476912.3	4290143.6

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST
4708700994	10/28/1963	Original Loc	Completed	W Kaufman, R Rhodes		W-12			Alfred M Oppenheimer II	Wolf's Head Oil Refining Co., Inc.			
4708700994	11/15/1972	Worked Over	Completed	W Kaufman, Roy Rhodes		W-12			Alfred M Oppenheimer II	Pennzoil Company			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_E
4708700994	10/28/1963	10/26/1963	1152	Ground Level	Clvr-Rsh Rn	Undf PRICE blw INJN	Big Injun (Price&eq)	Development Well	Development Well	Oil and Gas	Rotary	Fractured	2380		2380		
4708700994	11/15/1972	-/-/-	1152	Ground Level	Clvr-Rsh Rn	Undf PRICE blw INJN	Big Injun (Price&eq)	Development Well	Development Well	Oil	unknown	Acid+Frac	2380		0		

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708700994	10/28/1963	Show	Oil	Vertical	2220	Big Lime	2240	Big Lime	0	0			
4708700994	10/28/1963	Pay	Oil	Vertical	2316	Big Injun (Price&eq)	2330	Big Injun (Price&eq)	0	35			
4708700994	10/28/1963	Pay	Gas	Vertical	2316	Big Injun (Price&eq)	2330	Big Injun (Price&eq)	0	40			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700994	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Company	1984	1,470	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Products Company	1989	1,290	128	94	103	106	136	95	119	80	101	133	104	91
4708700994	Pennzoil Products Company	1990	1,196	103	73	114	82	86	82	73	97	98	145	124	119
4708700994	Pennzoil Products Company	1991	983	114	86	84	91	92	89	98	0	63	93	90	83
4708700994	Pennzoil Products Company	1992	823	93	46	50	50	61	73	75	82	76	87	68	62
4708700994	Pennzoil Products Company	1993	688	52	69	69	34	50	59	60	63	64	61	51	56
4708700994	Pennzoil Products Company	1994	624	63	57	29	51	62	53	51	59	54	52	44	49
4708700994	Pennzoil Products Company	1995	514	39	61	49	41	42	41	42	41	44	38	35	41
4708700994	Pennzoil Products Company	1996	406	21	1	52	44	32	34	42	33	38	27	41	41
4708700994	Pennzoil Products Company	1997	448	32	37	35	30	32	31	34	36	43	32	50	56
4708700994	Pennzoil Products Company	1998	409	55	52	43	40	35	46	29	24	21	22	20	22
4708700994	Pennzoil Products Company	1999	227	46	48	27	22	15	0	0	0	12	21	22	14
4708700994	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708700994	East Resources, Inc.	2001	648	7	42	63	70	79	70	66	58	61	62	63	7
4708700994	East Resources, Inc.	2002	623	54	47	49	50	50	53	53	55	43	46	58	65
4708700994	East Resources, Inc.	2003	540	31	21	0	23	54	61	57	52	56	70	78	37
4708700994	East Resources, Inc.	2004	619	46	50	45	49	64	55	67	56	54	29	27	77
4708700994	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708700994	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708700994	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708700994	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708700994	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708700994	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708700994	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708700994	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708700994	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708700994	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708700994	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708700994	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708700994	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708700994	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708700994	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708700994	HG Energy, LLC	2021	315	32	28	33	35	37	34	0	0	26	28	31	31
4708700994	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708700994	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0
4708700994	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700994	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Company	1983	445	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Pennzoil Products Company	1989	265	26	24	27	22	22	17	22	23	22	22	20	18
4708700994	Pennzoil Products Company	1990	250	23	17	21	21	14	20	21	24	24	26	22	17
4708700994	Pennzoil Products Company	1991	178	19	19	19	17	17	0	11	16	17	16	17	10
4708700994	Pennzoil Products Company	1992	160	12	12	15	14	13	14	14	17	13	13	10	13
4708700994	Pennzoil Products Company	1993	147	14	10	10	13	13	14	14	13	11	11	12	12
4708700994	Pennzoil Products Company	1994	131	6	12	15	12	10	12	12	11	9	11	8	13
4708700994	Pennzoil Products Company	1995	87	10	8	9	9	9	8	9	8	8	9	0	0
4708700994	Pennzoil Products Company	1996	109	14	12	8	8	9	6	8	9	9	9	8	9
4708700994	Pennzoil Products Company	1997	98	8	8	9	8	9	9	7	7	8	9	9	7
4708700994	Pennzoil Products Company	1998	76	9	8	7	9	3	0	0	0	0	0	24	16
4708700994	Pennzoil Products Company	1999	33	14	15	4	0	0	0	0	0	0	0	0	0
4708700994	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	East Resources, Inc.	2001	236	0	27	26	23	30	22	23	15	17	20	16	17
4708700994	East Resources, Inc.	2002	187	15	18	15	15	16	18	22	15	12	12	13	16
4708700994	East Resources, Inc.	2003	144	14	7	0	3	19	20	14	11	17	17	7	15
4708700994	East Resources, Inc.	2004	157	7	16	16	15	15	13	16	15	14	12	7	11
4708700994	East Resources, Inc.	2005	156	11	15	13	12	13	13	11	16	13	12	15	12
4708700994	East Resources, Inc.	2006	77	8	5	6	7	9	7	6	0	6	8	8	7
4708700994	East Resources, Inc.	2007	76	8	4	7	7	7	5	6	9	6	5	5	7
4708700994	East Resources, Inc.	2008	63	6	8	5	5	5	6	5	4	4	5	4	6
4708700994	East Resources, Inc.	2010	122	16	11	13	15	0	12	11	8	8	10	8	10
4708700994	East Resources, Inc.	2011	104	8	7	9	10	8	10	8	10	9	8	8	9
4708700994	HG Energy, LLC	2012	99	8	10	8	8	10	8	4	10	9	13	5	6
4708700994	HG Energy, LLC	2013	149	10	13	11	12	14	10	15	13	15	15	12	9
4708700994	HG Energy, LLC	2014	141	10	11	10	12	20	13	12	14	10	10	9	10
4708700994	HG Energy, LLC	2015	155	13	11	11	15	10	12	15	12	12	16	13	15
4708700994	HG Energy, LLC	2016	157	12	14	17	12	11	16	13	17	13	11	9	12
4708700994	HG Energy, LLC	2017	130	12	11	12	9	12	9	9	14	12	9	12	9
4708700994	HG Energy, LLC	2018	104	10	8	10	8	8	8	10	8	8	10	5	11
4708700994	HG Energy, LLC	2019	96	13	8	8	8	10	6	9	4	6	10	7	7
4708700994	HG Energy, LLC	2020	92	8	8	7	10	8	8	10	8	8	6	5	6
4708700994	HG Energy, LLC	2021	82	8	4	4	10	8	9	6	7	5	5	5	11
4708700994	HG Energy, LLC	2022	92	7	6	10	8	10	7	8	8	7	10	5	6
4708700994	HG Energy, LLC	2023	73	6	8	7	7	7	5	7	8	8	10	0	0
4708700994	Delta Helix Energy, LLC	2023	14	0	0	0	0	0	0	0	0	0	0	7	7

4708700994

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700994	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2016	0												
4708700994	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700994	HG Energy, LLC	2016	0												
4708700994	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700994	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4708700994	Original Loc	Little Lime	Well Record	2135	Reasonable	15	Reasonable	1152	Ground Level
4708700994	Original Loc	Pencil Cave	Past WVGES Staff Geologst	2150	Reasonable	35	Reasonable	1152	Ground Level
4708700994	Original Loc	Big Lime	Well Record	2185	Reasonable	109	Reasonable	1152	Ground Level
4708700994	Original Loc	Greenbrier Group	Past WVGES Staff Geologst	2185	Reasonable	125	Reasonable	1152	Ground Level
4708700994	Original Loc	Keener	Well Record	2294	Reasonable	16	Reasonable	1152	Ground Level
4708700994	Original Loc	Big Injun (Price&eq)	Past WVGES Staff Geologst	2310	Reasonable	25	Reasonable	1152	Ground Level
4708700994	Original Loc	Undf PRICE blw INJN	Well Record	2335	Reasonable	0	Reasonable	1152	Ground Level

Wireline (E-Log) Information:

* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708700994

W-12

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION

WELL RECORD

Quadrangle SPENCER

Permit No. ROA-994

Oil or Gas Well (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Slab Camp Run
Well No. W-12 Elev. 1152.09
District Smithfield County Roane
The surface of tract is owned in fee by Roy Rhodes c/o Bernard Burgess
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer II, et al.
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced October 26, 1963
Drilling completed October 28, 1963
Date Shot From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Show Oil & Gas (Drilled w/Rotary) Cu. Ft.
Rock Pressure lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED
WELL FRACTURED November 18, 1963

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe Float Collar Guide Shoe
13			
10			Size of 8 5/8" OD 4½" OD 4½" OD
8 5/8"	344'	344'	
6 5/8			Depth set 340 2357 2377
4½" OD	2392' 3"	2392' 3"	
3			Perf. top
2 3/8" Tbg.	2393' 2"	2393' 2"	Perf. bottom
Liners Used			Perf. top
			Perf. bottom

CASING CEMENTED 8 5/8" SIZE 340 No. Ft. 10/29/63 Date
4 1/2" 2377 No. Ft. 11/7/63 Date

COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

RESULT AFTER TREATMENT Gas - 40,000 Cu. Ft. Oil - 35 Bbls.
ROCK PRESSURE AFTER TREATMENT 510 Lbs.
Fresh Water NONE Feet Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Sand & Shale			0	120			
Red Rock			120	185			
Sand			185	205			
Red Rock			205	225			
Sand			225	250			
Shale			250	275			
Sand			275	325			
Red Rock			325	335			
Sand			335	344			
Red Rock			344	630			
Blue Shale			630	720			
Red Rock			720	870			
Sand			870	985			
Shale			985	1010			
Sand			1010	1385			
Shale			1385	1435			
Sand			1435	1510			
Slate			1510	1730			
Shale			1730	1915			
Sand			1915	1955			
Shale			1955	2135			
Little Lime			2135	2150			
Shale			2150	2155			
Sand			2155	2158			
Shale			2158	2185			
Big Lime			2185	2294			
				2300	Oil	2220-2240	Show Only
Keener Sand			2294	2310			
Big Injun			2310	2335			
			2332	2330	Oil & Gas	2316-2330	

(over)

4708700994

Formation	Color	Hard or Soft	Top 15	Bottom	Oil, Gas or Water	Depth Found	Remarks
Shale			2335	2380	OIL & GAS	2319-2330	
4½" Casing			2310	2377			
Rotary Hole			2304	2310			
TOTAL DEPTH				2380	OIL	2330-2340	Shows Oil
Red Rock			2182	2304			
Shale			2128	2182			
Sand			2122	2128			
Shale			2120	2122			
Little Lime			2132	2120			
Shale			1922	2132			
Sand			1912	1922			
Shale			1830	1912			
Sand			1810	1830			
Shale			1732	1810			
Sand			1702	1732			
Shale			1010	1702			
Sand			982	1010			
Red Rock			810	982			
Blue Shale			730	810			
Red Rock			690	730			
Sand			344	690			
Red Rock			332	344			
Sand			312	332			
Shale			320	312			
Sand			252	320			
Red Rock			202	252			
Sand			182	202			
Red Rock			150	182			
Sand & Shale			0	150			

WELL RECORD

Casing Used in Drilling	Left in Well	Cut & Pulled from Well
4½"	2377'	

CASING CEMENTED 4½" 2377' 100 SACKS

COAL WAS ENCOUNTERED AT FEET INCHES FEET INCHES

FEET FEET

Size	Kind of Packer	Depth Set
4½"	Baker	2377'

Size	Shot From	To	Kind of Shot	Extent

Size	Put in	Pulled out	Left

Rotary Tools Used from	feet to	feet, and from	feet to	feet

Cable Tools Used from	feet to	feet, and from	feet to	feet

Date	December 10, 1963
Date Drilling Commenced	
Date Drilling Completed	
Date of First Production	

Production	
Open Flow	
Volume	
Rock Pressure	

Contractor	Address
Wolf's Head Oil Refining Co. Inc.	

Driller	Address

Drillers Name	

Remarks

OIL AND GAS DIVISION

DEPARTMENT OF MINES

STATE OF WEST VIRGINIA

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By George W. Wilsman

George W. Wilsman (Title) Agent

Form No. 989 1M 2/60 H.C. 9282A

[illegible] OIL DRILLING COMPANY, INCORPORATED
SOUTH PENN OIL COMPANY

NEW WELL REPORT

4708700994

W-12

Lease No. [illegible] [illegible] Acres — Working District [illegible]

[illegible] Farm — Well No. W-12 N. [illegible] S. 67 E. [illegible] W. 37

[illegible] District or Township — [illegible] County — Quad.

Location Made September 27, 19 69 — Drilling Commenced October 26, 19 69

Rig Commenced October 26, 19 69 — Drilling Completed November 6, 19 69

Rig Completed October 30, 19 69 — Depth 2350' — Sand Big Injun

Rig Contractor Fleming Drilling Co., Inc. — Drilling Contractor Fleming Drilling Co., Inc.

Elevation: Floor — Ground 1152.09 — Work Order No. AFE # 126-69-W.Va.

FORMATION RECORD

Kind	Top	Bottom	Steel Line Meas.	Test	Kind	Top	Bottom	Steel Line Meas.	Test
[illegible]	0	100							
[illegible]	100	125							
[illegible]	125	225							
[illegible]	225	235							
[illegible]	235	250							
[illegible]	250	275							
[illegible]	275	325							
[illegible]	325	395							
[illegible]	395	445	340						
[illegible]	445	520							
[illegible]	520	720							
[illegible]	720	770							
[illegible]	770	845							
[illegible]	845	1000							
[illegible]	1000	1025							
[illegible]	1025	1035							
[illegible]	1035	1100							
[illegible]	1100	1150							
[illegible]	1150	1180							
[illegible]	1180	1225							
[illegible]	1225	1275							
[illegible]	1275	1325							
[illegible]	1325	1350							
[illegible]	1350	1370							
[illegible]	1370	1385							
[illegible]	1385	1395							
[illegible]	1395	1425							
[illegible]	1425	1445							
[illegible]	1445	1465							
[illegible]	1465	1475							
[illegible]	1475	1485							
[illegible]	1485	1495							
[illegible]	1495	1505							
[illegible]	1505	1515							
[illegible]	1515	1525							
[illegible]	1525	1535		Gas					
[illegible]	1535	1545							
[illegible]	1545	1555							
[illegible]	1555	1565							
[illegible]	1565	1575							
[illegible]	1575	1585							
[illegible]	1585	1595							
[illegible]	1595	1605							
[illegible]	1605	1615							
[illegible]	1615	1625							
[illegible]	1625	1635							
[illegible]	1635	1645							
[illegible]	1645	1655							
[illegible]	1655	1665							
[illegible]	1665	1675							
[illegible]	1675	1685							
[illegible]	1685	1695							
[illegible]	1695	1705							
[illegible]	1705	1715							
[illegible]	1715	1725							
[illegible]	1725	1735							
[illegible]	1735	1745							
[illegible]	1745	1755							
[illegible]	1755	1765							
[illegible]	1765	1775							
[illegible]	1775	1785							
[illegible]	1785	1795							
[illegible]	1795	1805							
[illegible]	1805	1815							
[illegible]	1815	1825							
[illegible]	1825	1835							
[illegible]	1835	1845							
[illegible]	1845	1855							
[illegible]	1855	1865							
[illegible]	1865	1875							
[illegible]	1875	1885							
[illegible]	1885	1895							
[illegible]	1895	1905							
[illegible]	1905	1915							
[illegible]	1915	1925							
[illegible]	1925	1935							
[illegible]	1935	1945							
[illegible]	1945	1955							
[illegible]	1955	1965							
[illegible]	1965	1975							
[illegible]	1975	1985							
[illegible]	1985	1995							
[illegible]	1995	2005							
[illegible]	2005	2015							
[illegible]	2015	2025							
[illegible]	2025	2035							
[illegible]	2035	2045							
[illegible]	2045	2055							
[illegible]	2055	2065							
[illegible]	2065	2075							
[illegible]	2075	2085							
[illegible]	2085	2095							
[illegible]	2095	2105							
[illegible]	2105	2115							
[illegible]	2115	2125							
[illegible]	2125	2135							
[illegible]	2135	2145							
[illegible]	2145	2155							
[illegible]	2155	2165							
[illegible]	2165	2175							
[illegible]	2175	2185							
[illegible]	2185	2195							
[illegible]	2195	2205							
[illegible]	2205	2215							
[illegible]	2215	2225							
[illegible]	2225	2235							
[illegible]	2235	2245							
[illegible]	2245	2255							
[illegible]	2255	2265							
[illegible]	2265	2275							
[illegible]	2275	2285							
[illegible]	2285	2295							
[illegible]	2295	2305							
[illegible]	2305	2315							
[illegible]		2317	2317						
[illegible]		2350	2350						

(OVER)

4708700994
W-12

NEW WELL REPORT – CONT'D.

INITIAL TORPEDO RECORD	
Date of Shot	
Name of Torpedo Co.	
No. of Quarts	
Length of Shell	
Diameter of Shell	
Length of Anchor	
Top of Shot	
Bottom of Shot	
Feet of Fluid in Hole When Shot	
Results:	

CASING AND TUBING RECORD

SIZE	PUT IN WELL TRANSFER NO.	PUT IN WELL FEET	PUT IN WELL INCH	PULLED OUT TRANSFER NO.	PULLED OUT FEET	PULLED OUT INC
8-5/8"	Baker	344	—			
4½"	Baker	2077	9			
2-3/8"						
Tubing	Baker	2073	2			

INITIAL PRODUCTION FIRST 24 HOURS

Open Flow /10ths Water in _____ Inch
/10ths Merc. in _____ Inch
Volume Gas & Oil (Pulled w/swab) Cu. Ft.
Rock Pressure _____ lbs. _____ hrs.
Oil See Remarks Log bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	8-5/8" OD	344	10-19-63
Float Collar	4½" OD	2077	11- 7-63
Guide Shoe	4½" OD	2077	11- 7-63

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED _____
DATE WELL FRACTURED 12-12-63
NAME OF COMPANY Halliburton Company
(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).

Used 999 Gals. Oil
Used 15,000# Sand
Used 75 Gals. Lyster
Used 500# Adomite II
Used 500 Gals. 15% Acid

BREAKDOWN PRESSURE 6000
PUMPING PRESSURE 1200 to 3000
AVERAGE PUMPING RATE/MINUTE 15.6 Gals.
PUMPING TIME 45 Minutes
RESULT AFTER TREATMENT | GAS 60,000 CU. FT.
OIL 35 BBLS.
ROCK PRESSURE AFTER TREATMENT 3000 LBS.

CASING CEMENTED

8-5/8" SIZE 344 FT. 10-19-63 DATE
4-1/2" SIZE 2077 FT. 11- 7-63 DATE
SIZE _____ FT. _____ DATE

Used 1% Calcium in 4-5/8" Casing.
50 Sxs - Cement
Cemented by: Gerald D. Jones

Used 1% Calcium in 8" Casing.
500 Gals. - Mud Flush
65 Cuft. - Pozmix Cement (Consisted of 35 Cuft. Columbia Cement & 30 Cuft. of Pozmix A & 1 Halliburton Gel.)
50' - Pete-Hall Cleaners & 5 Centralizers.
15# - Halliburton Weld-A
Cemented by: Halliburton Co.

REMARKS: Drilled 14-3/4" Hole from Surface to 359'
Drilled 7-7/8" Hole from 359' to 2085'.
Note: Rotary Tools Used.

Note: This well was logged by Schlumberger on November 7, 1963.

Note: This well was drilled according to Rule 11, under Section 15, of Article 1, Chapter 22 of the Code of the Department of Mines, Oil and Gas Division.

APPROVED

C. C. Casseus
SUPERINTENDENT

4708700995

W-13

WVGES
GEOLOGY UNDERLIES IT ALL
"Pipeline"

Select County: (087) Roane
Enter Permit #: 995
Get Data | Reset

Select datatypes: (Check All)
Location | Production | Plugging
Owner/Completion | Stratigraphy | Sample
Pay/Show/Water | Logs | Btm Hole Loc

Table Definitions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 995 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:07:33 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708700995	Roane	995	Smithfield	Spencer	Spencer	38.761905	-81.263508	477106.1	4290388.4

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708700995	11/-/1963	Original Loc	Completed	W Kaufman	20	W-13				Wolf's Head Oil Refining Co., Inc.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_
4708700995	11/-/1963	-/-/-	1096	Ground Level	Clvr-Rsh Rn	Price Fm & equivs	Price Fm & equivs	Development Well	Development Well	Oil and Gas	unknown	Fractured	2313		2313		0	

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708700995	11/-/1963	Pay	Oil & Gas	Vertical			2261	Big Injun (Price&eq)	0	0			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700995	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	Pennzoil Company	1984	1,470	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	Pennzoil Products Company	1989	74	12	0	0	0	0	0	0	0	0	0	0	62
4708700995	Pennzoil Products Company	1990	1,133	123	81	114	91	82	70	115	97	74	97	88	101
4708700995	Pennzoil Products Company	1991	1,048	93	81	84	77	87	74	115	90	91	93	85	78
4708700995	Pennzoil Products Company	1992	786	82	70	54	50	61	63	75	64	70	67	68	62
4708700995	Pennzoil Products Company	1993	644	52	48	64	31	50	54	60	58	64	56	51	56
4708700995	Pennzoil Products Company	1994	541	47	52	29	47	58	44	36	44	49	52	39	44
4708700995	Pennzoil Products Company	1995	452	39	37	44	36	37	32	37	46	44	33	40	27
4708700995	Pennzoil Products Company	1996	414	21	1	48	44	32	30	42	44	43	27	41	41
4708700995	Pennzoil Products Company	1997	359	28	28	31	30	28	31	34	36	43	32	38	0
4708700995	Pennzoil Products Company	1998	301	0	0	38	40	44	41	29	24	21	22	20	22
4708700995	Pennzoil Products Company	1999	200	46	48	0	22	15	0	0	0	12	21	22	14
4708700995	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708700995	East Resources, Inc.	2001	600	7	48	63	73	58	70	66	46	58	25	79	7
4708700995	East Resources, Inc.	2002	850	83	71	78	73	62	71	75	63	75	61	62	76
4708700995	East Resources, Inc.	2003	455	33	21	0	0	69	43	45	47	46	25	78	48
4708700995	East Resources, Inc.	2004	575	46	50	42	49	64	29	46	56	54	29	27	83
4708700995	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708700995	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708700995	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708700995	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708700995	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708700995	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708700995	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708700995	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708700995	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708700995	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708700995	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708700995	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708700995	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708700995	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708700995	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708700995	HG Energy, LLC	2021	315	32	28	33	35	37	34	0	0	26	28	31	31
4708700995	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708700995	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0
4708700995	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700995	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	Pennzoil Products Company	1989	59	0	0	0	0	0	0	0	0	0	15	24	20
4708700995	Pennzoil Products Company	1990	227	23	19	20	18	22	20	16	16	17	22	18	16
4708700995	Pennzoil Products Company	1991	197	19	16	18	14	20	17	16	16	16	15	15	15
4708700995	Pennzoil Products Company	1992	146	13	12	14	12	13	11	13	13	13	13	10	9
4708700995	Pennzoil Products Company	1993	138	13	9	10	12	13	13	14	12	11	11	9	11
4708700995	Pennzoil Products Company	1994	113	6	11	14	10	7	9	11	11	8	10	8	8
4708700995	Pennzoil Products Company	1995	79	9	7	8	7	8	9	9	7	9	6	0	0
4708700995	Pennzoil Products Company	1996	107	13	12	8	7	9	8	9	9	9	9	7	7
4708700995	Pennzoil Products Company	1997	69	7	8	8	8	9	9	7	7	6	0	0	0
4708700995	Pennzoil Products Company	1998	78	8	8	9	8	3	0	0	0	0	0	26	16
4708700995	Pennzoil Products Company	1999	29	14	15	0	0	0	0	0	0	0	0	0	0
4708700995	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	East Resources, Inc.	2001	224	0	31	26	24	22	22	23	12	16	8	20	20
4708700995	East Resources, Inc.	2002	260	23	27	24	22	20	24	31	17	21	16	14	21
4708700995	East Resources, Inc.	2003	124	15	7	0	0	24	14	11	10	14	6	7	16
4708700995	East Resources, Inc.	2004	144	7	16	15	15	15	7	11	15	14	12	7	10
4708700995	East Resources, Inc.	2005	159	10	14	12	12	13	13	11	23	13	12	15	11
4708700995	East Resources, Inc.	2006	80	10	5	8	7	8	7	7	0	5	7	8	8
4708700995	East Resources, Inc.	2007	82	8	7	9	7	7	6	6	9	6	5	5	7
4708700995	East Resources, Inc.	2008	71	6	8	5	4	6	7	7	8	4	6	4	6
4708700995	East Resources, Inc.	2010	120	15	11	13	15	0	12	10	8	8	10	8	10
4708700995	East Resources, Inc.	2011	106	7	8	9	10	8	10	8	10	8	8	11	9
4708700995	HG Energy, LLC	2012	92	8	10	8	8	10	7	5	10	6	10	4	6
4708700995	HG Energy, LLC	2013	132	11	14	13	12	10	9	13	8	10	11	9	12
4708700995	HG Energy, LLC	2014	133	10	10	10	10	20	14	12	13	9	8	7	10
4708700995	HG Energy, LLC	2015	132	11	7	9	11	9	10	14	10	12	12	12	15
4708700995	HG Energy, LLC	2016	136	10	12	16	12	12	15	10	14	11	8	7	9
4708700995	HG Energy, LLC	2017	94	9	8	9	7	9	8	8	10	8	6	8	4
4708700995	HG Energy, LLC	2018	74	4	4	7	8	6	6	6	5	5	7	6	10
4708700995	HG Energy, LLC	2019	76	13	4	6	7	9	5	6	4	5	6	4	7
4708700995	HG Energy, LLC	2020	66	5	5	6	8	6	5	7	4	5	4	5	6
4708700995	HG Energy, LLC	2021	62	7	3	3	8	4	8	4	5	5	5	4	6
4708700995	HG Energy, LLC	2022	68	7	6	7	8	5	4	5	5	6	5	4	6
4708700995	HG Energy, LLC	2023	45	4	4	5	4	6	4	4	5	4	5	0	0
4708700995	Delta Helix Energy, LLC	2023	10	0	0	0	0	0	0	0	0	0	0	6	4

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700995	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2016	0												

4708700995

4708700995	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708700995	HG Energy, LLC	2016	0												
4708700995	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708700995	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4708700995	Original Loc	Little Lime	Well Record	2065	Reasonable	45	Reasonable	1096	Ground Level
4708700995	Original Loc	Pencil Cave	Well Record	2110	Reasonable	5	Reasonable	1096	Ground Level
4708700995	Original Loc	Greenbrier Group	Past WVGES Staff Geologst	2115	Reasonable	135	Reasonable	1096	Ground Level
4708700995	Original Loc	Big Lime	Well Record	2115	Reasonable	120	Reasonable	1096	Ground Level
4708700995	Original Loc	Keener	Well Record	2235	Reasonable	15	Reasonable	1096	Ground Level
4708700995	Original Loc	Big Injun (Price&eq)	Past WVGES Staff Geologst	2250	Reasonable	15	Reasonable	1096	Ground Level

Wireline (E-Log) Information:

* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708700995

W-13

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION 16

Quadrangle SPENCER

Permit No. ROA-995

WELL RECORD

Oil or Gas Well (KD)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Slab Camp Run
Well No. W-13 Elev. 1096.46
District Smithfield County Roane
The surface of tract is owned in fee by Romie Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer II, et al.
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced November 10, 1963
Drilling completed November 17, 1963
Date Shot - From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Show Oil & Gas (Drilled w/Rotary) Cu. Ft.
Rock Pressure lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED
WELL FRACTURED November 27, 1963

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe
13			Float Collar
10			Guide Shoe
~~8 5/8"~~ 8 5/8"	354'	354'	Size of 8 5/8" OD
6 5/8"			4½" OD
~~4½"~~ 4½" OD	2330' 10"	2330' 10"	4½" OD
3			Depth set 350 2293' 2313'
2 3/8" Tbg.	2333' 6"	2333' 6"	Perf. top
Liners Used			Perf. bottom
			Perf. top
			Perf. bottom

CASING CEMENTED 8 5/8" SIZE 350 No. Ft. 11/11/63 Date
4 1/2" Size 2313 No. Ft. 11/18/63

COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

RESULT AFTER TREATMENT Gas - 37,000 Cu. Ft.
Oil - 33 Bbls.
ROCK PRESSURE AFTER TREATMENT 497 Lbs.
Fresh Water NONE Feet Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Clay & Shale			0	350			
Shale & Red Rock			350	400			
Sand & Shale			400	690			
Sand			690	735			
Red Rock			735	740			
Shale			740	[illegible]			
Sand & Shale			785	[illegible]			
Sand			790	805			
Shale			805	880			
Red Rock			880	930			
Sand & Shale			930	1120			
Sand			1120	1135			
Shale			1135	1145			
Sand			1145	1480			
Shale			1480	1490			
Red Rock			1490	1500			
Shale			1500	1535			
Sand			1535	1815			
Shale & Lime			1815	1870			
Sand			1870	2025			
Shale			2025	2050			
Sand			2050	2065			
Little Lime			2065	2110			
Pencil Cave			2110	2115			
Big Lime			2115	2235			
Keener Sand			2235	2250			
Big Injun			2250	2265			
Shale			2265	2313	Oil & Gas	2253-2261	

(over)

4708700995

Formation	Color	Hard or Soft	Top 16	Bottom	Oil, Gas or Water	Depth Found	Remarks
4½" Casing				2313			
TOTAL	DEPTH			2313			

Date December 10, 1963

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By George W. Wilsman

George W. Wilsman (Title) Agent

4708700995

W-13

Rec

FORM No. 959 TH 150 M'G. 9202A

WOLF'S HEAD OIL REFINING COMPANY, INCORPORATED

~~SOUTHLAND OIL COMPANY~~

NEW WELL REPORT

LEASE No. 81219 800 ACRES WORKING DISTRICT Spencer # 4

Wm. Kaufman FARM WELL No. W-13 N. S. 47 E. W. 37

Smithfield DISTRICT OR TOWNSHIP Reene COUNTY QUAD.

LOCATION MADE October 3, 19 63 DRILLING COMMENCED November 10, 19 63

RIG COMMENCED November 8, 19 63 DRILLING COMPLETED November 17, 19 63

RIG COMPLETED November 10, 19 63 DEPTH 2313' SAND Big Injun

RIG CONTRACTOR Denning Drilling Co., Inc. DRILLING CONTRACTOR Denning Drilling Co., Inc.

ELEVATION: FLOOR GROUND 1096.46' WORK ORDER No. AFE # WH-25-W.Va.

FORMATION RECORD

KIND	TOP	BOTTOM	STEEL LINE MEAS.	TEST	KIND	TOP	BOTTOM	STEEL LINE MEAS.	TEST
Clay & Shale	0	350	350						
Shale&RedRock	350	400							
Sand & Shale	400	690							
Sand	690	735							
Red Rock	735	740							
Shale	740	785							
Sand & Shale	785	790							
Sand	790	805							
Shale	805	880							
Red Rock	880	930							
Sand & Shale	930	1120							
Sand	1120	1135							
Shale	1135	1145							
Sand	1145	1480							
Shale	1480	1490							
Red Rock	1490	1500							
Shale	1500	1535							
Sand	1535	1815							
Shale & Lime	1815	1870							
Sand	1870	2025							
Shale	2025	2050							
Sand	2050	2065							
Little Lime	2065	2110							
Pencil Cave	2110	2115							
Big Lime	2115	2235							
Keener Sand	2235	2250							
Big Injun	2250	2265							
Oil & Gas	2253	2261							
Shale	2265	2313							
4½" Casing		2313	2313						
Total Depth		2313	2313						

(OVER)

NEW WELL REPORT — CONT'D.

4708700995

W-13

INITIAL TORPEDO RECORD	
Date of Shot	
[illegible] of Torpedo Co.	
N[illegible] [illegible]uarts	
Le[illegible] of Shell	
Diameter of Shell	
Length of Anchor	
Top of Shot	
Bottom of Shot	
Feet of Fluid in Hole When Shot	
Results:	

CASING AND TUBING RECORD

SIZE	PUT IN WELL TRANSFER NO.	PUT IN WELL FEET	PUT IN WELL INCH	PULLED OUT TRANSFER NO.	PULLED OUT FEET	PULLED OUT INCH
8-5/8"	Tally	354	—			
4½"OD	Tally	2330	10			
2-3/8" Tbg.	Tally	2333	6			

INITIAL PRODUCTION FIRST 24 HOURS

Open Flow /10ths Water in ____ Inch

____ /10ths Merc. in ____ Inch

Volume Show Oil & Gas (Drilled w/Rotary) Cu. Ft.

Rock Pressure ____ lbs. ____ hrs.

Oil # See Electric Log bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	8-5/8"OD	350	11-11-63
Float Collar	4½" OD	2293	11-18-63
Guide Shoe	4½" OD	2313	11-18-63

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED ____

DATE WELL FRACTURED November 27, 1963

NAME OF COMPANY Dowell

(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).

Used: 775 Bbls. Oil.
Used: 48,000# Sand
Used: 50 Gals - Freflo
Used: 450# Adomite II
Used: 350 Gals. BDA Acid

BREAKDOWN PRESSURE 1350#

PUMPING PRESSURE 2500 to 3400#

AVERAGE PUMPING RATE/MINUTE 18 Bbls.

PUMPING TIME 44 Minutes

RESULT AFTER TREATMENT } GAS 37,000 CU. FT.
OIL 33 BBLS.

ROCK PRESSURE AFTER TREATMENT 497 LBS.

CASING CEMENTED

Surface to:

8-5/8" SIZE 350 FT. 11-11-63 DATE

4-1/2" SIZE 2313 FT. 11-18-63 DATE

SIZE ____ FT. ____ DATE

USED IN CEMENTING 8-5/8" CASING:

50 Sacs - Cement

Cemented by: Well Service, Inc.

USED IN CEMENTING 4-1/2" CASING:

65 Sacs - Cement
500 Gals - Mud Flush
1# - Halliburton Weld-A
18 - 5' Sections of Roto-Well Cleaners.
4 — Centralizers

Cemented by: Halliburton Company

W-13

REMARKS: Drilled 10-5/8" Hole from Surface to 350'. Note: Rotary Tools Used.
Drilled 7-7/8" Hole from 350' to 2313'.

Note: This well was logged by Schlumberger on November 12, 1963.

Note: This well was drilled accordingto Rule 11, under Section 13, of Article 4, Chapter 22, of the Code of the Department of Mines, Oil & Gas Division.

APPROVED

C. C. Crawford
SUPERINTENDENT

4708701032

W-16

WVGES GEOLOGY UNDERLIES IT ALL "Pipeline"

Select County: (087) Roane
Enter Permit #: 1032
Get Data | Reset

Select datatypes: (Check All)
Location, Production, Plugging, Owner/Completion, Stratigraphy, Sample, Pay/Show/Water, Logs, Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 1032 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:11:31 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708701032	Roane	1032	Smithfield	Spencer	Spencer	38.75558	-81.259991	477409.7	4289685.6

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708701032	5/-/1964	Original Loc	Completed	William Kaufman	23	W-16				Wolf's Head Oil Refining Co., Inc.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_
4708701032	5/-/1964	-/-/-	1163	Ground Level	Clvr-Rsh Rn	Price Fm & equivs	Price Fm & equivs	Development Well	Development Well	Oil and Gas	unknown	Fractured	2371		2371		0	

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708701032	5/-/1964	Water	Unknown Water	Vertical			930						0
4708701032	5/-/1964	Water	Unknown Water	Vertical			1850						0
4708701032	5/-/1964	Pay	Oil & Gas	Vertical			2330	Big Injun (Price&eq)	0	0			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701032	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Company	1984	1,470	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1989	904	0	0	0	88	111	91	124	84	101	127	99	79
4708701032	Pennzoil Products Company	1990	442	108	64	0	0	53	66	47	24	23	18	21	18
4708701032	Pennzoil Products Company	1991	251	26	20	13	14	19	21	23	21	29	23	16	26
4708701032	Pennzoil Products Company	1992	125	22	19	21	17	20	26	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1993	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1994	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1995	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1996	22	21	1	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1997	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1998	109	0	0	0	0	0	0	0	24	21	22	20	22
4708701032	Pennzoil Products Company	1999	106	0	0	0	22	15	0	0	0	12	21	22	14
4708701032	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708701032	East Resources, Inc.	2001	14	7	0	0	0	0	0	0	0	0	0	0	7
4708701032	East Resources, Inc.	2002	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2003	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2004	56	0	0	0	0	0	0	0	0	0	29	27	0
4708701032	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708701032	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708701032	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708701032	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708701032	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708701032	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708701032	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708701032	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708701032	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708701032	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708701032	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708701032	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708701032	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708701032	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708701032	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708701032	HG Energy, LLC	2021	99	10	7	6	9	10	9	10	9	8	8	7	6
4708701032	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708701032	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0
4708701032	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701032	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Company	1983	444	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1989	225	0	20	22	21	23	18	22	22	21	19	21	16
4708701032	Pennzoil Products Company	1990	89	20	0	13	17	9	5	5	3	4	4	5	4
4708701032	Pennzoil Products Company	1991	47	3	3	4	4	4	4	5	4	3	5	4	4
4708701032	Pennzoil Products Company	1992	18	5	4	4	5	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1993	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1994	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1995	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1996	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1997	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1998	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Pennzoil Products Company	1999	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2001	32	0	0	0	0	0	0	0	0	32	0	0	0
4708701032	East Resources, Inc.	2002	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2003	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2004	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2005	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2006	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2007	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2008	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2010	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	East Resources, Inc.	2011	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2012	442	0	0	0	0	0	0	87	135	68	52	53	47
4708701032	HG Energy, LLC	2013	369	51	50	41	36	31	29	26	31	21	20	17	16
4708701032	HG Energy, LLC	2014	167	20	17	17	16	20	11	10	12	9	12	11	12
4708701032	HG Energy, LLC	2015	153	12	10	13	13	10	13	16	11	12	14	12	17
4708701032	HG Energy, LLC	2016	165	11	16	17	13	12	16	12	16	12	16	11	13
4708701032	HG Energy, LLC	2017	149	13	9	14	11	13	12	12	15	12	12	15	11
4708701032	HG Energy, LLC	2018	141	15	12	12	11	13	12	12	13	10	11	8	12
4708701032	HG Energy, LLC	2019	119	13	8	12	8	12	9	14	8	9	14	5	7
4708701032	HG Energy, LLC	2020	111	10	8	9	14	8	8	11	8	10	8	8	9
4708701032	HG Energy, LLC	2021	93	8	5	6	10	6	10	6	8	9	7	8	10
4708701032	HG Energy, LLC	2022	89	8	7	10	8	10	8	6	7	7	7	7	4
4708701032	HG Energy, LLC	2023	61	6	5	6	5	8	6	4	9	6	6	0	0
4708701032	Delta Helix Energy, LLC	2023	8	0	0	0	0	0	0	0	0	0	0	4	4

4708701032

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701032	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2016	0												
4708701032	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701032	HG Energy, LLC	2016	0												
4708701032	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701032	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

There is no Stratigraphy data for this well

Wireline (E-Log) Information:
* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708701032

W-16

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION /7

Quadrangle SPENCER

WELL RECORD

Permit No. ROA-1032 — Oil or Gas Well O & G (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman — Acres 800
Location (waters) Millstone Run
Well No. W-16 — Elev. 1162.93
District Smithfield — County Roane
The surface of tract is owned in fee by Kenneth Miller
Address Clover, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al.
300 South Lang Avenue — Address Pittsburgh 8, Pa.
Drilling commenced 4/29/64
Drilling completed 5/9/64
Date Shot — From — To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Drilled w/Rotary Cu. Ft.
Rock Pressure None Taken lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe
13			Float Collar
10 3/4"	10'	10'	Guide Shoe
8 5/8"	571'	571'	Size of 8 5/8"
7"	1150'	NONE	4½" OD
4½"	2384'	2384'	4½" OD
3			Depth set 571
2 3/8" Tbg.	2308'	2308'	2338'
Liners Used			2365'
			Perf. top
			Perf. bottom
			Perf. top
			Perf. bottom

Surface to:
CASING CEMENTED 8 5/8" SIZE 571 No. Ft. 5/1/64 Date
4½" 2365 5/10/64
COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED May 15, 1964 Used: 1,000 Bbl. Water, 48000 # Sand 20-40, 300 Gal. MCA 15%, 400 # WAC-8, 25 Gal. Aqua Frac and 40 Gal. Mor Flow-II
RESULT AFTER TREATMENT Gas - 111 M Cu. Ft. Oil - 15 Bbls.
ROCK PRESSURE AFTER TREATMENT 520 Lbs.
Fresh Water Feet — Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	10			
10" Casing				10			
Red Rock			10	20			
Sand			20	50			
Slate			50	100			
Red Rock			100	125			
Sand			125	170			
Slate			170	200			
Sand			200	270			
Red Rock			270	280			
Slate			280	300			
Red Rock			300	320			
Slate			320	380			
Red Rock			380	385			
Slate & Shell			385	400			
Sand			400	450			
Slate			450	500			
Red Rock			500	520			
Slate			520	530			
Red Rock			530	560			
8" Casing				571			
Slate			560	760			
Sand			760	790			
Red Rock			790	800			
Slate			800	870			
Red Rock			870	900			
Sand			900	930			
					Water	- 930	
Slate			930	1185			
Sand			1185	1220			

(over)

4708701032

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate			1220	1320			
Sand			1320	1340			
Slate			1340	1400			
Sand			1400	1535			
Slate			1535	1555			
Sand			1555	1635			
Slate			1635	1665			
Sand			1665	1740			
Slate			1740	1755			
Sand			1755	1800			
Slate			1800	1825			
Sand			1825	1990			
					Water	1850-1900	
Mayon Sand			1990	2020			
Slate			2020	2115			
Little Lime			2115	2167			
Pencil Cave			2167	2175			
Big Lime			2175	2300			
Injun Sand			2300	2330			
					Oil & Gas	Pay 2315-2330	
Slate			2330	2371			Log
4½ Casing						2365	Steel Line Meas.
TOTAL DEPTH				2371			

Date August 12, 19 64

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

Form No. 989 IN 1/62 M-0.5528

WOLF'S HEAD OIL REFINING CO. INC.
~~GOLDEN BEACON OIL COMPANY~~

RCa ✓

4708701032
W-16

NEW WELL REPORT

F No. 83219 500 Acres

Working District Spencer # 4

Wm. Kaufman Farm

Well No. W-16 N. S. 47 E. W. 37

Smithfield District or Township

Doddridge County

Quad.

Location Made 3-23- 19 64

Drilling Commenced 4-29- 19 64

Rig Commenced 4-27- 19 64

Drilling Completed 5-9- 19 64

Rig Completed 5-29- 19 64

Depth 2371' Sand Big Injun

Rig Contractor Gerald Jones

Drilling Contractor Gerald Jones

Elevation: Floor Ground 1142.93

Work Order No. AFE # WH-28-W.Va.

FORMATION RECORD

Kind	Top	Bottom	Steel Line Meas.	Test
p Soil	0	10		
" Casing		10'	10'	
d Rock	10	20		
nd	20	50		
ate	50	100		
d Rock	100	125		
nd	125	170		
ate	170	200		
nd	200	270		
d Rock	270	280		
ate	280	320		
d Rock	320	350		
	350	360		
	360	385		
ate of Shell	385	400		
nd	400	450		
ate	450	500		
d Rock	500	520		
ate	520	530		
d Rock	530	560		
Casing		571'	571'	
ate	560	760		
nd	760	790		
d Rock	790	800		
ate	800	870		
d Rock	870	900		
nd	900	930		
ter		939'		
ate	930	1185		
nd	1185	1220		
ate	1220	1320		
nd	1320	1340		
ate	1340	1400		
nd	1400	1535		
ate	1535	1555		
nd	1555	1635		
ate	1635	1665		
nd	1665	1710		
ate	1710	1755		
nd	1755	1800		
ate	1800	1825		
nd	1825	1990		
te	1990	1990		
rd	1990	2020		

Kind	Top	Bottom	Steel Line Meas.	Test
Slate	2020	2115		
Little Lime	2115	2167		
Pencil Cave	2167	2175		
Big Lime	2175	2300		
Injun Sand	2300	2330		
Oil & Gas Pay	2315	2330		
Slate	2330	2371		1oz
4½" Casing			2365	
Total Depth		2371	2371	

(OVER)

NEW WELL REPORT – CONTINUED

4708701032

W-16

W16

INITIAL TORPEDO RECORD

Date of Shot	
[illegible] Torpedo Co.	
[illegible] Parts	
Length of Shell	
Diameter of Shell	
Length of Anchor	
Top of Shot	
Bottom of Shot	
Feet of Fluid in Hole When Shot	
Results:	

CASING AND TUBING RECORD

SIZE	PUT IN WELL TRANSFER NO.	PUT IN WELL FEET	PUT IN WELL INCH	PULLED OUT TRANSFER NO.	PULLED OUT FEET	PULLED OUT INCH
10-3/4"	S.L.M.	10'				
8-5/8"	S.L.M.	571'				
7"	S.L.M.	1150			1150	
4½"	Talley	2364'				
2-3/8"	Talley	2308				
Tbg.						

INITIAL PRODUCTION FIRST 24 HOURS

Open Flow /10ths Water in _____ Inch

_____ /10ths Merc. in _____ Inch

Volume Drilled w/Rotary _____ Cu. Ft.

Rock Pressure None Taken lbs. _____ hrs.

Oil _____ bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	8-5/8"	571'	5-1-64
Float Collar	4½" O.D.	2318'	5-10-64
Guide Shoe	4½" O.D.	2365'	5-10-64

ACIDIZATION OR FRACTURING RECORD

Date Well Acidized _____

Date Well Fractured May 15, 1964

Name of Company Halliburton

(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)

Used: 1000 Gal. Water

Used: 18000 # Sand 20-40

Used: 300 Gal. HCA 15%

Used: 100# WAC-8

[illegible] 25 Gal. Aqua Frac

[illegible] 40 Gal. Nor Flow-II

Breakdown Pressure 1100

Pumping Pressure 1550 - 2700

Average Pumping Rate/Minute 22B.

Pumping Time 44 Minutes

Result After Treatment: Gas 111,000 Cu. Ft.; Oil 15 Bbls. Bbls.

Rock Pressure After Treatment 520 lbs.

CASING CEMENTED

Surface to:

8-5/8" Size 571' Ft. 5-1-64 Date

4½" Size 2365' Ft. 5-10-64 Date

Size _____ Ft. _____ Date

Used in Cementing 8" Casing:

50 Bags Cement

3 Bags HA-5 Blended 25

Cemented by Halliburton Co.

Used in Cementing 4½" Casing:

40 Bags Cement

6 Bags Aquagel

5 Gal. Resinent

Cemented by Well Service, Inc.

REMARKS: Note: Drilled w/Rotary

Note: Used 4 Centralizers @ 2111', 2274', 2305', 2335'

Note: This well was Logged by McCullough Tool Co. on 5-10-64

Note: Drilled 6¾" hole from surface to 571'

Note: Drilled 6¼" hole from 571' to 2371'

Note: Perforations: Triple Fang - Jet Cutter @ 2261'

Note: This well was Drilled according to Rule 11, under Section 13 of Article 4 Chapter 22 of the Code of the Department of Mines, Oil and Gas Division.

APPROVED

C. C. Cameron

SUPERINTENDENT

4708701053

W-17

WVGES GEOLOGY UNDERLIES IT ALL "Pipeline"

Select County: (087) Roane
Enter Permit #: 1053
Get Data | Reset

Select datatypes: (Check All)
Location | Production | Plugging
Owner/Completion | Stratigraphy | Sample
Pay/Show/Water | Logs | Btm Hole Loc

Table Definitions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 1053 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:10:31 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708701053	Roane	1053	Smithfield	Spencer	Spencer	38.757402	-81.263649	477092.4	4289888.7

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708701053	5/-/1964	Original Loc	Completed	William Kaufman	24	W17				Wolf's Head Oil Refining Co., Inc.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_
4708701053	5/-/1964	-/-/-	971	Ground Level	Clvr-Rsh Rn	Price Fm & equivs	Price Fm & equivs	Development Well	Development Well	Oil and Gas	unknown	Fractured	2190		2190		0	

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708701053	5/-/1964	Water	Unknown Water	Vertical			190						1
4708701053	5/-/1964	Pay	Oil & Gas	Vertical			2136	Big Injun (Price&eq)	0	0			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701053	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Company	1984	1,470	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Products Company	1989	2,378	210	153	175	176	212	165	232	183	215	272	198	187
4708701053	Pennzoil Products Company	1990	2,919	195	141	218	87	214	250	325	261	260	364	320	284
4708701053	Pennzoil Products Company	1991	3,736	306	293	267	216	357	315	379	340	314	336	302	311
4708701053	Pennzoil Products Company	1992	3,463	324	297	267	257	314	319	298	303	287	282	299	216
4708701053	Pennzoil Products Company	1993	3,350	336	369	331	144	257	240	296	260	260	282	266	309
4708701053	Pennzoil Products Company	1994	3,015	288	265	131	228	261	243	254	296	256	270	252	271
4708701053	Pennzoil Products Company	1995	2,772	260	233	230	200	253	244	241	249	226	233	198	205
4708701053	Pennzoil Products Company	1996	2,115	21	1	199	153	210	191	200	242	242	161	243	252
4708701053	Pennzoil Products Company	1997	2,366	223	223	175	176	148	201	150	172	225	236	207	230
4708701053	Pennzoil Products Company	1998	1,299	227	155	172	171	183	155	127	24	21	22	20	22
4708701053	Pennzoil Products Company	1999	513	144	141	122	22	15	0	0	0	12	21	22	14
4708701053	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708701053	East Resources, Inc.	2001	1,148	7	95	124	147	111	112	118	104	115	114	94	7
4708701053	East Resources, Inc.	2002	846	83	71	78	77	69	71	65	59	75	54	45	99
4708701053	East Resources, Inc.	2003	403	0	9	0	23	60	61	49	42	56	53	0	50
4708701053	East Resources, Inc.	2004	274	39	50	34	13	30	21	0	0	0	29	27	31
4708701053	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708701053	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708701053	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708701053	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708701053	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708701053	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708701053	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708701053	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708701053	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708701053	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708701053	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708701053	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708701053	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708701053	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708701053	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708701053	HG Energy, LLC	2021	99	10	7	6	9	10	9	10	9	8	8	7	6
4708701053	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708701053	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28
4708701053	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701053	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Company	1983	444	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Pennzoil Products Company	1989	500	44	40	42	38	43	39	47	47	42	45	38	35
4708701053	Pennzoil Products Company	1990	651	44	18	52	64	62	54	56	60	62	62	59	58
4708701053	Pennzoil Products Company	1991	722	60	45	74	60	66	64	55	58	57	60	59	64
4708701053	Pennzoil Products Company	1992	701	64	62	66	61	52	52	53	55	57	45	65	69
4708701053	Pennzoil Products Company	1993	681	67	42	51	53	64	58	57	60	57	61	55	56
4708701053	Pennzoil Products Company	1994	639	27	54	63	55	50	60	57	57	52	61	53	50
4708701053	Pennzoil Products Company	1995	480	47	39	55	53	52	49	46	49	45	45	0	0
4708701053	Pennzoil Products Company	1996	604	54	42	53	45	43	44	51	53	53	56	55	55
4708701053	Pennzoil Products Company	1997	480	40	47	42	52	40	43	37	51	33	37	37	21
4708701053	Pennzoil Products Company	1998	268	36	34	37	30	13	0	0	0	0	0	68	50
4708701053	Pennzoil Products Company	1999	106	44	44	18	0	0	0	0	0	0	0	0	0
4708701053	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	East Resources, Inc.	2001	392	0	61	51	48	42	35	41	27	0	37	24	26
4708701053	East Resources, Inc.	2002	253	23	27	24	23	22	24	27	16	21	14	10	22
4708701053	East Resources, Inc.	2003	104	0	3	0	3	21	20	12	9	17	13	0	6
4708701053	East Resources, Inc.	2004	50	6	16	12	4	7	5	0	0	0	0	0	0
4708701053	East Resources, Inc.	2005	267	0	0	0	3	37	31	24	38	37	24	41	32
4708701053	East Resources, Inc.	2006	479	40	32	52	34	52	50	45	0	43	41	41	49
4708701053	East Resources, Inc.	2007	474	56	47	52	51	39	25	39	36	32	30	36	31
4708701053	East Resources, Inc.	2008	397	30	25	31	34	29	34	32	38	41	41	30	32
4708701053	East Resources, Inc.	2010	209	20	17	19	24	0	15	23	18	15	22	20	16
4708701053	East Resources, Inc.	2011	131	8	9	12	11	8	11	11	11	10	10	16	14
4708701053	HG Energy, LLC	2012	178	13	17	13	12	17	20	5	21	16	18	12	14
4708701053	HG Energy, LLC	2013	209	18	19	16	16	18	17	22	15	16	19	17	16
4708701053	HG Energy, LLC	2014	176	16	8	7	16	19	14	14	17	14	13	15	23
4708701053	HG Energy, LLC	2015	176	20	15	16	20	19	12	15	12	12	13	9	13
4708701053	HG Energy, LLC	2016	130	9	12	12	9	7	12	12	15	11	12	9	10
4708701053	HG Energy, LLC	2017	85	11	7	9	7	8	6	6	7	4	4	8	8
4708701053	HG Energy, LLC	2018	106	8	8	10	12	10	10	9	7	6	10	6	10
4708701053	HG Energy, LLC	2019	122	15	10	8	11	13	10	10	8	9	13	8	7
4708701053	HG Energy, LLC	2020	108	10	8	7	12	8	8	11	8	10	9	8	9
4708701053	HG Energy, LLC	2021	65	8	5	4	10	8	9	7	10	0	0	0	4
4708701053	HG Energy, LLC	2022	93	9	8	9	8	10	8	7	7	7	9	7	4
4708701053	Delta Helix Energy, LLC	2023	8	0	0	0	0	0	0	0	0	0	0	4	4
4708701053	HG Energy, LLC	2023	73	8	7	9	6	6	6	7	7	7	10	0	0

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

4708701053

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701053	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2016	0												
4708701053	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701053	HG Energy, LLC	2016	0												
4708701053	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701053	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

There is no Stratigraphy data for this well

Wireline (E-Log) Information:
* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708701053
W-17

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION 12

Quadrangle SPENCER

Permit No. ROA-1053

WELL RECORD

Oil or Gas Well Gas-Oil (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-17 Elev. 971.38
District Smithfield County Roane
The surface of tract is owned in fee by Romie Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced May 14, 1964
Drilling completed May 21, 1964
Date Shot ____ From ____ To ____
Wit'l ____
Open Flow ____ /10ths Water in ____ Inch
____ /10ths Merc. in ____ Inch
Volume Drilled w/Rotary Cu. Ft.
Rock Pressure None lbs. ____ hrs.
Oil ____ bbls., 1st 24 hrs.
WELL ACIDIZED ____

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe Float Collar Guide Shoe
13			Size of 8 5/8" 4½" 4½"
10 3/4"OD	10.00'	10.00'	Depth set 470' 2159' 2190'
8 5/8"OD	470.00'	470.00'	Perf. top
6⅝			Perf. bottom
4½"OD	2204.00'	2204.00'	Perf. top
3			Perf. bottom
2			
Liners Used			

CASING CEMENTED 8 5/8" SIZE 470 No. Ft. Surface to: 5/16/64 Date
4½" 2190 5/22/64

COAL WAS ENCOUNTERED AT - FEET - INCHES
____ FEET ____ INCHES ____ FEET ____ INCHES
____ FEET ____ INCHES ____ FEET ____ INCHES

WELL FRACTURED 6/2/64 - Used: 1,050 Bbls. Water, 50,000 # Sand 20-40, 300 Gal. M. C. A., 350 # WAC-8, 25 Gal. Aqua Frac and 40 Gal. Morflo

RESULT AFTER TREATMENT Gas - 30,000 Cu. Ft. Oil - 30 Bbls.

ROCK PRESSURE AFTER TREATMENT 450 Lbs.

Fresh Water ____ Feet ____ Salt Water ____ Feet ____

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	5			
10" Casing				10			
Sand			5	80			
Red Rock			80	90			
Sand			90	120			
Red Rock			120	130			
Slate			130	180			
Sand			180	250			
					Water	- 190	½ Bailer Hr.
Red Rock			250	275			
Slate			275	300			
Red Rock			300	325			
Slate			325	340			
Sand			340	375			
Red Rock			375	395			
Slate			395	400			
Red Rock			400	420			
Slate			420	460			
8" Casing				470			
Sand			460	500			
Slate			500	600			
Red Rock			600	640			
Slate			640	780			
Red Rock			780	800			
Slate & Shells			800	860			
Red Rock			860	890			
Slate			890	900			
Red Rock			900	915			
Slate			915	920			

(over)

4708701053

Formation	Color	Hard or Soft	Top 12	Bottom	Oil, Gas or Water	Depth Found	Remarks
Red Rock			920	930			
Slate			930	1035			
Sand			1035	1115			
Slate			1115	1195			
Sand			1195	1285			
Slate			1285	1335			
Red Rock			1335	1355			
Slate			1355	1400			
Sand			1400	1440			
Red Rock			1440	1465			
Sand			1465	1500			
Slate			1500	1580			
Sand			1580	1675			
Slate			1675	1700			
Sand			1700	1875			
Black Sand			1875	1905			
Sand			1905	1965			
Little Lime			1965	1970			
Slate			1970	1980			
					Oil & Gas	2020-2035	Show
Big Lime			1980	2100			
Keener			2100	2110			
					Oil & Gas	2110-2122	
Big Injun			2110	2136			
					Oil & Gas	2125-2136	Show
Slate			2136	2190			
4½" Casing				2190			
TOTAL DEPTH				2190			

Date June 12, 19 64

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By

George W. Wilsman, (Title) Agent

Form No. 989 1M 11/62 N.C. 3329

WOLF'S HEAD OIL REFINING, COMPANY, INC.
SOUTH PENN OIL COMPANY

Rec

4708701053

W-17

NEW WELL REPORT

Lease No. 61219 600 Acres

Farm Mr. Kaufman

District or Township Smithfield

Working District Spencer & A.

Well No. W-17 N. S. 47 E. W. 37

Range County Quad.

Location Made 4-21- 19 64

Rig Commenced 5-11- 19 64

Rig Completed 5-14- 19 64

Rig Contractor Gerald D. Jones

Elevation: Floor Ground 971.30

Drilling Commenced 5-14- 19 64

Drilling Completed 5-21- 19 64

Depth 2190' Sand Big Injun

Drilling Contractor Gerald D. Jones

Work Order No. AFE # WV-23-W, Va.

FORMATION RECORD

Kind	Top	Bottom	Steel Line Meas.	Test
Top Soil	0	5		
10" Casing		10	10	
Sand	5	80		
Red Rock	80	90		
Sand	90	120		
Red Rock	120	130		
Slate	130	160		
Sand	160	250		
Slate		190		4 Hailer Nr.
Red Rock	250	275		
Slate	275	300		
Red Rock	300	325		
[illegible]	325	340		
[illegible]	340	375		
Red Rock	375	395		
Slate	395	400		
Red Rock	400	420		
Slate	420	460		
8" Casing		470	470	
Sand	460	500		
Slate	500	600		
Red Rock	600	640		
Slate	640	760		
Red Rock	760	800		
Slate & Shells	800	860		
Red Rock	860	890		
Slate	890	900		
Red Rock	900	915		
Slate	915	920		
Red Rock	920	930		
Slate	930	1035		
Sand	1035	1115		
Slate	1115	1195		
Sand	1195	1265		
Slate	1265	1335		
Red Rock	1335	1355		
Slate	1355	1400		
Sand	1400	1440		
Red Rock	1440	1465		
Sand	1465	1500		
Slate	1500	1560		
Sand	1560	1675		
[illegible]	1675	1700		
Sand	1700	1875		

Kind	Top	Bottom	Steel Line Meas.	Test
Black Sand	1875	1905		
Sand	1905	1965		
Little Lime	1965	1970		
Slate	1970	1980		
Oil & Gas	2020	2025		Show
Big Lime	1980	2100		
Keener	2100	2110		
Oil & Gas	2115	2122		
Big Injun	2110	2135		
Oil & Gas	2135	2136		Show
Slate	2136	2190		
4½" Casing		2190	2190	
Total Depth		2190	2190	

W-1

(OVER)

4708701053
W-17

W17

NEW WELL REPORT – CONTINUED

INITIAL TORPEDO RECORD	
Date of Shot	
Name of Torpedo Co.	
No. of Quarts	
Length of Shell	
Diameter of Shell	
Length of Anchor	
Top of Shot	
Bottom of Shot	
Feet of Fluid in Hole When Shot	
Results:	

CASING AND TUBING RECORD

SIZE	PUT IN WELL TRANSFER NO.	PUT IN WELL FEET	PUT IN WELL INCH	PULLED OUT TRANSFER NO.	PULLED OUT FEET	PULLED OUT INCH
10-3/4" O.D.	S.L.H.	10	00			
8-5/8" O.D.	S.L.H.	470	00			
4½" O.D.	Fuller	2204	00			

INITIAL PRODUCTION FIRST 24 HOURS	
Open Flow /10ths Water in	Inch
/10ths Merc. in	Inch
Volume Drilled W/Rotary	Cu. Ft.
Rock Pressure None lbs.	hrs.
Oil	bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	8-5/8"	470	5-16-64
Float Collar	4½"	2159'	5-22-64
Guide Shoe	4½"	2190	5-22-64

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED
DATE WELL FRACTURED 6-2-64
NAME OF COMPANY Halliburton
(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)

Used 7,000 Bbls. Water
Used 50,000 # Sand 20-40
Used 300 Gal. H.C.L.
Used 350# WAC-9
Used 25 Gal. Aqua Flow
Used 40 Gal. Korflo

BREAKDOWN PRESSURE 1000
PUMPING PRESSURE 1500 - 2000
AVERAGE PUMPING RATE/MINUTE 20
PUMPING TIME 524 Mins.
RESULT AFTER TREATMENT GAS 10,000 CU. FT.
OIL 30 BBLS.
ROCK PRESSURE AFTER TREATMENT 450 LBS.

CASING CEMENTED

Surface to:
8-5/8" SIZE 470 FT. 5-16-64 DA
4½" SIZE 2190' FT. 5-22-64 DA
SIZE FT. DA

Used in Cementing 8-5/8" Casing
100 Bags Portland Cement
2 Bags Aquagel
4 HA-5
Cemented by Halliburton
Used in Cementing 4½" Casing
40 Bags Reg. Cement
9 - 100# Bentonite
50# Lime
Cemented by Dowell

REMARKS: Note: Drilled W/Rotary
Note: Drilled 12¼" hole from surface to 470'
Drilled 7-7/8" hole from 470' to 2190'

Note: Used 5 Centralizers @ 2178', 2139', 2100', 2060' & 2017'

Note: This Well was Logged by Schlumberger on 5-22-64

Note: Perforated by Basin Surveys on 6-1-64
2 - Holes @ 2111'-9" 3 Holes @ 2133'-9"

Note: This Well was drilled according to Rule 11, under Section 13 of Article 4, Chapter 22 of the Code of the Department of Mines, Oil and Gas Division.

APPROVED

C. C. Crawford
SUPERINTENDENT

4708701055

W-18

"Pipeline"

Select County: (087) Roane
Enter Permit #: 1055
Get Data | Reset

Select datatypes: (Check All)
Location | Production | Plugging
Owner/Completion | Stratigraphy | Sample
Pay/Show/Water | Logs | Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 1055 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:34:06 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708701055	Roane	1055	Smithfield	Spencer	Spencer	38.757692	-81.259094	477488.3	4289919.8

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708701055	6/-/1964	Original Loc	Completed	William Kaufman	25	W18				Wolf's Head Oil Refining Co., Inc.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_
4708701055	6/-/1964	-/-/-	875	Ground Level	Clvr-Rsh Rn	Price Fm & equivs	Price Fm & equivs	Development Well	Development Well	Oil and Gas	unknown	Fractured	2097		2097		0	

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708701055	6/-/1964	Water	Unknown Water	Vertical			1645						0
4708701055	6/-/1964	Pay	Oil & Gas	Vertical			2026	Big Injun (Price&eq)	0	0			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701055	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Company	1984	1,470	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Products Company	1989	1,127	122	94	83	44	111	74	119	89	101	121	90	79
4708701055	Pennzoil Products Company	1990	1,424	108	73	104	82	99	113	152	135	144	164	145	105
4708701055	Pennzoil Products Company	1991	1,136	109	96	89	91	97	100	69	112	97	98	85	93
4708701055	Pennzoil Products Company	1992	856	88	74	63	58	71	63	80	82	76	61	68	72
4708701055	Pennzoil Products Company	1993	689	52	64	64	34	50	63	65	54	50	61	61	51
4708701055	Pennzoil Products Company	1994	599	58	62	29	47	54	53	61	59	36	52	44	44
4708701055	Pennzoil Products Company	1995	470	39	47	34	26	42	37	46	41	44	38	35	41
4708701055	Pennzoil Products Company	1996	402	21	1	37	40	48	38	42	33	33	27	41	41
4708701055	Pennzoil Products Company	1997	416	32	33	31	30	28	31	34	36	30	37	44	50
4708701055	Pennzoil Products Company	1998	309	55	30	34	0	30	31	20	24	21	22	20	22
4708701055	Pennzoil Products Company	1999	227	46	48	27	22	15	0	0	0	12	21	22	14
4708701055	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708701055	East Resources, Inc.	2001	14	7	0	0	0	0	0	0	0	0	0	0	7
4708701055	East Resources, Inc.	2002	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2003	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2004	56	0	0	0	0	0	0	0	0	0	29	27	0
4708701055	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708701055	East Resources, Inc.	2006	509	36	37	41	41	45	44	48	33	36	43	50	53
4708701055	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708701055	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708701055	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708701055	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708701055	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708701055	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708701055	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708701055	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708701055	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708701055	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708701055	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708701055	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708701055	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708701055	HG Energy, LLC	2021	558	55	40	45	38	46	49	52	51	47	48	40	47
4708701055	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708701055	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0
4708701055	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701055	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Company	1983	444	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Pennzoil Products Company	1989	231	21	10	22	17	22	19	22	21	19	19	21	18
4708701055	Pennzoil Products Company	1990	297	21	17	24	29	29	28	31	27	28	23	21	19
4708701055	Pennzoil Products Company	1991	211	20	19	20	19	12	21	17	17	16	18	16	16
4708701055	Pennzoil Products Company	1992	159	15	14	14	12	14	14	14	12	13	15	10	12
4708701055	Pennzoil Products Company	1993	144	13	10	10	14	14	12	11	13	13	10	11	13
4708701055	Pennzoil Products Company	1994	122	6	11	13	12	12	12	8	11	9	10	8	10
4708701055	Pennzoil Products Company	1995	81	7	5	9	8	10	8	9	8	8	9	0	0
4708701055	Pennzoil Products Company	1996	107	10	11	12	9	9	6	7	9	9	9	8	8
4708701055	Pennzoil Products Company	1997	90	7	8	8	8	9	9	5	8	7	8	9	4
4708701055	Pennzoil Products Company	1998	62	7	6	6	6	2	0	0	0	0	0	20	15
4708701055	Pennzoil Products Company	1999	33	14	15	4	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2001	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2002	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2003	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2004	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2005	267	0	0	0	3	37	31	24	38	37	24	41	32
4708701055	East Resources, Inc.	2006	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2007	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2008	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	East Resources, Inc.	2010	148	21	15	19	19	0	9	15	10	10	13	8	9
4708701055	East Resources, Inc.	2011	121	9	9	9	11	11	10	8	9	9	10	14	12
4708701055	HG Energy, LLC	2012	58	10	10	8	8	12	10	0	0	0	0	0	0
4708701055	HG Energy, LLC	2013	135	10	16	16	14	14	12	15	12	8	6	4	8
4708701055	HG Energy, LLC	2014	125	11	14	12	12	16	8	8	10	8	10	8	8
4708701055	HG Energy, LLC	2015	75	10	7	8	10	8	7	10	5	0	0	0	10
4708701055	HG Energy, LLC	2016	108	9	12	10	8	9	10	7	10	7	8	8	10
4708701055	HG Energy, LLC	2017	98	8	9	13	10	9	10	10	14	12	3		
4708701055	HG Energy, LLC	2018	87	10	6	7	8	7	7	7	5	6	6	8	10
4708701055	HG Energy, LLC	2019	131	13	12	8	10	16	11	14	8	9	14	6	10
4708701055	HG Energy, LLC	2020	117	10	8	10	14	9	10	12	9	10	9	9	7
4708701055	HG Energy, LLC	2021	113	8	6	8	10	7	13	10	11	10	11	8	11
4708701055	HG Energy, LLC	2022	102	11	9	12	7	10	8	7	9	8	8	8	5
4708701055	HG Energy, LLC	2023	85	8	8	9	8	10	8	8	9	7	10	0	0
4708701055	Delta Helix Energy, LLC	2023	11	0	0	0	0	0	0	0	0	0	0	5	6

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

4708701055

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701055	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2016	0												
4708701055	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701055	HG Energy, LLC	2016	0												
4708701055	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701055	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

There is no Stratigraphy data for this well

Wireline (E-Log) Information:
* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708701055

W-18

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION 9

Quadrangle SPENCER

WELL RECORD

Permit No. ROA-1055

Oil or Gas Well Oil & Gas (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-18 Elev. 875.44
District Smithfield County Roane
The surface of tract is owned in fee by G. W. Webb c/o Bill Webb
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced June 1, 1964
Drilling completed June 6, 1964
Date Shot - From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Drilled w/Rotary (Show Only) Cu. Ft.
Rock Pressure None lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe Float Collar
13			Guide Shoe
10 3/4"OD	15'	15'	Size of 8 5/8"OD 4½"OD 4½"OD
8 5/8"OD	396'	396'	Depth set 393' 2064' 2095'
6⅝			
4½"OD	2109'	2109'	Perf. top
3			Perf. bottom
2 3/8"OD	2039.71'	2039.71'	Perf. top
Liners Used			Perf. bottom

CASING CEMENTED 8 5/8" SIZE 393 No. Ft. 6/2/64 Date Surface to:
4½" 2095 6/6/64
COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 6/12/64 - Used: 1,020 Bbl. Water, 60,000 # Sand, 250 Gal. B.D.A., 175# J-98, 350# J-84, 20 Gal. Deterger and 35 Gal. Freflo
RESULT AFTER TREATMENT Gas - 30,000 Cu. Ft. Oil - 9 Bbls.
ROCK PRESSURE AFTER TREATMENT 46½ Lbs.
Fresh Water - Feet - Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	5			
Conductor				15			
Sand			5	20			
Red Rock			20	30			
Sand			30	50			
Slate			50	100			
Sand			100	140			
Slate			140	160			
Sand			160	185			
Slate			185	195			
Red Rock			195	210			
Sand			210	250			
Slate			250	305			
Sand			305	340			
Slate			340	390			
Sand			390	420			
Red Rock			420	450			
Sand			450	500			
Slate			500	600			
Sand			600	625			
Red Rock			625	650			
Slate			650	780			
Sand			780	800			
Slate			800	900			
Sand			900	950			
Shale			950	1000			
Sand			1000	1050			
Slate			1050	1100			
Sand			1100	1175			

(over)

4708701055

Formation	Color	Hard or Soft	Top 9	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate			1175	1200			
Sand			1200	1300			
Slate			1300	1350			
Sand			1350	1400			
Slate			1400	1450			
Sand			1450	1500			
Slate			1500	1645			
Salt Sand			1645	1725			Water
Black Slate			1725	1845			
Little Lime			1845	1885			
Big Lime			1885	2005			
Big Injun			2005	2035			
					Oil & Gas	2009-2026	Show Only
Brake			2035	2040			
Big Injun			2040	2047			
Slate			2047	2097			
4½" Casing				2095			
TOTAL DEPTH				2097			

Date July 13, 1964

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC., Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

4708701055

W-18

Bottom of Sh

Feet of Fh When Shot

Results:

INITIAL PRODUCTION FIRST 24 HOURS

Open Flow /10ths Water in Inch

/10ths Merc. in Inch

Volume Drilled w/Rotary (Show only) Cu. Ft.

Rock Pressure None lbs. hrs.

Oil bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	6-5/8" O.D.	393'	6-2-64
Float Collar	4½" O.D.	2064'	6-6-64
Guide Shoe	4½" O.D.	2098'	6-6-64

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED

DATE WELL FRACTURED 6-12-64

NAME OF COMPANY Dowell

(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)

Used: 1020 Bbl. Water

Used: 40,000 # Sand

Used: 250 Gal. E.D.T.A.

Used: 175 # J-96

Used: 350# J-84

Used: 20 Gal. Detergor

Used: 35 Gal. Profle

BREAKDOWN PRESSURE 1250#

PUMPING PRESSURE 2200# & 3200#

AVERAGE PUMPING RATE/MINUTE 21.4

PUMPING TIME 58 Min.

RESULT AFTER TREATMENT } GAS 35,000 CU. FT.

OIL 0 BBLS.

ROCK PRESSURE AFTER TREATMENT 445 LBS.

CASING CEMENTED

Surface to:

6-5/8" SIZE 393 FT. 6-2-64 DAT

4½" SIZE 2095 FT. 6-6-64 DAT

SIZE FT. DAT

Used in Cementing 6-5/8" Casing:

55 Bags Marquette Common Bulk Cement

2-1/4-5 Blended 2%

Cemented by: Halliburton

Used in Cementing 4½" Casing:

40 Bags Cement

4 Bags Aquagel

1 Bag Lime

5 Gal. Redmont

Cemented by Well Service, Inc.

REMARKS: Note: Drilled 8¾" Hole from Surface to 393'
Drilled 6¾" Hole from 393' to 2097'

Note: Used 5 Centralizers @ 2064', 1933', 2002', 1971' & 1940'

Note: This well was logged by Schlumberger on 6-4-64.

Note: Perforated @ 2018' with 1 - 6 way Jet on Single Plane by Basin Surveys, Inc.

Note: This well was drilled according to Rule 11, under Section 13 of Article 4, Chapter 22 of the code of the Department of Mines, Oil and Gas Division.

APPROVED

C. C. Cameron

SUPERINTENDENT

Form No. 989 IN LIEU No. 9929

WOLF'S HEAD OIL REFINING CO., INC.
SOUTH BENN OIL COMPANY

Rec

4708701055
W-18

NEW WELL REPORT

No. 81219 800 Acres — Working District Spencer & A

Farm: Wm. Kaufman — Well No. W-18 N. S. 47 E. W. 37

District or Township: Smithfield — County: Ritchie — Quad.

Location Made May 1, 1964 — Drilling Commenced June 1, 1964

Rig Commenced May 28, 1964 — Drilling Completed June 6, 1964

Rig Completed May 29, 1964 — Depth 2097' — Sand Big Injun

Rig Contractor Gerald D. Jones — Drilling Contractor Gerald D. Jones

Elevation: Floor — Ground 875.44 — Work Order No. AFE # WW-30-H. Va.

FORMATION RECORD

Kind	Top	Bottom	Steel Line Meas.	Test	Kind	Top	Bottom	Steel Line Meas.	Test
p Soil	0	5			Slate	2047	2097		
nductor		15	15		4½" Casing		2095	2095	
nd	5	20							
d Rock	20	30			Total Depth		2097	2097	
nd	30	50							
late	50	100							
nd	100	140							
late	140	160							
nd	160	165							
late	165	195							
d Rock	195	210							
n	210	250							
	250	305							
	305	340							
late	340	390							
nd	390	420							
d Rock	420	450							
nd	450	500							
late	500	600							
nd	600	625							
d Rock	625	650							
late	650	750							
nd	750	800							
late	800	900							
nd	900	950							
nale	950	1000							
nd	1000	1050							
late	1050	1100							
nd	1100	1175							
late	1175	1200							
nd	1200	1300							
late	1300	1350							
nd	1350	1400							
late	1400	1450							
nd	1450	1500							
late	1500	1645							
lt Sand	1645	1725		Water					
lack Slate	1725	1845							
ttle Lime	1845	1895							
g Lime	1895	2005							
g Injun	2005	2015							
ll [illegible]	2015	2026		Show Only					
na[illegible]	2026	2040							
g [illegible]n	2040	2047							

(OVER)

4708701056

W-19

WVGES GEOLOGY UNDERLIES IT ALL "Pipeline"

Select County: (087) Roane
Enter Permit #: 1056
Get Data Reset

Select datatypes: (Check All)
Location, Production, Plugging, Owner/Completion, Stratigraphy, Sample, Pay/Show/Water, Logs, Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 087 Permit = 1056 Link to all digital records for well

Report Time: Thursday, April 03, 2025 7:47:40 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708701056	Roane	1056	Smithfield	Spencer	Spencer	38.759355	-81.26243	477199	4290105.2

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_E
4708701056	6/19/1964	Original Loc	Completed	Maxel Smith	W-19	26	William Kaufman	81219	Alfred M Oppenheimer	Wolf's Head Oil Refining Co., Inc.			
4708701056	-/-/-	Worked Over	Completed	Maxel Smith	W-19					Pennzoil Products Company		Big Injun (Price&eq)	

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_
4708701056	6/19/1964	6/12/1964	1061	Ground Level	Clvr-Rsh Rn	Undf PRICE blw INJN	Big Injun (Price&eq)	Development Well	Development Well	Oil and Gas	Rotary	Acid+Frac	2277		2277		
4708701056	-/-/-	-/-/-	1061	Ground Level	Clvr-Rsh Rn	Undf PRICE blw INJN	Big Injun (Price&eq)	Service Well	Unsuccessful	Salt Water Disp	unknown	unknown	2277		0		

Comment: -/-/- Injection zone footage in pays is proposed.

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708701056	6/19/1964	Water	Unknown Water	Vertical			1990						0
4708701056	6/19/1964	Show	Oil & Gas	Vertical	2115	Big Lime	2120	Big Lime	0	0			
4708701056	6/19/1964	Pay	Gas	Vertical	2206	Big Injun (Price&eq)	2216	Big Injun (Price&eq)	0	50			
4708701056	6/19/1964	Pay	Oil	Vertical	2206	Big Injun (Price&eq)	2216	Big Injun (Price&eq)	0	25			
4708701056	-/-/-	Horizon	Injection	Vertical	2202	Big Injun (Price&eq)	2235	Big Injun (Price&eq)					

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701056	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Philco Gas Co.	1984	1,471	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Pennzoil Products Company	1989	1,263	146	90	107	106	111	91	124	89	101	121	90	87
4708701056	Pennzoil Products Company	1990	1,182	108	73	109	82	82	82	126	97	98	121	103	101
4708701056	Pennzoil Products Company	1991	1,110	109	71	84	82	97	95	115	90	91	98	90	88
4708701056	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701056	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Pennzoil Company	1983	444	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Philco Gas Co.	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Pennzoil Products Company	1989	258	27	24	22	21	23	19	22	21	19	21	21	18
4708701056	Pennzoil Products Company	1990	242	22	17	20	21	24	20	21	20	20	22	21	14
4708701056	Pennzoil Products Company	1991	203	19	17	20	18	20	17	16	17	17	17	15	10
4708701056	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701056	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701056	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701056	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4708701056	Original Loc	Little Lime	Well Record	2027	Reasonable	35	Reasonable	1061	Ground Level
4708701056	Original Loc	Pencil Cave	Well Record	2062	Reasonable	16	Reasonable	1061	Ground Level
4708701056	Original Loc	Big Lime	Well Record	2078	Reasonable	115	Reasonable	1061	Ground Level
4708701056	Original Loc	Keener	Well Record	2193	Reasonable	9	Reasonable	1061	Ground Level
4708701056	Original Loc	Big Injun (Price&eq)	Well Record	2202	Reasonable	33	Reasonable	1061	Ground Level
4708701056	Original Loc	Undf PRICE blw INJN	Well Record	2235	Reasonable			1061	Ground Level

Wireline (E-Log) Information:

* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708701056

W-19

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION

Quadrangle SPENCER

Permit No. ROA-1056

WELL RECORD

Oil or Gas Well Oil & Gas (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-19 Elev. 1060.85
District Smithfield County Roane
The surface of tract is owned in fee by Maxel Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced June 12, 1964
Drilling completed June 19, 1964
Date Shot — From — To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Drilled w/Rotary (Show Only) Cu. Ft.
Rock Pressure No Test lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe
13			Float Collar
10 3/4"OD	9'	9'	Guide Shoe
8 5/8"OD	466'	466'	Size of 8 5/8" 4½"OD
6¾			4½"OD
~~Surg~~ 4½"OD/ Tally	2286'	2286'	Depth set 454'
S.L.M.	2272'	2272'	2248'
			2272' Perf. top
2 3/8"OD	2251.83'	2251.83'	Perf. bottom
Liners Used			Perf. top
			Perf. bottom

CASING CEMENTED Surface to; 8 5/8" SIZE 454 No. Ft. 6/13/64 Date
4½" 2272 6/20/64
COAL WAS ENCOUNTERED AT — FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 6/27/64 - Used: 1,050 Bbls. Water, 46,000 # Sand, 300 Gal. BDA Acid, 175# J-98, 350# J-84, 20 Gal. Deterger and 35 Gal. Freflo
RESULT AFTER TREATMENT Gas - 50,000 Cu. Ft. Oil - 25 Bbls.
ROCK PRESSURE AFTER TREATMENT 400 Lbs.
Fresh Water — Feet — Salt Water — Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	10			
Conductor				9			
Red Rock			10	20			
Slate			20	85			
Sand			85	200			
Slate			200	230			
Red Rock			230	265			
Slate			265	295			
Sand			295	395			
Slate			395	420			
Red Rock			420	430			
Sand			430	470			
Slate			470	485			
Red Rock			485	495			
Slate			495	515			
Red Rock			515	525			
Slate			525	675			
Red Rock			675	735			
Sand			735	765			
Red Rock			765	815			
Slate			815	840			
Sand			840	905			
Red Rock			905	925			
Slate			925	965			
Red Rock			965	985			
Slate			985	1245			
Sand			1245	1350			
Slate			1350	1375			
Sand			1375	1400			

(over)

4708701056

Formation	Color	Hard or Soft	Top 10	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate			1400	1570			
Sand			1570	1620			
Slate			1620	1730			
Sand			1730	1760			
Slate			1760	1805			
Sand			1805	1920			
Slate			1920	1990			
Sand			1990	2027			Water
Little Lime			2027	2062			
Pencil Cave			2062	2078			
					Oil & Gas	2115-2120	Show Only
Big Lime			2078	2193			
Keener			2193	2202			
Big Injun			2202	2235			
Pay			2206	2216			Show
Slate			2235	2277			
4½" Casing				2272			
TOTAL DEPTH				2277			

Date July 13, 19 64

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC., Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

4708701056

Fig No 7 **W-19**

Form OG-10

JUL 24

Office COPY

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION 10.

Quadrangle SPENCER

Permit No. ROA-1056

WELL RECORD

Oil or Gas Well Oil &.

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-19 Elev. 1060.85
District Smithfield County Roane
The surface of tract is owned in fee by Maxel Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced June 12, 1964
Drilling completed June 19, 1964
Date Shot - From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Drilled w/Rotary (Show Only) Cu. Ft.
Rock Pressure No Test lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer
13			Steel Shoe
10 3/4"OD	9'	9'	Float Collar
8 5/8"OD	466'	466'	Guide Shoe
6 5/8			Size of 8 5/8"
4½"OD/ Tally S.L.M.	2286' 2272'	2286' 2272'	4½"OD
2			Depth set 454' 2248'
2 3/8"OD	2251.83'	2251.83	2272'
Liners Used			Perf. top
			Perf. bottom
			Perf. top
			Perf. bottom

CASING CEMENTED 8 5/8" SIZE 454 No. Ft. 6/13/64 Surface tag
4½" 2272 6/20/64
COAL WAS ENCOUNTERED AT - FEET INC
FEET INCHES FEET INC
FEET INCHES FEET INC

WELL FRACTURED 6/27/64 - Used: 1,050 Bbls. Water, 46,000 # Sand, 300 Gal. BDA Acid, 175# 350# J-84, 20 Gal. Deterger and 35 Gal. Freflo
RESULT AFTER TREATMENT Gas - 50,000 Cu. Ft. Oil - 25 Bbls.
ROCK PRESSURE AFTER TREATMENT 400 Lbs.
Fresh Water - Feet - Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	10			
Conductor				9			
Red Rock			10	20			
Slate			20	85			
Sand			85	200			
Slate			200	230			
Red Rock			230	265			
Slate			265	295			
Sand			295	395			
Slate			395	420			
Red Rock			420	430			
Sand			430	470			
Slate			470	485			
Red Rock			485	495			
Slate			495	515			
Red Rock			515	525			
Slate			525	675			
Red Rock			675	735			
Sand			735	765			
Red Rock			765	815			
Slate			815	840			
Sand			840	905			
Red Rock			905	925			
Slate			925	965			
Red Rock			965	985			
Slate			985	1245			
Sand			1245	1350			
Slate			1350	1375			
Sand			1375	1400			

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(over)

4708701056

W-19

Formation	Color	Hard or Soft	Top 10	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate			1400	1570			
Sand			1570	1620			
Slate			1620	1730			
Sand			1730	1760			
Slate			1760	1805			
Sand			1805	1920			
Slate			1920	1990			
Sand			1990	2027			Water
Little Lime			2027	2062			
Pencil Cave			2062	2078			
					Oil & Gas	2115-2120	Show Only
Big Lime			2078	2193			
Keener			2193	2202			
Big Injun			2202	2235			
Pay			2206	2216			Show
Slate			2235	2277			
4½" Casing				2272			
TOTAL DEPTH				2277			

W19

Date July 13, 19 64

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

4708701068
W-20

WVGES
GEOLOGY UNDERLIES IT ALL
"Pipeline"

Select County: (087) Roane
Enter Permit #: 1068
Get Data | Reset

Select datatypes: (Check All)
Location, Production, Plugging, Owner/Completion, Stratigraphy, Sample, Pay/Show/Water, Logs, Btm Hole Loc

Table Description
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" New

WV Geological & Economic Survey:

Well: County = 87 Permit = 1068 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:08:15 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708701068	Roane	1068	Smithfield	Spencer	Spencer	38.762653	-81.261226	477304.6	4290470.8

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708701068	7/8/1964	Original Loc	Completed	William Kaufman	27	W20				Wolf's Head Oil Refining Co., Inc.			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_BEF	G_
4708701068	7/8/1964	6/27/1964	1022	Ground Level	Clvr-Rsh Rn	Price Fm & equivs	Price Fm & equivs	Development Well	Development Well	Oil and Gas	unknown	Fractured	2255		2255		0	

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708701068	7/8/1964	Water	Unknown Water	Vertical			1300						0
4708701068	7/8/1964	Water	Unknown Water	Vertical			1780						0
4708701068	7/8/1964	Pay	Oil & Gas	Vertical			2202	Big Injun (Price&eq)	0	0			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701068	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Company	1984	1,471	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Products Company	1989	1,220	146	90	75	106	111	74	119	89	101	127	99	83
4708701068	Pennzoil Products Company	1990	1,291	103	68	114	91	103	125	163	140	126	0	134	124
4708701068	Pennzoil Products Company	1991	1,135	119	96	89	72	101	95	98	96	97	104	85	83
4708701068	Pennzoil Products Company	1992	859	71	74	63	62	76	63	92	87	70	61	68	72
4708701068	Pennzoil Products Company	1993	680	67	64	69	34	61	59	65	54	59	56	51	41
4708701068	Pennzoil Products Company	1994	597	58	43	29	47	54	53	61	44	58	57	53	40
4708701068	Pennzoil Products Company	1995	517	39	61	49	41	42	41	46	41	44	33	44	36
4708701068	Pennzoil Products Company	1996	439	21	1	52	40	48	34	46	50	38	27	41	41
4708701068	Pennzoil Products Company	1997	267	28	33	35	30	32	31	34	32	12	0	0	0
4708701068	Pennzoil Products Company	1998	109	0	0	0	0	0	0	0	24	21	22	20	22
4708701068	Pennzoil Products Company	1999	213	59	48	0	22	15	0	0	0	12	21	22	14
4708701068	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708701068	East Resources, Inc.	2001	562	7	37	63	67	66	42	66	50	58	52	47	7
4708701068	East Resources, Inc.	2002	522	40	39	46	50	50	47	51	41	39	46	27	46
4708701068	East Resources, Inc.	2003	385	31	21	0	0	57	52	53	38	50	49	0	34
4708701068	East Resources, Inc.	2004	465	20	50	42	49	51	42	67	49	39	29	27	0
4708701068	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708701068	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708701068	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708701068	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708701068	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708701068	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708701068	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708701068	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708701068	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708701068	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708701068	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708701068	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708701068	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708701068	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708701068	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708701068	HG Energy, LLC	2021	217	17	14	14	17	21	21	29	0	3	29	25	27
4708701068	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708701068	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28
4708701068	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701068	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Company	1983	444	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Company	1984	382	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Pennzoil Products Company	1989	245	19	24	22	17	22	19	22	22	21	20	20	17
4708701068	Pennzoil Products Company	1990	281	23	19	25	32	31	29	27	0	26	27	23	19
4708701068	Pennzoil Products Company	1991	205	20	15	21	18	17	18	17	18	16	16	13	16
4708701068	Pennzoil Products Company	1992	165	15	15	14	12	16	15	13	12	13	15	13	12
4708701068	Pennzoil Products Company	1993	139	14	10	12	13	14	12	13	12	11	8	11	9
4708701068	Pennzoil Products Company	1994	129	6	11	13	12	12	9	13	12	11	9	8	13
4708701068	Pennzoil Products Company	1995	88	10	8	9	9	10	8	9	7	10	8	0	0
4708701068	Pennzoil Products Company	1996	114	14	11	12	8	10	9	8	9	9	9	7	8
4708701068	Pennzoil Products Company	1997	52	8	8	9	8	9	8	2	0	0	0	0	0
4708701068	Pennzoil Products Company	1998	37	0	0	0	0	0	0	0	0	0	0	21	16
4708701068	Pennzoil Products Company	1999	33	18	15	0	0	0	0	0	0	0	0	0	0
4708701068	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	East Resources, Inc.	2001	203	0	24	26	22	25	13	23	13	16	17	12	12
4708701068	East Resources, Inc.	2002	163	11	15	14	15	16	16	21	11	11	12	6	15
4708701068	East Resources, Inc.	2003	106	14	7	0	0	20	17	13	8	15	12	0	0
4708701068	East Resources, Inc.	2004	123	3	16	15	15	12	10	16	13	10	3	3	7
4708701068	East Resources, Inc.	2005	100	8	12	11	8	10	13	10	14	12	2	0	0
4708701068	East Resources, Inc.	2006	70	0	0	0	0	0	0	7	0	6	19	15	23
4708701068	East Resources, Inc.	2007	197	23	20	27	27	24	12	17	9	7	10	10	11
4708701068	East Resources, Inc.	2008	113	11	9	10	8	7	8	6	16	17	10	7	4
4708701068	East Resources, Inc.	2010	168	20	17	19	20	0	13	16	13	13	15	12	10
4708701068	East Resources, Inc.	2011	146	9	9	12	12	11	10	11	11	13	14	20	14
4708701068	HG Energy, LLC	2012	200	13	19	22	21	23	22	10	21	16	17	8	8
4708701068	HG Energy, LLC	2013	174	12	15	16	14	16	15	20	16	11	15	12	12
4708701068	HG Energy, LLC	2014	107	14	10	8	8	11	8	8	10	8	6	8	8
4708701068	HG Energy, LLC	2015	91	10	8	8	10	8	8	10	8	5	5	4	7
4708701068	HG Energy, LLC	2016	83	5	7	9	5	4	8	6	10	6	5	8	10
4708701068	HG Energy, LLC	2017	74	8	8	9	6	7	6	6	7	4	4	5	4
4708701068	HG Energy, LLC	2018	85	7	8	8	8	10	8	6	5	5	5	5	10
4708701068	HG Energy, LLC	2019	98	10	8	8	8	13	10	10	6	6	7	5	7
4708701068	HG Energy, LLC	2020	92	10	8	7	10	6	6	9	8	8	7	7	6
4708701068	HG Energy, LLC	2021	74	4	4	4	10	8	9	6	5	7	5	5	7
4708701068	HG Energy, LLC	2022	60	5	5	6	8	8	7	5	7	7	2	0	0
4708701068	Delta Helix Energy, LLC	2023	8	0	0	0	0	0	0	0	0	0	0	4	4
4708701068	HG Energy, LLC	2023	6	0	0	0	0	0	0	0	0	1	5	0	0

4708701068

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701068	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2016	0												
4708701068	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701068	HG Energy, LLC	2016	0												
4708701068	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701068	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

There is no Stratigraphy data for this well

Wireline (E-Log) Information:

* Scanned/Raster Log Information:

API	STATUS	LOG_TOP	LOG_BOT	DEEPEST_FML	LOGS_AVAIL	SCAN	GR_TOP	GR_BOT	D_TOP	D_BOT	N_TOP	N_BOT	I_TOP	I_BOT	T_TOP	T_BOT	S_TOP	S_BOT	O_TOP	O_BOT	INCH2	IN(
4708701068	Regular Entry	1850	2254		D,C,*	Y			1850	2254									1850	2254	N	Y

Scanned/Raster Comment: *logs: caliper, bit size

* There is no Digitized/LAS Log data for this well

Downloadable Log Images/Data: We advise you to save the scanned log or digitized log file(s) to your PC for viewing. To do so, right-click the file of interest and select the save option. Then you can direct the file to a location of your choice. Please note the scanned log images vary in size and some may take several minutes to download.

Scanned/Raster Logs

FILENAME
4708701068dco.tif

Quick Reference Guide for Log File Names For more info about WVGES scanned logs click here

geologic log types:

- d density (includes bulk density, compensated density, density, density porosity, grain density, matrix density, etc.)
- e photoelectric adsorption (PE or Pe, etc.)
- g gamma ray
- i induction (includes dual induction, medium induction, deep induction, etc.)
- l laterolog
- m dipmeter
- n neutron (includes neutron porosity, sidewall neutron--SWN, etc.)
- o other[1]
- s sonic or velocity
- t temperature (includes borehole temperature, BHT, differential temperature, etc.)
- z spontaneous potential or potential

mechanical log types:

- b cement bond
- c caliper
- o other[1]
- p perforation depth control or perforate

[1]other logs may include, but are not limited to, such curves as audio, bit size, CCL--casing collar locator, continuous meter, directional survey, gas detector, guard, NCTL--Nuclear Cement Top Locator, radioactive tracer, tension

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708701068

W-20

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION /8

Quadrangle SPENCER

WELL RECORD

Permit No. ROA-1068

Oil or Gas Well (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY, INC.
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-20 Elev. -
District Smithfield County Roane
The surface of tract is owned in fee by Romie Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II, et al
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced June 27, 1964
Drilling completed July 8, 1964
Date Shot - From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Show (Drilled w/Rotary) Cu. Ft.
Rock Pressure No Test lbs. hrs.
Oil bbls., 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe Float Collar Guide Shoe
13			Size of 8 5/8"OD 4½"OD 4½"OD
10 3/4"OD	9'	9'	Depth set 437' 2226' 2253.96'
8 5/8"OD	437'	437'	Perf. top
6⅝			Perf. bottom
4½"OD	2276.46'	2276.46'	Perf. top
3			Perf. bottom
2 3/8"OD	2260'	2260'	
Liners Used			

CASING CEMENTED 8 5/8" SIZE 437 No. Ft. 6/28/64 Date (Surface to:")
4½" 2253.96 7/8/64

COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 7/15/64 - Used: 35,500 Gals. Water, 48,500 # Sand 20-40, 300 Gal. MCA 15%, 500 # WAC-8, 35 Gal. Morflo and 20 Gal. Aquafrac
RESULT AFTER TREATMENT Gas - 40,000 Cu. Ft. Oil - 20 Bbls.
ROCK PRESSURE AFTER TREATMENT 340 Lbs.
Fresh Water - Feet Salt Water - Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	10			
Conductor				9			
Slate			10	20			
Sand			20	80			
Slate			80	100			
Sand			100	145			
Slate			145	195			
Red Rock			195	215			
Sand			215	295			
Slate			295	330			
Red Rock			330	350			
Slate			350	370			
Red Rock			370	395			
Slate			395	410			
Red Rock			410	430			
Sand			430	450			
Slate			450	475			
Red Rock			475	500			
Slate			500	520			
Sand			520	540			
Red Rock			540	565			
Slate			565	580			
Sand			580	600			
Slate			600	625			
Red Rock			625	650			
Slate			650	700			
Sand			700	760			
Slate			760	795			
Red Rock			795	825			
Slate			825	865			

(over)

4708701068

Formation	Color	Hard or Soft	Top /8	Bottom	Oil, Gas or Water	Depth Found	Remarks
Sand			865	900			
Slate			900	925			
Red Rock			925	940			
Slate			940	955			
Red Rock			955	975			
Sand			975	1000			
Slate			1000	1065			
Red Rock			1065	1090			
Sand			1090	1125			
Slate			1125	1165			
Sand			1165	1200			
Slate			1200	1250			
Sand			1250	1300			
Slate			1300	1400			Water
Sand			1400	1470			
Slate			1470	1505			
Sand			1505	1525			
Slate			1525	1575			
Sand			1575	1625			
Slate			1625	1685			
Sand			1685	1720			
Slate			1720	1780			
Sand			1780	1910			Water
Black Slate			1910	1995			
Little Lime			1995	2032			
Pencil Cave			2032	2063			
Big Lime			2063	2170			
Keener			2170	2193			
					Oil & Gas	2170-2175	Show
					Oil & Gas	2180-2193	Show
Big Injun			2193	2213			
					Oil & Gas	2193-2202	Show
Slate			2213	2255			
4½" Casing				2253			
TOTAL DEPTH				2255			

Date August 11, 1964

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

Fo_ 9 1H 11/61 M-6.9029

WOLF'S HEAD OIL REFINING CO., INC.
[redacted]

RCC

4708701068

W-20

NEW WELL REPORT

No. 81219 800 Acres

Wm. Kaufman Farm

Smithfield District or Township

Working District Spencer # 4

Well No. W-20 N. _ S. 47 E. _ W. 37

Roane County _ Quad.

Location Made May 21, 1964

Rig Commenced June 26, 1964

Rig Completed June 27, 1964

Rig Contractor Gerald D. Jones

Elevation: Floor _ Ground

Drilling Commenced June 27, 1964

Drilling Completed July 8, 1964

Depth 2255' Sand Big Injun

Drilling Contractor Gerald D. Jones

Work Order No. AFE # WH-32-W. Va.

FORMATION RECORD

Kind	Top	Bottom	Steel Line Meas.	Test
ob Soil	0	10		
onductor		9	9	
late	10	20		
and	20	80		
late	80	100		
and	100	145		
late	145	195		
ed Rock	195	215		
and	215	295		
late	295	330		
ed Rock	330	350		
late	350	370		
[illegible]	370	395		
[illegible]	395	410		
ed Rock	410	430		
and	430	450	437	
late	450	475		
ed Rock	475	500		
late	500	520		
and	520	540		
ed Rock	540	565		
late	565	580		
and	580	600		
late	600	625		
ed Rock	625	650		
late	650	700		
and	700	760		
late	760	795		
ed Rock	795	825		
late	825	865		
and	865	900		
late	900	925		
ed Rock	925	940		
late	940	955		
ed Rock	955	975		
and	975	1000		
late	1000	1055		
ed Rock	1055	1090		
and	1090	1125		
late	1125	1165		
and	1165	1200		
lat[illegible]	1200	1250		
[illegible]	1250	1300		
[illegible]	1300	1400		Water

Kind	Top	Bottom	Steel Line Meas.	Test
Sand	1400	1470		
Slate	1470	1505		
Sand	1505	1525		
Slate	1525	1575		
Sand	1575	1625		
Slate	1625	1685		
Sand	1685	1720		
Slate	1720	1780		
Sand	1780	1910		Water
Black Slate	1910	1995		
Little Lime	1995	2032		
Pencil Cave	2032	2063		
Big Lime	2063	2170		
Keener	2170	2193		
Oil & Gas	2170	2175		Show
Oil & Gas	2180	2193		Show
Big Injun	2193	2213		
Oil & Gas	2193	2202		Show
Slate	2213	2255		
4½" Casing	[redacted]	2253	2253.96	
Total Depth		2255	2255	Drillers

(OVER)

4708701068
W-20

NEW WELL REPORT — CONTINUED

INITIAL TORPEDO RECORD

Date of Shot	
Name of Torpedo Co.	
No. of Quarts	
Length of Shell	
Diameter of Shell	
Length of Anchor	
Top of Shot	
Bottom of Shot	
Feet of Fluid in Hole When Shot	
Results:	

CASING AND TUBING RECORD

SIZE	PUT IN WELL TRANSFER NO.	PUT IN WELL FEET	PUT IN WELL INCH	PULLED OU TRANSFER NO.	PULLED OU FE	INC
10 3/4" O.D.	S.L.M.	9	=			
8 5/8" O.D.	S.L.M.	437	.00			
4½" O.D.	Talley	2276	.46			
2 3/8" O.D.	Talley	2260	.00			

INITIAL PRODUCTION FIRST 24 HOURS

Open Flow /10ths Water in ____ Inch
/10ths Merc. in ____ Inch
Volume Show (Drilled W/Rotary) Cu. Ft.
Rock Pressure No Test lbs. ____ hrs.
Oil ____ bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	8 5/8" O.D.	437	6-26-64
Float Collar	4½" O.D.	2226	7-8-64
Guide Shoe	4½" O.D.	2253.96	7-8-64

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED ____
DATE WELL FRACTURED 7-15-64
NAME OF COMPANY Halliburton
(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)

Used: 35,500 Gals. Water
Used: 48,500 # Sand 20-40
~~Used: 500 Gal. WGA-15~~
Used: 500# WAC-8
Used: 35 Gal. Nonflo
Used: 20 Gal. ~~[illegible]~~ Aquafrac

BREAKDOWN PRESSURE 1200#
PUMPING PRESSURE 2000 - 3000
AVERAGE PUMPING RATE/MINUTE 18.8
PUMPING TIME 45 Min.
RESULT AFTER TREATMENT { GAS 40,000 CU. FT.
OIL 20 BBLS.
ROCK PRESSURE AFTER TREATMENT 340 LBS.

CASING CEMENTED

Surface to:
8 5/8" SIZE 437 FT. 6-26-64 DA
4½" SIZE 2253.96 FT. 7-8-64 DA
SIZE ____ FT. ____ DA

Used in Cementing 8 5/8" Casing:
75 Bags - Portl. Cement
2 Bags - Calcium Chloride
Cemented by: Well Services, Inc.
Used in Cementing 4½" Casing:
45 Bags - Cement
6 Bags - Baroid Aquagel
1 Bag - Lime
Cemented by: Well Services, Inc.

REMARKS: Note: Drilled 8¾" Hole from Surface to 437'
Drilled 6¾" Hole from 437' to 2255'
Note: Used 5 Centralizers @ 2070', 2130', 2161', 2193' & 2228'
Note: This Well was logged by Lane Wells on 7-8-64 @ 2257' Total Depth
Note: Perforated @ 2178½ Triple Free Notch Gutter
Note: This well was drilled according to Rule 11, under Section 13 of Article 4, Chapter 2[illegible] of the Code of the Department of Mines, Oil and Gas Division.

APPROVED
C. C. Carson
SUPERINTENDENT

4708701079

W-21

"Pipeline"

Select County: (087) Roane
Enter Permit #: 1079
Get Data | Reset

Select datatypes: (Check All)
Location, Production, Plugging, Owner/Completion, Stratigraphy, Sample, Pay/Show/Water, Logs, Btm Hole Loc

Table Descriptions
County Code Translations
Permit-Numbering Series
Usage Notes
Contact Information
Disclaimer
WVGES Main
"Pipeline-Plus" Now

WV Geological & Economic Survey:

Well: County = 87 Permit = 1079 Link to all digital records for well

Report Time: Thursday, April 03, 2025 8:09:10 PM

Location Information: View Map

API	COUNTY	PERMIT	TAX_DISTRICT	QUAD_75	QUAD_15	LAT_DD	LON_DD	UTME	UTMN
4708701079	Roane	1079	Smithfield	Spencer	Spencer	38.760719	-81.258731	477520.7	4290255.7

There is no Bottom Hole Location data for this well

Owner Information:

API	CMP_DT	SUFFIX	STATUS	SURFACE_OWNER	WELL_NUM	CO_NUM	LEASE	LEASE_NUM	MINERAL_OWN	OPERATOR_AT_COMPLETION	PROP_VD	PROP_TRGT_FM	TFM_EST_PR
4708701079	7/19/1964	Original Loc	Completed	William Kaufman	28	W21				Wolf's Head Oil Refining Co., Inc.			
4708701079	8/30/1986	Worked Over	Completed	William Kaufman		W-21				Pennzoil Company			

Completion Information:

API	CMP_DT	SPUD_DT	ELEV	DATUM	FIELD	DEEPEST_FM	DEEPEST_FMT	INITIAL_CLASS	FINAL_CLASS	TYPE	RIG	CMP_MTHD	TVD	TMD	NEW_FTG	KOD	G_
4708701079	7/19/1964	7/13/1964	1046	Ground Level	Clvr-Rsh Rn	Big Injun (Price&eq)	Big Injun (Price&eq)	Development Well	Development Well	Oil and Gas	unknown	Fractured	2260		2260		
4708701079	8/30/1986	8/20/1986	1045	Ground Level	Clvr-Rsh Rn	Big Injun (Price&eq)	Big Injun (Price&eq)	Development Well	Development Well	Oil w/ Gas Show	unknown	Acid+Frac	2260		0		

Pay/Show/Water Information:

API	CMP_DT	ACTIVITY	PRODUCT	SECTION	DEPTH_TOP	FM_TOP	DEPTH_BOT	FM_BOT	G_BEF	G_AFT	O_BEF	O_AFT	WATER_QNTY
4708701079	8/30/1986	Show	Gas	Vertical	2122	Big Lime	2182	Big Lime	0	10			
4708701079	8/30/1986	Pay	Oil	Vertical	2122	Big Lime	2182	Big Lime	0	3			
4708701079	7/19/1964	Pay	Oil	Vertical	2233	Big Injun (Price&eq)	2260	Big Injun (Price&eq)	0	12			
4708701079	7/19/1964	Pay	Gas	Vertical	2233	Big Injun (Price&eq)	2260	Big Injun (Price&eq)	0	39			

Production Gas Information: (Volumes in Mcf)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_GAS	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701079	Pennzoil Company	1981	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Company	1982	999	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Company	1983	1,492	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Company	1984	1,471	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Products Company	1989	1,575	163	108	119	123	136	100	151	103	137	179	132	124
4708701079	Pennzoil Products Company	1990	1,735	149	97	153	120	119	125	163	154	149	194	170	142
4708701079	Pennzoil Products Company	1991	1,536	145	111	125	87	130	116	161	128	114	162	138	119
4708701079	Pennzoil Products Company	1992	1,346	126	98	88	87	107	105	126	128	114	123	110	134
4708701079	Pennzoil Products Company	1993	1,145	114	118	104	45	116	104	111	99	91	89	93	61
4708701079	Pennzoil Products Company	1994	865	0	66	44	72	91	97	97	64	49	95	92	98
4708701079	Pennzoil Products Company	1995	1,117	98	84	88	92	101	101	93	97	98	91	97	77
4708701079	Pennzoil Products Company	1996	853	21	1	99	58	87	81	88	99	81	61	78	99
4708701079	Pennzoil Products Company	1997	585	85	77	75	67	56	70	79	64	12	0	0	0
4708701079	Pennzoil Products Company	1998	109	0	0	0	0	0	0	0	24	21	22	20	22
4708701079	Pennzoil Products Company	1999	358	98	93	61	22	15	0	0	0	12	21	22	14
4708701079	East Resources, Inc.	2000	150	13	14	10	0	17	8	0	20	14	16	16	22
4708701079	East Resources, Inc.	2001	586	7	37	63	58	66	64	66	54	65	52	47	7
4708701079	East Resources, Inc.	2002	540	40	39	46	50	53	53	53	52	39	42	27	46
4708701079	East Resources, Inc.	2003	313	31	21	0	0	60	61	49	47	10	0	0	34
4708701079	East Resources, Inc.	2004	56	0	0	0	0	0	0	0	0	0	29	27	0
4708701079	East Resources, Inc.	2005	383	22	22	21	24	40	34	29	39	41	40	33	38
4708701079	East Resources, Inc.	2006	509	38	37	41	41	45	44	48	33	36	43	50	53
4708701079	East Resources, Inc.	2007	430	51	38	42	30	27	23	27	34	31	32	49	46
4708701079	East Resources, Inc.	2008	479	40	39	40	37	41	39	40	41	41	45	38	38
4708701079	East Resources, Inc.	2010	506	49	35	40	42	43	40	41	41	40	46	47	42
4708701079	East Resources, Inc.	2011	547	44	41	47	47	47	43	47	48	46	48	44	45
4708701079	HG Energy, LLC	2012	525	40	35	39	40	44	40	28	52	57	57	47	46
4708701079	HG Energy, LLC	2013	533	48	35	38	39	51	47	42	48	45	50	44	46
4708701079	HG Energy, LLC	2014	383	42	37	42	36	1	9	15	35	42	42	39	43
4708701079	HG Energy, LLC	2015	464	37	32	33	37	42	41	42	40	40	40	37	43
4708701079	HG Energy, LLC	2016	467	39	38	39	39	41	38	40	38	39	39	39	38
4708701079	HG Energy, LLC	2017	404	37	32	33	31	34	30	32	32	34	36	37	36
4708701079	HG Energy, LLC	2018	426	36	33	38	36	38	37	39	36	34	33	32	34
4708701079	HG Energy, LLC	2019	365	35	32	34	31	24	24	26	32	30	33	34	30
4708701079	HG Energy, LLC	2020	358	35	31	35	17	29	32	33	32	28	28	29	29
4708701079	HG Energy, LLC	2021	65	9	6	6	7	8	7	6	4	2	3	3	4
4708701079	HG Energy, LLC	2022	339	28	21	29	27	29	28	31	31	29	29	29	28
4708701079	Delta Helix Energy, LLC	2023	58	0	0	0	0	0	0	0	0	0	0	30	28
4708701079	HG Energy, LLC	2023	313	30	27	31	32	32	30	32	32	34	33	0	0

Production Oil Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_OIL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701079	Pennzoil Company	1981	440	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Company	1982	307	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Company	1983	444	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Company	1984	383	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Pennzoil Products Company	1989	330	30	28	27	23	28	22	30	31	28	30	29	24
4708701079	Pennzoil Products Company	1990	358	31	25	29	32	31	32	32	32	33	31	28	22
4708701079	Pennzoil Products Company	1991	288	28	18	27	22	28	24	20	28	26	23	23	21
4708701079	Pennzoil Products Company	1992	265	21	21	21	20	22	22	21	24	21	28	22	22
4708701079	Pennzoil Products Company	1993	211	21	13	23	23	24	22	20	19	20	12	0	14
4708701079	Pennzoil Products Company	1994	212	9	17	22	22	19	13	11	20	19	22	20	18
4708701079	Pennzoil Products Company	1995	197	18	18	22	22	20	19	20	19	22	17	0	0
4708701079	Pennzoil Products Company	1996	237	27	16	22	19	19	18	17	20	17	22	21	19
4708701079	Pennzoil Products Company	1997	108	17	18	16	18	21	16	2	0	0	0	0	0
4708701079	Pennzoil Products Company	1998	79	0	0	0	0	0	0	0	0	0	0	40	39
4708701079	Pennzoil Products Company	1999	68	30	29	9	0	0	0	0	0	0	0	0	0
4708701079	East Resources, Inc.	2000	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	East Resources, Inc.	2001	210	0	24	26	19	25	20	23	14	18	17	12	12
4708701079	East Resources, Inc.	2002	169	11	15	14	15	17	18	22	14	11	11	6	15
4708701079	East Resources, Inc.	2003	87	14	7	0	0	21	20	12	10	3	0	0	0
4708701079	East Resources, Inc.	2004	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	East Resources, Inc.	2005	250	0	0	0	0	31	29	23	35	36	22	39	35
4708701079	East Resources, Inc.	2006	444	36	28	42	32	49	45	44	0	41	41	38	48
4708701079	East Resources, Inc.	2007	446	53	43	51	50	37	22	38	35	32	28	33	24
4708701079	East Resources, Inc.	2008	70	0	0	0	0	0	0	0	0	27	18	12	13
4708701079	East Resources, Inc.	2010	167	21	16	19	19	0	13	16	12	14	15	12	10
4708701079	East Resources, Inc.	2011	163	9	9	12	11	13	9	3	22	14	19	22	20
4708701079	HG Energy, LLC	2012	200	15	19	22	21	23	20	10	21	16	17	8	8
4708701079	HG Energy, LLC	2013	156	12	15	16	14	15	15	20	16	7	10	8	8
4708701079	HG Energy, LLC	2014	106	10	10	8	8	10	8	8	10	8	10	8	8
4708701079	HG Energy, LLC	2015	100	10	6	8	9	8	7	10	8	8	10	7	9
4708701079	HG Energy, LLC	2016	98	8	8	10	8	6	9	7	10	7	7	8	10
4708701079	HG Energy, LLC	2017	124	8	9	10	10	11	10	9	12	12	12	14	7
4708701079	HG Energy, LLC	2018	110	10	8	8	10	11	9	9	10	9	10	7	9
4708701079	HG Energy, LLC	2019	114	14	10	8	9	15	10	10	6	8	10	7	7
4708701079	HG Energy, LLC	2020	94	10	8	6	11	6	8	9	8	8	6	7	7
4708701079	HG Energy, LLC	2021	83	5	4	4	10	8	10	6	6	8	6	8	8
4708701079	HG Energy, LLC	2022	87	7	6	9	8	10	7	8	7	7	6	8	4
4708701079	Delta Helix Energy, LLC	2023	8	0	0	0	0	0	0	0	0	0	0	3	5

4708701079	HG Energy, LLC	2023	71	7	7	8	8	4	7	8	9	5	8	0	0

4708701079

Production NGL Information: (Volumes in Bbl) ** some operators may have reported NGL under Oil

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_NGL	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701079	HG Energy, LLC	2013	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2014	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2015	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2016	0												
4708701079	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Production Water Information: (Volumes in Gallons)

API	PRODUCING_OPERATOR	PRD_YEAR	ANN_WTR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DCM
4708701079	HG Energy, LLC	2016	0												
4708701079	HG Energy, LLC	2018	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2019	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2020	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2021	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2022	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	HG Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0
4708701079	Delta Helix Energy, LLC	2023	0	0	0	0	0	0	0	0	0	0	0	0	0

Stratigraphy Information:

API	SUFFIX	FM	FM_QUALITY	DEPTH_TOP	DEPTH_QUALITY	THICKNESS	THICKNESS_QUALITY	ELEV	DATUM
4708701079	Original Loc	Little Lime	Well Record	2040	Reasonable	39	Reasonable	1046	Ground Level
4708701079	Original Loc	Big Lime	Well Record	2079	Reasonable	111	Reasonable	1046	Ground Level
4708701079	Original Loc	Big Injun (Price&eq)	Well Record	2190	Reasonable	22	Reasonable	1046	Ground Level

Wireline (E-Log) Information:

* There is no Scanned/Raster Log data for this well

* There is no Digitized/LAS Log data for this well

* There is no Scanned or Digital Logs available for download

There is no Plugging data for this well

There is no Sample data for this well

Form OG-10

4708701079

W-21

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES
OIL AND GAS DIVISION

Quadrangle SPENCER

Permit No. ROA-1079

WELL RECORD

Oil or Gas Well (KIND)

Company WOLF'S HEAD OIL REFINING COMPANY
Address P. O. Box 1588, Parkersburg, W. Va.
Farm Wm. Kaufman Acres 800
Location (waters) Millstone Run
Well No. W-21 Elev. 1045.56
District Smithfield County Roane
The surface of tract is owned in fee by Romie Smith
Otto Route Address Spencer, W. Va.
Mineral rights are owned by Alfred M. Oppenheimer, II et al.
300 South Lang Avenue Address Pittsburgh 8, Pa.
Drilling commenced July 13, 1964
Drilling completed July 19, 1964
Date Shot - From To
With
Open Flow /10ths Water in Inch
/10ths Merc. in Inch
Volume Show (drilled w/Rotary) Cu. Ft.
Rock Pressure No Test lbs. hrs.
Oil Show bbls. 1st 24 hrs.
WELL ACIDIZED

Casing and Tubing	Used in Drilling	Left in Well	Packers
Size			
16			Kind of Packer Steel Shoe Float Collar Guide Shoe
13			
10 3/4" OD	10'	10'	Size of 8 5/8" OD 4½" OD 4½" OD
8 5/8" OD	435'	435'	
4½" OD	2274'	2274'	Depth set 432' 2233' 2260'
5 3/16			
3			Perf. top
2 3/8" Tbg.	2211'	2211'	Perf. bottom
Liners Used			Perf. top
			Perf. bottom

Surface to:
CASING CEMENTED 8 5/8" SIZE 432 No. Ft. 7/15/64 Date
4½" 2260 7/19/64
COAL WAS ENCOUNTERED AT - FEET INCHES
FEET INCHES FEET INCHES
FEET INCHES FEET INCHES

WELL FRACTURED 7/24/64 - Used: 42,916 Gals. Water, 53,500 # Sand, 250 Gals. MCA, 400 # WAC-8, 25 Gals. Detergent and 35 Gals. Morflo
RESULT AFTER TREATMENT Gas - 39,000 Cu. Ft. Oil - 12 Bbls.
ROCK PRESSURE AFTER TREATMENT 240 Lbs.
Fresh Water Feet Salt Water Feet

Formation	Color	Hard or Soft	Top	Bottom	Oil, Gas or Water	Depth	Remarks
Top Soil			0	10			
Conductor				10			
Sand			10	35			
Red Rock			35	60			
Sand			60	100			
Slate			100	170			
Sand			170	205			
Red Rock			205	225			
Slate			225	300			
Sand			300	320			
Slate			320	430			
Sand			430	470			
Slate			470	500			
Red Rock			500	535			
Slate & Shale			535	600			
Red Rock			600	625			
Slate			625	705			
Sand			705	740			
Slate			740	770			
Red Rock			770	785			
Sand			785	820			
Slate			820	1120			
Sand			1120	1150			
Slate			1150	1225			
Lime			1225	1250			
Slate			1250	1350			
Sand			1350	1370			
Slate			1370	1465			
Sand			1465	1580			

(over)

4708701079

Formation	Color	Hard or Soft	Top 18	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate			1530	1630			
Sand			1630	1695			
Slate			1695	1730			
Sand			1730	1910			
Slate			1910	2040			
Little Lime			2040	2079			
Big Lime			2079	2190			
Slate			[illegible]	[illegible]	Oil & Gas	2127-2160	Show
Sand			[illegible]	[illegible]	Oil & Gas	2175-2185	Show
Big Injun.			2190	2212			
Slate			[illegible]	[illegible]	Oil & Gas	2192-2210	Show
Shale			2210	2260			
4½" Casing			[illegible]	2260			
Red Rock			[illegible]	[illegible]			
Slate TOTAL DEPTH			[illegible]	2260			
Red Rock			[illegible]	[illegible]			
Slate			[illegible]	[illegible]			
Sand			[illegible]	[illegible]			
Slate			[illegible]	[illegible]			
Sand			[illegible]	[illegible]			
Slate			[illegible]	[illegible]			
Red Rock			[illegible]	[illegible]			
Sand			[illegible]	[illegible]			
Slate			[illegible]	[illegible]			
Sand			[illegible]	[illegible]			
Red Rock			[illegible]	[illegible]			
Sand			[illegible]	[illegible]			
Conductor				[illegible]			
Top Soil			0	[illegible]			

Date August 12, 19 64

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INC. Owner

By George W. Wilsman

George W. Wilsman, (Title) Agent

Form No. 389 1M 11/61 M-C. 5929

WOLF'S HEAD OIL REFINING COMPANY, INC.
SOUTHPENN OIL COMPANY

RC- 4708701079

W-21

NEW WELL REPORT

LEASE No. EHRENDEN #1219 800 ACRES — WORKING DISTRICT Spencer #4

Wm. Kaufman FARM — WELL No. W-21 N. ____ S. 47 E. ____ W. 37

Smithfield DISTRICT OR TOWNSHIP — Ritchie COUNTY — ____ QUAD.

LOCATION MADE June 9, 19 64 — DRILLING COMMENCED July 13, 19 64

RIG COMMENCED July 13, 19 64 — DRILLING COMPLETED July 19, 19 64

RIG COMPLETED July 13, 19 64 — DEPTH 2260' SAND Big Injun

RIG CONTRACTOR Gerald D. Jones — DRILLING CONTRACTOR Gerald D. Jones

ELEVATION: FLOOR ____ GROUND 1045.56 — WORK ORDER No. AFE #NW-36-W.Va.

FORMATION RECORD

KIND	TOP	BOTTOM	STEEL LINE MEAS.	TEST	KIND	TOP	BOTTOM	STEEL LINE MEAS.	TEST
Top Soil	0	10							
Conductor		10	10						
Sand	10	35							
Red Rock	35	60							
Sand	60	100							
Slate	100	170							
Sand	170	205							
Red Rock	205	225							
Slate	225	300							
Sand	300	320							
Slate	320	480							
Sa[illegible]	480	470	482						
[illegible]	470	500							
[illegible]k	500	535							
Sh[illegible] & Shale	535	600							
Red Rock	600	625							
Slate	625	705							
Sand	705	740							
Slate	740	770							
Red Rock	770	785							
Sand	785	820							
Slate	820	1120	1120						
Sand	1120	1150							
Slate	1150	1225							
Lime	1225	1250							
Slate	1250	1350							
Sand	1350	1370							
Slate	1370	1455							
Sand	1455	1530							
Slate	1530	1630							
Sand	1630	1695							
Slate	1695	1730							
Sand	1730	1910							
Slate	1910	2010							
Middle Lime	2010	2079							
Big Lime	2079	2100							
Oil & Gas	2127	2160		Show					
Oil & Gas	2175	2185		Show					
Big Injun	2190	2212							
Oil & Gas	2192	2210		Show					
Shale	2210	2260							
Up[illegible] Casing		2260	2260						
Fo[illegible] Depth		2260	2260						

(OVER)

4708701079

W-21

NEW WELL REPORT — CONTINUED

INITIAL TORPEDO RECORD	
Date of Shot	
Name of Torpedo Co.	
No. of Quarts	
Length of Shell	
Diameter of Shell	
Length of Anchor	
Top of Shot	
Bottom of Shot	
Feet of Fluid in Hole When Shot	
Results:	

CASING AND TUBING RECORD

SIZE	PUT IN WELL TRANSFER NO.	PUT IN WELL FEET	PUT IN WELL INCH	PULLED OUT TRANSFER NO.	PULLED OUT FEET	PULLED OUT INC
10-1/4" OD	S.L.A.	10	--			
8-5/8" OD	Seiler	453	--			
4½" OD	Seiler	2276	--			
2-3/8" OD						
Tbg.	Seiler	2211	--			

INITIAL PRODUCTION FIRST 24 HOURS

Open Flow /10ths Water in ____ Inch

/10ths Merc. in ____ Inch

Volume Show (drilled w/Rotary) Cu. Ft.

Rock Pressure No test lbs. ____ hrs.

Oil Show bbls., First 24 hrs.

PACKER RECORD

KIND	SIZE	DEPTH SET	DATE SET
Steel Shoe	8-5/8" OD	453	7/15/64
Float Collar	4½" OD	2233	7/19/64
Guide Shoe	4½" OD	2260	7/19/64

ACIDIZATION OR FRACTURING RECORD

DATE WELL ACIDIZED ____

DATE WELL FRACTURED July 24, 1964

NAME OF COMPANY Halliburton

(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)

Used: 12,000 Gals. Water

Used: 33,000 # Sand

Used: 250 Gals. - HCL

Used: 400 # - FAW - 1

Used: 25 Gals. - Jetsperse

Used: 35 Gals. - Nonfle

BREAKDOWN PRESSURE 2000#

PUMPING PRESSURE 3500 - 2000

AVERAGE PUMPING RATE/MINUTE 30.8

PUMPING TIME 15 mins.

RESULT AFTER TREATMENT | GAS 27,000 CU. FT.

OIL 12 BBLS.

ROCK PRESSURE AFTER TREATMENT 800 LBS.

CASING CEMENTED

SIZE	FT.	DATE
8-5/8"	453	7-15-64
4½"	2260	7-19-64

WAS IN CEMENTING 8-5/8" CASING:

60 Sacks - Bulk Cement

1 Sag - Calcium Chloride

Cemented by: Well Service, Inc.

WAS IN CEMENTING 4½" CASING:

45 Sacks - Columbia Cement

5 Sacks - Aquagel

1 Sag - Salt

5 Gals. - Resilient

Cemented by: Well Service, Inc.

REMARKS: Note: Drilled 8¾" Hole from Surface to 453'. Drilled 6¾" Hole from 453' to 2260'.

Note: Used 5 centralizers @ 1976', 919', 867', 2270', 2222'

Note: This well was logged by Schlumberger on 7-19-64.

Note: This well was perforated by Jensen Survey on 7-22-64 @ 2237' - 5 way jet

Note: This well was drilled according to Rule 11, under Section 13 of Article 4, Chapter 52 of the Rule of the Department of Mines, Oil & Gas Division.

APPROVED

C. C. Crouser

SUPERINTENDENT

12-M