#### 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	HG Energy LL	.C	
Existing UIC Permit ID Number	2D0871056	UIC Well API Number	47-087-01056

	Oil and Gas 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	<b>√</b>	Check	<b>V</b>
Groundwater Protection Plan	1	Electronic	
(GPP) Fee: \$50.00		Other	

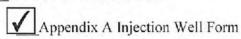
Places shock the items completed and enclosed

rieas	e check the items completed and enclosed.
$\checkmark$	Checklist
<b>/</b>	_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 Busine
	CERTIFICATION

W Department of Environmental Protection



✓ Section 6 – Construction



Appendix B Storage Tank Inventory

Section 7 - Area of Review

Appendix C Wells Within the Area of Review



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):
Reviewed by (Sign):
Date Reviewed:





#### WEST VIRGINIA DEPARTMENT OF **ENVIRONMENTAL PROTECTION**

#### OFFICE OF OIL AND GAS

601 57<sup>th</sup> Street, SE Charleston, WV 25304 (304) 926-0450 www.dep.wv.gov/oil-and-gas

#### UNDERGROUND INJECTION CONTROL (UIC) **PERMIT APPLICATION**

UIC PERMIT ID # 2D0871056

API# 47-087-01056

well # Kaufman W-19

Section I. Facility Information

Facility Name: Kaufman W-19 Disposal

Address: 5260 Dupont Rd

City: Spencer

Zip: 25276 State: WV

County: Roane

Location description:

On the waters of Millstone Run in Smithfield District of Roane County

Location of well(s) or approximate center of field/project in UTM NAD 83 (meters):

Northing: 4,289,969.6

Easting: 477,119.8

**Environmental Contact Information:** 

Name: Matt McGuire

**HSE Mgr** Title:

Phone: 304-483-3266

Email: mmcguire@hgenergyllc.com

Section 2. Operator Information

Operator Name: H G Energy LLC

Operator ID:

494497948

Address: 5260 Dupont Rd

City: Parkersburg

State: WV Zip: 26101

County: Wood

Contact Name:

Roger Heldman

Operations Mgr Contact Title:

Contact Phone: 304-481-9061

Contact Email: rheldman@hgenergyllc.com



Section 3.	Applicant Inf	ormation		
Ownership Status:	■ PRIVATE  □ OTHER (explain		FEDERAL	☐ STATE
SIC code: II 131	1 (2D, 2H, 2R)	] 1479 (3S)	OTHER (6	(explain):
Section 4.	Applicant / A	ctivity Req	uest and	d Type:
A. Apply for	a new UIC Permit:		2H □ 2R	□ 3S
	existing UIC Permit			□ 38
	isting UIC Permit:		2H 🗆 2R	□ 3S
(Submit of 2D COMMERC	nly documentation IAL FACILITY:	pertaining to th		on request)
Section 5.	Briefly desci	ribe the nat	ure of bu	usiness and the activities to be conducted:
Oil & natural g the Big Injun \$		. Water prod	duced fror	m approximately 75 shallow wells is injected into



#### CERTIFICATION

All permit applications must be signed by a responsible corporate officer for a corporation, by a general partner for a partnership, by the proprietor of a sole proprietorship, or by a principal executive or ranking elected official for a public agency, or a <sup>1</sup>duly authorized representative in accordance with 47CSR13-13.11.b.

A. Name and title of person applying for permit:

Print Name: Eric Grayson

Print Title: Vice President

B. Signature and Date.

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.

Signature:

Date:

5/21/18



<sup>1</sup> A person is a duly authorized representative if:

The authorization is made in writing by a person described in subdivision 47CSR13-13.11.a.

The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of the plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility.

The written authorization is submitted to the Director.

- 1. Water produced in conjunction with crude oil from the Wm 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 water produced from nearby Clover Field Big Injun wells is filtered and in injected into Kaufman W- 19. A schematic of the production facility is show in the attached Fig No. 1.
- 2. The attached Fig No. 2 is a schematic of the as drilled injection well, Wm Kaufman W-19, with Big Injun (injection zone), Big Lime, and shale (confining zones) marked. Tubing and casing depths along with cement info is also shown on the schematic.
- 3. See Appendix A & B
- 4. This disposal well was drilled in 1964 and logged with GR/ Density/ Caliper logs. A copy of The United States Department of the Interior Report No 6992 (Reservoir Study of the William Kaufman Clove-Rush Run Oilfield, Roane County, WV by Karl-Heinz Frohne) is shown in Fig No. 3. This study provides a detailed study of the reservoir based on a core from Wm Kaufman No. 7 located approx. 2600' South West of Kaufman W- 19.

- 1. A ¼ mile fixed radius from the injection well, Wm Kaufman W-19 was utilized for the AOR investigation.
- Attached in Fig No. 4 is a map showing the wells within the AOR. The wells within the AOR
  are listed in APPENDIX C. The Well records available are also enclosed in Fig No. 5. The local
  PSD ( Clover PSD ) was contacted and the required Affidavit obtained. It is enclosed in
  APPENDIX D.
- 3. The USDWs in this area vary from approximately 20'-to 100'. Six potential sources of drinking water were identified within the AOR. TDS was measured as part of the analysis.
- 4. The wells within the AOR were located and shown on the attached map (Fig No. 5). All but one of the residences were determined to be utilizing the Clover PSD for their water source. The remaining well and one additional well, located outside the AOR were sampled for analysis. The results of this analysis is 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 buy the operator at this time.
- 7. This application if for a single disposal well and not an area permit.

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 filed. 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 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 Wm Kaufman No. 7 is included in the United States Bureau of Mines 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 shown in Fig No. 3.

The current operating conditions of this water disposal well are:

Average daily rate or volume- 10 bbls

Maximum Daily rate - 150 bbls

Average daily injection pressure- 500 psig

Maximum injection pressure - 686 psig

- 2. The attached Appendix G lists the wells served by this diposal well.
- 3. The injection fluid was sampled an analized for the required constituants. A copy of the analysis is attached in the enclosed Fig No 6.
- 4. The only additive to the injected fluid is a scale and corrosion inhibitor combination ( Baker Hughes WCW219 ). This material is added to the injection water at a concentration of 50 PPM. A MSDS is enclosed in Fig No. 7.
- 5. The tubing / casing annulus of this injection well is filled with fresh water with a packer fluid (corrosion inhibitor).
- 6. In the event of a well failure the injection will be immediately shut in. The surface casing in this injection well is set at 466' and cemented to surface. The depth of the casing is below any know USDW in this area. If there was a failure of the injection string ( tubing ) there would still be three layers of protection between the injection fluid and the USDW's. Those three layers are the 4 ½" long string, 8 5/8" surface casing, and the cement outside of the 8 5/8" casing. The tubing casing annulus is left open during injection so any failure on the injection string will be noticed soon after any failure. In the event of a mechanical integrity failure that cannot be repaired immediately the water will either be disposed of in a commercial injection well or the producing wells shut in until the issues is resolved.

- 1. Pressure and injection volumes are monitored daily for this injection well. Those volumes and pressure are recorded by the lease operator and reported weekly. That information is reported to the WVDEP monthly on form WR -40. This process has worked successfully for the 25 yrears this well has been utilized as a disposal well.
- 2. Currently the majority of the fluid injected at this well is transported by pipeline to the storage tank that services this injection well. A small portion of that fluid is transported by a small truck with a 500 gals tank from the producing well to the storage tank that serves this injection well. Those volumes are recorded at the producing well weekly. The only fluids injected are the fluids transported via pipeline and this small truck.

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

This injection well has surface casing set at 466' and cemented to surface. The 4 1/2" long sting is set at 2272' and cemented to approximately 2025'. The well will be plugged to the standards set by the WVDEP at the time it is plugged. If the well were to be plugged today the cement plugs would be set as follows:

Plug No 1 - 2200'-2100 Free point, cut and POH w/  $4 \frac{1}{2}$ " casing – est 1975' Plug No 2 – 2025'-1925' Plug No 3 – 1100'-1000' Plug No 4 – 515'-415' ( base of surface casing ) Plug No 5 – 100'-0 6 % gel between cement plugs.

Additional \$5000 bond was posted at a prior renewal of this permit and we would ask that that bond remain in effect.

See APPENDIX I

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

See APPENDIX J

SEE APPENDIX K

### **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): 2277 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 2455	_ psig (BHFP)
8) MAXIMUM PROPOSED INJECTION OPERATIONS:	
Injection rate (bbl/hour) 12	
Injection volume (bbl/day)50	
Injection pressure (psig) 686	
Bottom hole pressure (psig) 2400	
9) DETAILED IDENTIFICATION OF MATERIALS TO BE INJECTED, INCLUDING ADDITIVES:	
Produced water, bactericides, and other chemicals as may be necessary to n quality.	naintain water
Temperature of injected fluid: (°F)	
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. Internal corrosion protection the chemical corrosion inhibitors.	irough



#### APPENDIX A (cont.)

#### 12. Casing and Tubing Program

ТҮРЕ	Size	New or Used	<u>Grade</u>	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			



### (4/25)

## APPENDIX B Storage Tank Inventory

Tank Type Single/Double Wall	single	single	single	single	single	single							
Volume of Fluid Stored (gallons)	7000	7000	3500	3500	3500	3500							
Type of Fluid Stored	crude oil	crude oil	crude oil	crude oil	prod water	prod water							
Capacity (gallons)	8820	8820	4200	4200	4200	4200							
Construction Material (Steel, plastic, etc.)	steel	steel	steel	steel	steel	steel							
Tank Age (Months)	120	09	90	09	144	180							
Installation Date	2008	2013	2013	2013	2006	2003							
cation 83 Meters) Easting	477,149.523	477,153.348	476,875.744	476,873.231	476,870.978	477,157.955							
Tank Location (UTM NAD 83 Meters) Northing Eastin	4,289,962.851	4,289,963.617	4,289,305.826	4,289,308.386	4,289,310.501	4,289,964.380							
Tank ID	321	322	324	325	326	323							
API#													



## APPENDIX C

# Wells within the Area of Review

API#	Well Type	Well Status (Active, Abandoned, Shut-in, Plugged)	Northing (UTM NAD 83 Meters)	Easting (UTM NAD 83 Meters)	Penetrate Injection Zone (Y or N)	Penetrate Confining Zone (Y or N)	Total Vertical Depth	Surface Elevation
087-01068	9/0	A	4,290,470.861	477,304.589	>	>	2255	1022
087-01079	9/0	A	4,290,255.635	477,520.749	Υ	<b>&gt;</b>	2260	1045.56
087-00995	9/0	A	4,290,388.426	477,106.089	<b>\</b>	<b>&gt;</b>	2313	1096.46
087-01056	WIW	A	4,290,105.192	477,198.935	>	>	2277	1060.85
087-01055	9/0	4	4,289,919.828	477,488.230	>	>	2097	875.44
087-01053	9/0	A	4,289,888.778	477,092.399	>	>	2190	971.38
087-01032	9/0	A	4,289,685.688	477,409.657	>	>	2371	1162.93
087-00988	9/0	A	4,289,673.220	477,190.137	<b>\</b>	<b>&gt;</b>	2430	1224.93
087-00985	WIW		4,289,706.988	476,757.003	٨	Υ	2219	1003.40
087-00894	9/0	A	4,289,969.500	476,883.929	7	<b>\</b>		
087-91145			4,289,758.063	476,520.205				
087-00984	9/0	А	4,289,499.926	476,642.048	7	λ	2270	1040.47
78600-780	9/0	A	4,289,588.208	476,357.739	<b>\</b>	<b>\</b>	2335	1132.36
087-30190			4,289,635.662	476,521.234				
087-00994	9/0	A	4,290,143.637	476,912.239	<b>\</b>	<b>\</b>	2380	1152.09

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



#### 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)

#### HG Energy LLC

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

#### Clover PSD

that there are no such publically recorded sources.

(Signature of Authorized Representative)

Sworn and subscribed to before me this 14th day of June, 2017.

my commission expires March 8, 2021

(Notary Signature)





# APPENDIX E Water Sources

Year 2018

Operator: H G Energy LLC

UIC Permit #2D0871056

		Source # 1	Source # 2	Source #	Source #
Water Source Name		Joe Lung	Richard Smith		
Northing		4,289,922.116	4,290,238.230		
Easting		477,868.117	477,263.225		
Parameter	Units				
TPH - GRO	mg/L	QN	QN		
TPH - DRO	mg/L	QN	ON		
TPH - ORO	mg/L	QN	QN		
BTEX	mg/L	ND	QN		
Chloride	mg/L	3.77	6.29		
Sodium	mg/L				
Total Dissolved Solids (TDS)	mg/L	199	211		
Aluminum	mg/L	ND	ON		
Arsenic	mg/L	QN	ON		
Barium	mg/L	772.	0200.		
Iron	mg/L	.705	.212		
Manganese	mg/L	.0655	ON		
Hd	SU	7.1	7.01		
Calcium	mg/L	37.9	.191		
Sulfate	mg/L	5.75	6.54		
MBAS	mg/L	ND	ND		
Dissolved Methane	mg/L	ND	ON		
Dissolved Ethane	mg/L	ND	ND		
Dissolved Butane	mg/L	QN	ON		
Dissolved Propane	mg/L	ND	ON		
Bacteria	c/100m	#	33		



Lung

#### REI Consultants, Inc. - Analytical Report

WO#: 17122738

Date Reported: 1/15/2018 Original

Client:

**HG ENERGY LLC** 

Collection Date:

12/20/2017 2:20:00 PM

Project:

KAUFMAN UNIT WATER SAMPLING

Date Received:

12/20/2017

Lab ID:

17122738-02A

Matrix:

**Drinking Water** 

Client Sample ID:

KJL

Site ID: SPENCER, WV

·						·	
Analysis	Result	MDL	PQL	MCL	Qual Units	Date Analyzed NEL	ΑP
METALS BY ICP-Low Level			Method: (1994)	EPA 200	0.7 Rev. 4.4	Analyst: EP	
Aluminum	ND	0.0030	0.0050	NA	mg/L	12/26/2017 3:33 PM	
Arsenic	ND	0.0080	0.0200	NA	mg/L	12/26/2017 3:33 PM	
Barium	0.277	0.0030	0.0050	NA	mg/L	12/26/2017 3:33 PM	
Calcium	37.9	0.0500	0.500	NA	mg/L	12/26/2017 3:33 PM	
Iron	0.705	0.0100	0.0500	NA	mg/L	12/26/2017 3:33 PM	
Manganese	0.0655	0.0030	0.0050	NA	mg/L	12/26/2017 3:33 PM	
SEMI-VOLATILE RANGE ORGANICS	s		Method:	SW8015	iC .	Analyst: YT	
TPH (Diesel Range: C10 - C28)	ND	0.12	0.25	NA	mg/L	12/27/2017 7:03 AM	
TPH (Oil Range: C22 - C36)	ND	0.12	0.25	NA	mg/L	12/27/2017 7:03 AM	
Surr: o-Terphenyl	69.9	NA	17.6-135	NA	%Rec	12/27/2017 7:03 AM	
VOLATILE RANGE ORGANICS			Method:	SW8015	SC .	Analyst: TKC	
TPH (Gasoline Range: C6 - C10)	ND	0.250	0.500	NA	mg/L	1/2/2018 8:38 PM	
Surr: 2,5-Dibromotoluene	68.0	NA	53.5-143	NA	%Rec	1/2/2018 8:38 PM	
VOLATILE ORGANIC COMPOUNDS	;		Method:	SW8021	В	Analyst: TKC	
Benzene	ND	0.500	1.00	NA	μg/L	1/2/2018 8:38 PM	
Toluene	ND	0.500	1.00	NA	μg/L	1/2/2018 8:38 PM	
Ethylbenzene	ND	0.500	1.00	NA	μg/L	1/2/2018 8:38 PM	
m,p-Xylene	ND	1.00	2.00	NA	μg/L	1/2/2018 8:38 PM	
o-Xylene	ND	0.500	1.00	NA	μg/L	1/2/2018 8:38 PM	
Surr: 1,1,1-Trifluorotoluene	76.1	NA	57.1-139	NA	%Rec	1/2/2018 8:38 PM	
SURFACTANTS:			Method:	SM5540	C-2000	Analyst: BD	
MBAS (calibrated on MW340 LAS)	ND	0.0250	0.0625	NA	mg/L	12/21/2017 5:21 PM	
COLIFORM BY MPN:			Method:	SM9223	B-QT	Analyst: BD	
E-Coli	ND	1	1	NA	MPN/100mL	12/21/2017 10:45 AM	
Total Coliform	11	1	1	NA	MPN/100mL	12/21/2017 10:45 AM	
ANIONS by ION CHROMATOGRAPH	·Υ		Method: I (1993)	EPA 300	).0, Rev.2.1	Analyst: CF	
Chloride	3.77	0.20	1.00	NA	mg/L	12/26/2017 10:35 AM	
Sulfate	5.75	1.00	5.00	NA	mg/L	12/21/2017 11:25 PM	

WO#: 17122738

Date Reported: 1/15/2018

Original

Client:

**HG ENERGY LLC** 

Collection Date:

12/20/2017 2:20:00 PM

Project:

KAUFMAN UNIT WATER SAMPLING

**Date Received:** 

12/20/2017

Lab ID: Client Sample ID: 17122738-02A

KJL

Matrix: Site ID: Drinking Water SPENCER, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed NELAP
TOTAL DISSOLVED SOLIDS			Method:	SM2540	C-199	7	Analyst: KY
Total Dissolved Solids	199	5	10	NA		mg/L	12/21/2017 7:00 PM
TOTAL SUSPENDED SOLIDS			Method:	SM2540	D-199	7	Analyst: KY
Total Suspended Solids	2	1	5	NA	J	mg/L	12/21/2017 5:00 PM
pH - LAB TEST, HOLD TIME EXP	RED:		Method:	SM4500	)-H+-B-	2000	Analyst: VS
pH	7.10	NA	NA	NA	Н	SU	12/22/2017 2:06 PM
ORGANIC CARBON, TOTAL			Method:	SM5310	C-200	0	Analyst: VS
Total Organic Carbon	0.74	0.20	1.00	NA	J	mg/L	12/27/2017 1:30 PM

5mith

WO#: 17122738

Date Reported: 1/15/2018

Original

Client:

HG ENERGY LLC

**Collection Date:** 

12/20/2017 4:30:00 PM

Project:

KAUFMAN UNIT WATER SAMPLING

**Date Received:** 

12/20/2017 Drinking Water

Lab ID: Client Sample ID: 17122738-03A

**KRAS** 

Matrix: Site ID:

SPENCER, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed NELAP
METALS BY ICP-Low Level			Method:   (1994)	EPA 200	0.7 Rev	. 4.4	Analyst: EP
Aluminum	ND	0.0030	0.0050	NA		mg/L	12/26/2017 3:37 PM
Arsenic	ND	0.0080	0.0200	NA		mg/L	12/26/2017 3:37 PM
Barium	0.0070	0.0030	0.0050	NA		mg/L	12/26/2017 3:37 PM
Calcium	0.191	0.0500	0.500	NA	J	mg/L	12/26/2017 3:37 PM
Iron	0.212	0.0100	0.0500	NA		mg/L	12/26/2017 3:37 PM
Manganese	ND	0.0030	0.0050	NA		mg/L	12/26/2017 3:37 PM
SEMI-VOLATILE RANGE ORGANIC	S		Method:	SW8015	iC		Analyst: YT
TPH (Diesel Range: C10 - C28)	ND	0.13	0.26	NA		mg/L	12/27/2017 7:36 AM
TPH (Oil Range: C22 - C36)	ND	0.13	0.26	NA		mg/L	12/27/2017 7:36 AM
Surr: o-Terphenyl	32.8	NA	17.6-135	NA		%Rec	12/27/2017 7:36 AM
VOLATILE RANGE ORGANICS			Method:	SW8015	C		Analyst: TKC
TPH (Gasoline Range: C6 - C10)	ND	0.250	0.500	NA		mg/L	1/2/2018 9:09 PM
Surr: 2,5-Dibromotoluene	69.1	NA	53.5-143	NA		%Rec	1/2/2018 9:09 PM
VOLATILE ORGANIC COMPOUNDS	;		Method:	S <b>W</b> 8021	В		Analyst: TKC
Benzene	ND	0.500	1.00	NA		μg/L	1/2/2018 9:09 PM
Toluene	ND	0.500	1.00	NA		μg/L	1/2/2018 9:09 PM
Ethylbenzene	ND	0.500	1.00	NA		μg/L	1/2/2018 9:09 PM
m,p-Xylene	ND	1.00	2.00	NA		μg/L	1/2/2018 9:09 PM
o-Xylene	ND	0.500	1.00	NA		μg/L	1/2/2018 9:09 PM
Surr: 1,1,1-Trifluorotoluene	81.1	NA	57.1-139	NA		%Rec	1/2/2018 9:09 PM
SURFACTANTS:			Method:	SM5540	C-200	0	Analyst: BD
MBAS (calibrated on MW340 LAS)	ND	0.0250	0.0625	NA		mg/L	12/21/2017 5:21 PM
COLIFORM BY MPN:			Method: \$	SM9223	B-QT		Analyst: BD
E-Coli	ND	1	1	NA		MPN/100mL	12/21/2017 10:45 AM
Total Coliform	33	1	1	NA		MPN/100mL	12/21/2017 10:45 AM
ANIONS by ION CHROMATOGRAPH	·Υ		Method: I (1993)	EPA 300	).0, Re <sup>,</sup>	v.2.1	Analyst: CF
Chloride	6.29	0.20	1.00	NA		mg/L	12/22/2017 6:43 PM
Sulfate	6.54	1.00	5.00	NA		mg/L	12/21/2017 11:44 PM

WO#: 17122738

Date Reported: 1/15/2018

Original

Client:

**HG ENERGY LLC** 

**Collection Date:** 

12/20/2017 4:30:00 PM

Project:

KAUFMAN UNIT WATER SAMPLING

Date Received:

12/20/2017

Lab ID:

17122738-03A

Matrix:

Drinking Water

Client Sample ID:

**KRAS** 

Site ID:

SPENCER, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed NELAP
TOTAL DISSOLVED SOLIDS			Method:	SM2540	C-1997	7	Analyst: KY
Total Dissolved Solids	211	5	10	NA		mg/L	12/21/2017 7:00 PM
TOTAL SUSPENDED SOLIDS			Method:	SM2540	D-1997	7	Analyst: KY
Total Suspended Solids	ND	1	5	NA		mg/L	12/21/2017 5:00 PM
pH - LAB TEST, HOLD TIME EXP	IRED:		Method:	SM4500	-H+-B-	2000	Analyst: VS
pH	7.01	NA	NA	NA	Н	SU	12/22/2017 2:07 PM
ORGANIC CARBON, TOTAL			Method:	SM5310	C-2000	)	Analyst: VS
Total Organic Carbon	0.76	0.20	1.00	NA	J	mg/L	12/22/2017 5:58 PM

WO#: 17122738

Date Reported: 1/15/2018

Original

Client:

**HG ENERGY LLC** 

**Collection Date:** 

12/20/2017 12:00:00 AM

Project:

KAUFMAN UNIT WATER SAMPLING

Date Received:

12/20/2017

Lab ID:

17122738-04A

Matrix:

Trip Blank

Client Sample ID:

TRIP BLANK

Site ID:

SPENCER, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed N	ELAP
VOLATILE RANGE ORGANICS			Method: \$	SW8015	SC .	-	Analyst: TKC	
TPH (Gasoline Range: C6 - C10)	ND	0.250	0.500	NA		mg/L	1/3/2018 2:24 AM	PAVA
Surr: 2,5-Dibromotoluene	85.4	NA	53.5-143	NA		%Rec	1/3/2018 2:24 AM	
VOLATILE ORGANIC COMPOUNDS	3		Method: S	SW8021	IB		Analyst: TKC	
Benzene	ND	0.500	1.00	NA		μg/L	1/3/2018 2:24 AM	VA
Toluene	ND	0.500	1.00	NA		μg/L	1/3/2018 2:24 AM	VA
Ethylbenzene	ND	0.500	1.00	NA		μg/L	1/3/2018 2:24 AM	VA
m,p-Xylene	ND	1.00	2.00	NA		μg/L	1/3/2018 2:24 AM	VA
o-Xylene	ND	0.500	1.00	NA		μg/L	1/3/2018 2:24 AM	VA
Surr: 1,1,1-Trifluorotoluene	87.4	NA	57.1-139	NA		%Rec	1/3/2018 2:24 AM	



Improving the environment, one client at a time...

REI Consultants, Inc. PO Box 286 Beaver, WV 25813 TEL: (304)255-2500 Website: www.reiclabs.com

Sample Receipt Checklist

Client Name: H	IGE001		Work	Order Number: 1	17122738
RCPNo: 1	Date and Time Received:	12/20/2017 7:25:00	OPM F	Received by:	Doug Arthur
Completed By:	Blane Williams	Reviewed By:	Jimmy S	Suttle	
Completed Date:	12/21/2017 8:01:22 AM	Reviewed Date:	12/21/20	017 10:38 AM	
Carrier Name	e: REIC				
1. Chain	of custody present?		Yes x	No 🗆	
2. Chain	of custody signed when relinquished and received?		Yes x	No 🔲	
3. Are ma	atrices correctly identified on Chain of custody?		Yesx	No 🗌	
4. Is it cle	ear what analyses were requested?		Yesx	No 🔲	
5. Custo	dy seals intact?		Yes 🔲	No 🗆	Not Present x
6. Sampl	les in proper container type and preservative?		Yes 🗵	No 🔲	
7. Were	correct preservatives noted on COC?	•	Yes x	No 🔲	NA 🗌
8. Sampl	le containers intact?		Yes x	No 🔲	
9. Suffici	ent sample volume for indicated test?		Yes X	No 🔲	
10. Were	container labels complete?		Yes x	No 🗌	
11. All san	mples received within holding time?		Yes x	No 🔲	_
12. Was a	n attempt made to cool the samples?		Yes x	No L	NA 📙
13. Sampl	e Temp. taken and recorded upon receipt?		Yesx	No 🔲	To 0.4 °C
14. Water	- Were bubbles absent in VOC vials?		Yes x	No 🗌	No Vials
15. Are Sa	amples considered acceptable?		Yes X	No 🔲	
16. COC f	filled out properly?		Yesx	No 🗌	
Client No	otification/Response				
Client Name:	HGE001		V	Vork Order Numbe	er: 17122738
Comment:					
0"1 O1	· · · · · · · · · · · · · · · · · · ·	D 0	المحاد		
Client Contact Contact Mode		Person Con	tacteo:		
Date Contacte Regarding: Client Instructi		stacted By:			
Corrective Act	lion:				

#### DAT Reports.

#### Data Analysis Technologies, Inc.

7715 Corporate Blvd. Plain City, OH 43064 800-733-8644

#### Sample Analysis Certificate

Client:

REI Consultants, Inc.

Address:

225 Airport Industrial Park Road

Beaver, WV 25813

Date:

1/12/2018

DAT Project ID: Date Received:

1217048 12/26/2017

Attn:

Jimmy Suttle

Client Project: COC 9559

Hydrogen Sulfide-RSK175/ASTM D6228

The following samples were received on 12/26/2017:

**DAT Sample** 

Client Sample ID

Date

 $\mathbf{ID}$ 

Sampled **Matrix** 

1217048-05 a/b

KPW 1300

12/20/2017 aqueous

**Results:** 

See attached summary.

QC:

Met the criteria for the method.

Reviewed and approved for release by:

Ronald K. Mitchum, Ph.D.

President, DAT

#### DAT Reports®

#### **Data Summary**

Analysis:

Hydrogen Sulfide- Method RSK175/ASTM D6228

Client:

REIC-COC 9559

**DATL Project:** 

1217048

			H2S		
Client ID	Lab ID	Date Sampled	(mg/L)	RL (mg/L)	Q
KPW 1300 (17122738-01A)	1217048-05 a/b	20-Dec-17	' ND	0.000552	

ND = Not detected RL= Low calibration point ppm=ug/ml (mg/L) Relinquisted By:

Date

ğ

Roceived By:

Date There

Received By: UPS

Date Time :00

☐ HARDCOPY (extra cost)

REPORT TRANSMITTAL DESIRED:

□ FAX

TIAME T

CNLING

FOR LAB USE ONLY

C Attempt to Cool?

12-26-17 110

= 8

TAT:

Standard 💥

RUSH

Next BD []

2nd BD 🔲

34 BB □

III.

Note: RUSH requests will incur surcharges!



# CHAIN OF CUSTODY RECORD

COC ID: 9559

PAGE: 1 OF:

ADDRESS
REI Consultants, Inc.
PO Box 286 Beaver, WV 25813 TEL: (304) 255-2500

Website: www.reiclabs.com

FAX: (304) 255-2572

Please Include Email Address of Report Recipient Whenever Possible!!!

SUB C	SUB CONTRATOR DAT LAB	LAB	COMPANY:	D.	ATA ANAL	DATA ANALYSIS TECHNOL		SPECIAL INSTRUCTIONS / COMMENTS:	
ADDRESS		7715 CORPORATE BLVD.	VD.					State Code: WV Please use SampleID as purchase order number. After analysis, the samples do not need to be returned and can be or	State Code: WV Please use SampleID as purchase order number.  After analysis, the samples do not need to be returned and can be disposed per your standard laboratory
CITY, S	STATE, ZE: PLAI	CITY, STATE, ZZ: PLAIN CITY, OH 43064	<b>.4</b>					practices. Please email results to Jimmy Suitle at: jsuttle@reiclabs.com Thank you	it jsuttle@reiclabs.com Thank you
PHONE		(800) 733-8644	FAX:	<u>a</u>	(614) 873-0810			ANALYTICAL PARAMETERS	Procevetion Codes:     Nume
ACCOUNT #:	JVI #:		EMAIL:				налкос		l Hydrochioric Acid 2 Nitrie Acid 3 Suffarie Acid
MBITI	SAMPLE ID	Citest Sumplo ID	H E	Bottle Type	XIXTAM	GELOSTICO ELVO	HEN_SULVEDE_L_SUB (EPA NUMBER OF CONTAINERS		4 Socium Thiosnifae 5 Sotium Rydroxide/ 5 Sotium Arcenite 6 Socium Rydroxide 7 Ascentiva Add 8 Socium Suitto-HICL 9 Poussium Dibydrogen Chraic 10 Browinm Cobride COMMENTS:
							*		
1	17122738-01A KPW	KPW	· Hom G		Waste Water	12/20/2017 1:00:00 2	2		_
				ļ		PM	-		

#### **DAT** SAMPLE RECEIVING

7715 Corporate Blvd. Plain City,OH 43064.

Project Number: 1217048

Date Received:	12/26/2017	Carrier:	UPS
Client Name:	REI Consultants	Analysis:	Hydrogen Sulfide
Tracking number:	1Z26X7130375660054	Package Temp:	8°C
Custody Seals '?:	No	coc: 🗹	check if COC from client

Sample Information

Client ID:	Laboratory ID	Date	Matrix:	Container:	Comment
CUFWI 0920	1217048-01 a/b	12/20/2017	aqueous	40mL VOA vial	in duplicate
CPIW 0940	1217048-02 a/b	12/20/2017	laqueous	40mL VOA vial	in duplicate
UCUS 1010	1217048-03 a/b	12/20/2017	aqueous	40mL VOA vial	in duplicate
LCUS 1035	1217048-04 a/b	12/20/2017	aqueous	40mL VOA vial	in duplicate
KPW 1300	1217048-05 a/b	12/20/2017	'aqueous	40mL VOA vial	in duplicate

Laboratory Receiving Initials

1217048 12/26/2017 11:55:51 AM

17048	DATFRM1049 Revision
<b>C</b> #	
DAT Project	
٠	
r receipt, the samples met all of DAT's acceptance criteria.	

The samples met all of DAT's acceptance criteria.    Cense   Lants / 1169 B		Sample Receipt Report	
Upon receipt of samples, check if any of the following discrepancies have been noted.    Discrepancy Type   COC and samples do not match   Spacify applicable clear ID or "all"	Clie Cust Seco	REI Consoltants  - 90/- Date:   w. Initials:	
Discrepance) Type   O'C and samples do not match   No unique sample identifications   No unique sample identifications   No unique sample identifications   Samples arceived outside of the required temp criteria. Receipt Temp: 6°C     No date of collection stated   Correction Temp: 6°C     No date of collection stated   Correction Temp: 6°C     No fine of collection stated   Correction Temp: 7°C     No fine of collection stated   Correction Temp: 7°C     No fine of collection stated   Correction Temp: 7°C     No fine of containers were not expropriated   Sample abelia were destroyed or unreadable     Samples aboved sign of faunage or contamination   Chieve was not extended at time of sample to perform the requested analysis: Headspace? Y N If Yes, list sample ID     Samples showed sign of damage or contamination   Chieve Was not extended at time of sample may be opened at time of sample recept.   Chieve Discrepancies:   Beatspace or thesence of basispace of or N) for VOA squorus samples show that is no observed at time of sample meeting.   Chieve Discrepancies:   Redum Spl wt:	Upc	receipt of samples, check if any of the following discrepancies have been	toted.
No unique sample dentifications   No unique sample dentification and dentifications dentification of the required temp criteria. Receipt Temp: 8°C     No date of collection stated   Corrected Temp: 8°C     No date of collection stated   Corrected Temp: 8°C     No time of collection stated   Corrected Temp: 8°C     Sample solve were destroyed or unreadable   Sample stated Sample to finding the requested analysis. Samples stowed sign of damage or contamination.   Aqueous samples for volatite analysis: Headspace? Y N   H Yes, list sample ID(s) in details:		Discrepancy Type	Specify applicable client ID or "all"
Samples received outside of the required temp criteria   Receipt Temp:   S C		No unique sample identifications	
No preservation type was noted Corrected Temp: 6 C  No date of collection stated Corrected Temp: 8 C  No time of collection stated Corrected Temp: 8 C  No time of collection stated Corrected Temp: 8 C  The sample collection stated Sample collection stated Sample shall were destroyed or unreadable Sample about the requested analysis.  Sample labels were received outside of holding time There was not enough sample to perform the requested analysis.  Samples showed sign of damage or contamination.  Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample ID(s) in details:  Details:  Sample pH for nonvolatile aqueous samples and presence or thesace of headspace (Y or N) for VOA equeous samples shall be recorded at time of sample tog-in.  Other Discrepancies:  Sample ID  Sample pH or nonvolatile aqueous samples met all of DAT's acceptance criteria.  Details:  Sample pH or nonvolatile aqueous samples met all of DAT's acceptance criteria.  DAT Project # (2, 170 # 170 # 180 m 170 m 17		Receipt Temp:	C
No date of collection stated   Corrected Temp: 8 ° C     No time of collection stated   The samples of collection stated     The samples over not appropriate   Sample containers were not appropriate     Sample containers were not appropriate   Sample by ever destroyed or unreadable     Sample labels were destroyed or unreadable     Sample showed sign of damage or contamination.     Aqueous samples for volatile analysis: Headspace? Y N If Yee, list sample ID(s) in details:     Aqueous samples for volatile analysis: Headspace? Y N If Yee, list sample ID(s) in details:     Aqueous samples and presence or detence of headspace (Y or N) for VOA aqueous samples and presence or detence of headspace (Y or N) for VOA aqueous samples at time of sample begin.     Container Return Vesting     Container Return Spl W:		Cor	0
No time of collection stated		Corrected Temp:	0
The sample collector was not named   Sample containers were not appropriate   Sample containers were not appropriate   Sample swere destroyed or unreadable   Samples were electroyed or unreadable   Samples were received outside of holding time   There was not enough sample to perform the requested analysis.   Samples showed sign of damage or contamination.   Aqueous samples for volatile analysis:   Headspace? Y N   If Yes, list sample D(s) in details:			
Sample containers were not appropriate   Sample labels were destroyed or unreadable		The sample collector was not named	
Sample labels were destroyed or unreadable     Samples were received outside of holding time     There was not enough sample to perform the requested analysis.     Samples showed sign of damage or contamination.     Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample D(s) in details:     Details:     Sample pH for nonvolatile aqueous samples and presence or theence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample receipt.     Cother Discrepancy     Sample pH for nonvolatile aqueous samples and presence or theence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample receipt.     Sample pH for nonvolatile aqueous samples met all of DAIT's acceptance criteria.     Discrepancy		Sample containers were not appropriate	
Samples were received outside of holding time   There was not enough sample to perform the requested analysis.   Samples showed sign of damage or contamination.   Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample ID(s) in details:      Details:   Details:   Sample pH for nonvolatile aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample receipt.   Other Discrepancies:   Sample ID   Price:   Sample ID   Price:   Sample ID   Price:   Sample ID   Price:   Size:   Return Spl wt:   Return Sp		Sample labels were destroyed or unreadable	
There was not enough sample to perform the requested analysis.   Samples showed sign of damage or contamination.     Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample DD(s) in details:    Details:     Sample pH for nonvolatile aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.     Other Discrepancies:     Sample D		Samples were received outside of holding time	
Samples showed sign of damage or contamination.     Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample D(s) in details:    Details:     Sample pH for nonvolatile aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.   Other Discrepances shall VOA viails be opened at time of sample receipt.     Other Discrepances shall VOA viails be opened at time of sample receipt.     Other Discrepances shall VOA viails be opened at time of sample receipt.     Other Discrepances shall VOA viails be opened at time of sample receipt.     Other Discrepance or absence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.     Other Discrepance or absence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.     Other Discrepance or absence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.     Other Discrepance or absence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples and sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples and sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples and sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples and sample Discrepance or absence of headspace (Y or N) for VOA aqueous samples sample D(s) in details:		There was not enough sample to perform the requested analysis.	
Aqueous samples for volatile analysis: Headspace? Y N If Yes, list sample ID(s) in details:  Details:  Sample pH for nonvolatile equeous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.  Under no circumstances shall VOA vials be opened at time of sample receipt.  Sample ID  Sample ID  Sample ID(s) in details:  Sample PH for nonvolatile equeous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.  Sample ID  Sample ID  Sample ID  Sample ID(s) in details:  Container Return  Yes / No  Price: Size: Return Spl wt:  Return Spl wt:  Return Spl wt:		Samples showed sign of damage or contamination.	
Details:  Sample pH for nonvolatile aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.  Other Discrepancies:  Sample ID  Discrepancy  Container Return  Yes / No  Price: Size: Size: Return Spl wt:		e? Y N If	sample ID(s) in details:
Sample pH for nonvolatile aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall be recorded at time of sample log-in.  Other Discrepancies:  Sample ID  Sample ID  Sample ID  Price:  Size:  Return Spl wt:    217048	Det		
Discrepancy  Ceipt, the samples met all of DAT's acceptance criteria.  DAT Project # (2.176 95)	Sampl Under	bH for nonvolatife aqueous samples and presence or absence of headspace (Y or N) for VOA aqueous samples shall to circumstances shall VOA vials be opened at time of sample receipt.	e recorded at time of sample log-in.
DAT Project # (2.170 yz	Othe	Discrepancies:  Discrepancy	Container Return
DAT Project # (2170 45			Yes/No Price: Size: Return Spl wt:
ı			1217045



2005 N. Center Ave. Somerset, PA 15501

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

Thursday, January 4, 2018

Jimmy Suttle REI CONSULTANTS, INC. PO BOX 286 225 INDUSTRIAL PARK ROAD BEAVER, WV 25813

Order No.: G1712D23

Dear Jimmy Suttle:

Geochemical Testing received 2 sample(s) on 12/22/2017 for the analyses presented in the following report.

There were no problems with the analyses and all QC data met 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,

Timothy W. Bergstresser

Director of Technical Services

Timoff W Ley truse



#### **Geochemical Testing**

CLIENT:

REI CONSULTANTS, INC.

Project:

Lab Order:

G1712D23

**CASE NARRATIVE** 

Date: 04-Jan-18

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.

#### SAMPLE RECEIPT CHECKLIST

	Response
COC is present	Yes
COC is filled out in ink and legible	Yes
COC relinquished, signature, date, and time	Yes
Samples arrived within hold time	Yes
Containers properly preserved for the requested testing	Yes
Sample containers have legible labels	Yes
Sample preservation verified	Yes
Appropriate sample containers are used	Yes
Sample container(s) received at proper temperature	Yes
Zero headspace where required	Yes
Sufficient volume for all requested analyses	Yes

Comments on the above checklist: None

Legend:

ND - Not Detected

J - Indicates an estimated value.

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

Q - Qualifier

QL -Quantitation Limit

DF - Dilution Factor

S - Spike Recovery outside accepted recovery limits

R - RPD outside accepted recovery limits

E - Value above quantitation range

\*\* - Value exceeds Action Limit

H - Method Hold Time Exceeded

MCL - Contaminant Limit



#### **Laboratory Results**

**Geochemical Testing** 

REI CONSULTANTS, INC.

Lab Order:

G1712D23

Project:

**CLIENT:** 

Lab ID:

G1712D23-002

Matrix.

ACUECUS

Date: 04-Jan-18

Client Sample ID: 17122738-03A

**Collection Date:** 

Sampled By:

REIC

DateReceived:

12/22/2017 10:55:36 AM

12/20/2017 2:30:00 PM

Matrix:	AQUEOUS						DateRe	eceivea: 12/22	2/2017 10:55:56 AWI
Analyses		Result	Q	MDL	PQI	Units	DF	Date Prepared	Date Analyzed
DISSOLVED	GASSES			Analys	st: TEW	ı		RSK 175	RSK 175
Butane, dissolv	ed	ND		0.010	0.020	mg/L	1	12/27/17 1:06 PM	01/02/18 2:22 PM
Ethane, dissolv	ed	ND		0.010	0.020	mg/L	1	12/27/17 1:06 PM	01/02/18 2:22 PM
Methane, disso	lved	0.18		0.010	0.020	mg/L	1	12/27/17 1:06 PM	01/02/18 2:22 PM
Propane, dissol	ved	ND		0.010	0.020	mg/L	1	12/27/17 1:06 PM	01/02/18 2:22 PM

CHAIN OF CITATORY RECORD	TONY	0000	V	3-0516	v13-0516	CUENTID	DATE	
47422738		2000	Chent: HC	HG ENERGY	>		***************************************	
1/12/30	OIL W		Contact Person Roger Heldman	Roger He	eldman		Phone 304-420-1107	
	Y		Address			City		
. !			Billing Address (if different)	s (if different)				
Jimmy Suttle & In	& Industrial Consultants, Inc.	ç.Inc.			Clty		State Zip	
MAIN LABORATORY & CORPORATE HEADQUARTERS: PO. Box 286 · 225 Industrial Park Rd. Beaver, WV 25813	PORATE HEADQUA Park Rd. Beaver, WV 25	RTERS:	Site ID & State Spender, WV	Spencer,	WV	Projito Kaufman Unil Water Sampling	San	
SHEMANDOAH Service Center ROANOKE Service Center 1557 Commerce Rd., Ste 201 3029-C Petrs Creek ( Andrew 24, 2482 Roanske, Va 24018	800 • www.reiclobs.com ROANOKE Service Center 3030-C Petrs Creek Rd Roanoke, VA 24019 Roanoke, VA 24019		MORGANTOWN Service Center 16 Commerce Drive Wastover, 2000		P. P.H. Spec	ecific Gravity, Barium, Specific Conganese, Total Dissolved Solids, Hardness, Total Organic Carbon	pH. Specific Gravity, Barium, Specific Conductance, Iron, Magnasium, Chloride.  Manganese, Total Dissolved Solids, Hydrogen Sutfide, Sodium, Alkelinity, Hardness, Total Organic Carbon.	oride.
			1000	1		See Comments	e Comments	
TURNAROUND TIME  RUSH TURNAROUND*  O SPAY O SPAY O 2 DAY  *Rush workneeds prior laboratory approval and will lineur additional changes	RUSH TURNARBUNDS S DAY O S DAY O S DAY STANDARD S S DAY S S DAY O S S DAY S S DAY O S S DAY S DAY DAY O S DAY S DAY DAY S DAY DAY S	RUSH TURNARBUNDS  SPAY O 1 DAY O 2 DAY  y approval and will incur additional charges	Send Results Via:  Send Results Via:  Send Results Via:	AT S & METH		Arsenic, Bart Mangan	Arsenic, Barlum, Calcium, Chloride, Detergents (MBAS), Iron, Manganese, TDS, TSS, TOC, Dissolved Methane,	Iron.
All analytical requests are subject to REIC's Standard T	ect to REIC's Standa	ard Terms and Conditions.	ditions.	YJANA			Bacteria (Total Coliform)	ropane
SAMPLEID	No. & Type of Containers	Sampling Date/Time	e Matrix	Sample	0,	E, ., ., 0,	0 Name 7 Assultached	1
KPW	2P / 3G	12/20/17 1300	w water	Grab	X		2 National Control of the Charles of	e mande
	-						Spolum Thiosulfate Spolum Hydroxide/ Sodium Arrentie	
							6 Section Hydroxide (2) (1) (1) (1) (2) (2) (2) (2) (3) (4) (4) (5) (4) (5) (5) (5) (5) (5) (5) (5) (5) (5) (5	]
KJL	9G / 4P	12/20/17 1420	D Water	Grab		XXXXX	COMMENTS:	
KRAS	7G / 4P	12/17/17 1630	D Water	Grab		(X (X (X		
Trip Blank	16						J. Mary Suffle 1	
							CUSTODY SEALS   1.V   (A1N	
Corrected temp at arrival:	"H .C ICEDYY N	IR#	Container	rs provided b	Containers provided by: (X REIC   Client	8	Delivered by: 1 Juliant Dyneic   Jurys     Fedex   Jusps	JUSP
william 12	24 183	5				Task star	See	
TWO TO	1	200				Dusy NECD	Stive	
HZD.	Enthy Trum					Caner NELL	Control	
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# **Laboratory Results**

**Geochemical Testing** 

REI CONSULTANTS, INC.

CLIENT: Lab Order:

G1712D23

**Project:** 

G1712D23-001

Lab ID: Matrix:

AQUEOUS

Date: 04-Jan-18

Client Sample ID: 1712278-02A

**Collection Date:** 

12/20/2017 2:20:00 PM

Sampled By:

REIC

DateReceived: 12/22/2017 10:55:36 AM

Matrix: 11QCDCCC				Daten	ccivcu. 12/22	5/2017 10.55.50 ALVI
Analyses	Result Q	MDL	PQL Units	DF	Date Prepared	Date Analyzed
DISSOLVED GASSES		Analys	t: <b>TEW</b>		RSK 175	RSK 175
Butane, dissolved	ND	0.010	0.020 mg/L	1	12/27/17 1:06 PM	01/02/18 2:06 PM
Ethane, dissolved	ND	0.010	0.020 mg/L	1	12/27/17 1:06 PM	01/02/18 2:06 PM
Methane, dissolved	ND	0.010	0.020 mg/L	1	12/27/17 1:06 PM	01/02/18 2:06 PM
Propane, dissolved	ND	0.010	0.020 mg/L	1	12/27/17 1:06 PM	01/02/18 2:06 PM

# 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)
	<u></u>			
	,			
			-	

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



		APPENDIX G		
API#	Operator	Farm Name	Well No	Producing Formation
47-087-03022	H G Energy LLC	Bays, J. H.	1	Big Injun
47-087-01955	H G Energy LLC	Bays, J. H.	6	Big Injun
47-087-04492	H G Energy LLC	Bays, J. H.	601	Big Injun
47-087-02435	H G Energy LLC	Chambers, C. B.	4	Devonian Shale
47-087-03050	H G Energy LLC	Chambers Heirs	1	Big Injun
47-087-02436	H G Energy LLC	Chambers Heirs	5	Big Injun
47-087-02994	H G Energy LLC	Chambers Heirs	6	Big Injun
47-087-03032	H G Energy LLC	Chambers Heirs	7	Big Injun
47-087-03247	H G Energy LLC	Chambers Heirs	8	Big Injun
47-087-03035	H G Energy LLC	Chambers Heirs	10	Big Injun
47-087-03033	H G Energy LLC	Chambers Heirs	11	Big Injun
47-087-02993	H G Energy LLC	Chambers Heirs	15	Big Injun
47-087-02438	H G Energy LLC	Chambers Heirs	17	Big Injun
47-087-02439	H G Energy LLC	Chambers Heirs	18	Big Injun
47-087-00913	H G Energy LLC	Chambers Heirs	21	Big Injun
47-087-01076	H G Energy LLC	Chambers Heirs	23	Big Injun
47-087-03076	H G Energy LLC	Douglas, Cynthia (TR #1)	2	Big Injun
47-087-02980	H G Energy LLC	Douglas, Cynthia (TR #2)	3	Big Injun
47-087-03075	H G Energy LLC	Douglas, Cynthia (TR #3)	4	Big Injun
47-087-02995	H G Energy LLC	Harris, J.A.	14	Big Injun
47-087-01872	H G Energy LLC	Harris, J.A.	16	Big Injun
47-087-01927	H G Energy LLC	Harris, J.A.	17	Big Injun
47-087-01962	H G Energy LLC	Harris, J.A.	18	Big Injun
47-087-01953	H G Energy LLC	Harris, J.A.	19	Big Injun
47-087-00970	H G Energy LLC	Kaufman, Wm.	W-2	Big Injun
47-087-00971	H G Energy LLC	Kaufman, Wm.	W-3	Big Injun
47-087-00978	H G Energy LLC	Kaufman, Wm.	W-4	Big Injun
47-087-00984	H G Energy LLC	Kaufman, Wm.	W-5	Big Injun
47-087-00987	H G Energy LLC	Kaufman, Wm.	W-6	Big Injun
47-087-00988	H G Energy LLC	Kaufman, Wm.	W-8	Big Injun
47-087-00992	H G Energy LLC	Kaufman, Wm.	W-10	Big Injun
47-087-00993	H G Energy LLC	Kaufman, Wm.	W-11	Big Injun
47-087-00994	H G Energy LLC	Kaufman, Wm.	W-12	Big Injun
47-087-00995	H G Energy LLC	Kaufman, Wm.	W-13	Big Injun
47-087-00996	H G Energy LLC	Kaufman, Wm.	W-14	Big Injun
47-087-01004	H G Energy LLC	Kaufman, Wm.	W-15	Big Injun
47-087-01032	H G Energy LLC	Kaufman, Wm.	W-16	Big Injun
47-087-01053	H G Energy LLC	Kaufman, Wm.	W-17	Big Injun
47-087-01055	H G Energy LLC	Kaufman, Wm.	W-18	Big Injun
47-087-01068	H G Energy LLC	Kaufman, Wm.	W-20	Big Injun

47-087-01079	H G Energy LLC	Kaufman, Wm.	W-21	Big Injun
47-087-02981	H G Energy LLC	Kaufman, Wm.	4	Big Injun
47-087-00894	H G Energy LLC	Kaufman, Wm.	5	Big Injun
47-087-00909	H G Energy LLC	Kaufman, Wm.	6	Big Injun
47-087-00963	H G Energy LLC	Kaufman, Wm.	7	Big Injun
47-087-01923	H G Energy LLC	Kaufman, Wm.	29	Big Injun
47-087-04489	H G Energy LLC	Kaufman, Wm.	604	Big Injun
47-087-04490	H G Energy LLC	Kaufman, Wm.	605	Big Injun
47-087-04491	H G Energy LLC	Kaufman, Wm.	606	Big Injun
47-087-02578	H G Energy LLC	Kincaid, S. B.	3	Devonian Shale
47-087-03040	H G Energy LLC	Lewis, Asbury	1	Big Injun
47-087-00027	H G Energy LLC	Lewis, Asbury	2	Big Injun
47-087-03041	H G Energy LLC	Lewis, Asbury	3	Big Injun
47-087-01026	H G Energy LLC	Lewis, Asbury	5	Big Injun
47-087-01095	H G Energy LLC	Lewis, Asbury	6	Big Injun
47-087-01096	H G Energy LLC	Lewis, Asbury	7	Big Injun
47-087-04493	H G Energy LLC	Lewis, Asbury	602	Big Injun
47-087-00565	H G Energy LLC	Simmons, David	2	Big Injun
47-087-02743	H G Energy LLC	Simmons, David	3	Big Injun
47-087-03061	H G Energy LLC	Simmons, David	6	Big Injun
47-087-03030	H G Energy LLC	Simmons, David	10	Big Injun
47-087-03047	H G Energy LLC	Simmons, David	11	Big Injun
47-087-02988	H G Energy LLC	Simmons, David	12	Big Injun
47-087-03013	H G Energy LLC	Simmons, David	13	Big Injun
47-087-03053	H G Energy LLC	Simmons, David	14	Big Injun
47-087-03048	H G Energy LLC	Simmons, David	15	Big Injun
47-087-03045	H G Energy LLC	Simmons, David	17	Big Injun
47-087-03029	H G Energy LLC	Simmons, David	19	Big Injun
47-087-03031	H G Energy LLC	Simmons, David	23	Big Injun
47-087-02986	H G Energy LLC	Simmons, David	24	Big Injun
47-087-00889	H G Energy LLC	Simmons, David	26	Big Injun
47-087-01027	H G Energy LLC	Simmons, David	27	Big Injun
47-087-01072	H G Energy LLC	Simmons, David	28	Big Injun
47-087-01086	H G Energy LLC	Simmons, David	29	Big Injun
47-087-01873	H G Energy LLC	Simmons, David	31	Big Injun
47-087-01954	H G Energy LLC	Simmons, David	32	Big Injun
47-087-02082	H G Energy LLC	Simmons, David	33	Big Injun

# **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: Roger Heldman					
Phone Number: 304-420-1107					
E-mail Address: rheldman@hgenergyllc.com					
Date: 5/21/18					
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 / workover activities					
well completion / workover 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 patroled for leaks. Pipelines are registered with the WV 811 to minimize possibility of being damaged by others. Pressure monitoring / shut down controls on pump. Workover fluids are properly contained and disposed of. The injection well is monitored for mechanical integrity failures and is pressure tested every 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.					



4.	<ul> <li>Summarize all activities at your facility that are already regulated for groundwa protection.</li> </ul>	ter
	This facility is currently covered by an existing UIC permit No. 2D0871056. Storage tanks are registered uder WV tank regulations. Any spills / leaks are reported to WVDEP /EPA.	
5.	. Discuss any existing groundwater quality data for your facility or an adjacent property	
	There are no know 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 a property unless allowed by another rule.	the
	No waste material are or will be used for deicing or fill material.	
7.	Describe the groundwater protection instruction and training to be provided to employees. Job procedures shall provide direction on how to prevent groundwa 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 spill. Prior to the release of any storm water from secondary containment it is tested to assure that it meets guidelines for discharge.	



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 pipelines and the injection line are located parallel to roadways which are traveled several times weekly.

Signature: 🗸

Date: 5/21/18



## APPENDIX I

## Requirement for Financial Responsibility to Plug/Abandon an Injection Well

То:	WV Department of Environmental Protection Office of Oil and Gas
	601 57 <sup>th</sup> Street, SE
	Charleston, West Virginia 25304-2345
	ATTN: Underground Injection Control Program
From:	H G Energy LLC
	5260 Dupont Rd
	Parkersburg, WV 26101
Date:	5/21/18
Subject:	Underground Injection Control (UIC) Permit Application # 200871056
	Requirement for Financial Responsibility
undergrour	nin financial responsibility and resources to close, plug, and abandon ad injection wells(s) in a manner prescribed by the Chief of the Office
of Oil and	
Name:	Eric Grayson
Signature:	Cw/ Jugo
Date:	5/21/18



#### 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.

his is not a commercial facilty	
	;



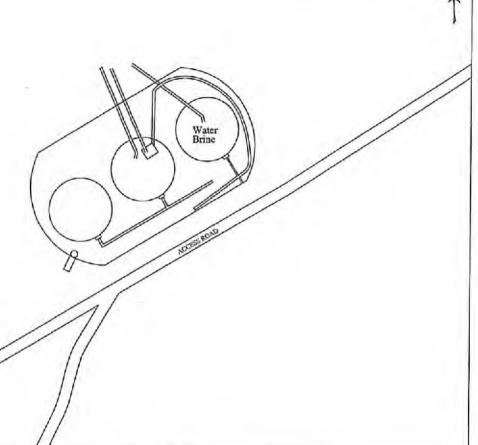
### **APPENDIX K**

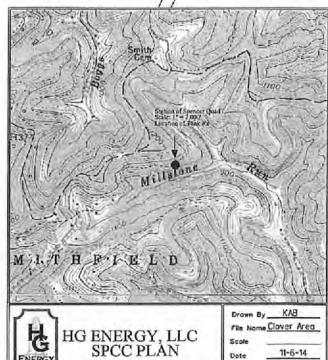
# Identify permit or construction approvals received or applied for under the following programs:

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
Toxic Substances Control Act (TSCA)	
Best Management Plans	
Management of Used Oil	
Other Relevant Permits (Specify):	
WV DEP Tank Registrations	See Appendix B
	,



# FACILITY SITE PLAN





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

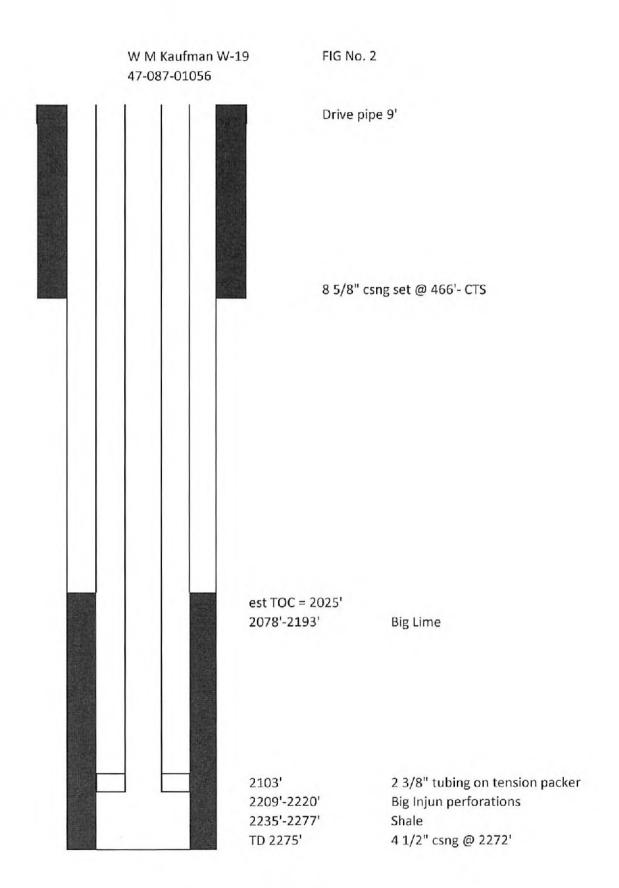
Volume bbl: 210

Tank #'s: 321-323

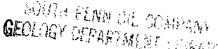
Dike Dimensions: 150' peri. X 2.2' depth

11-6-14

Calculated Capacity: 471 bbl



5/24/2018 Not to scale



bureau of mines report of investigations 6992

EXTRA COPY

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

By Karl-Heinz Frohne



UNITED STATES DEPARTMENT OF THE INTERIOR

BUREAU OF MINES

July 1967

This document is released by the Bureau of Mines in recognition of the necessity for prompt and timely reporting. It is understood that the information contained herein may be superseded by subsequent publications. Some concessions in form and style are made in the interest of timeliness.

Water R. Hmand J.

# 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

BUREAU OF MINES
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 oilwater 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

Petroleum research engineer, Morgantown Petroleum Research Laboratory, Bureau of Mines, Morgantown, W. Va.

expected to recover only 5 to 25 percent  $(2)^2$  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  $(\underline{6})$ .

#### 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  $30^{\circ}$  east (4). In the Kaufman lease area, the sand dips to the northwest at about 70 feet per mile.

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

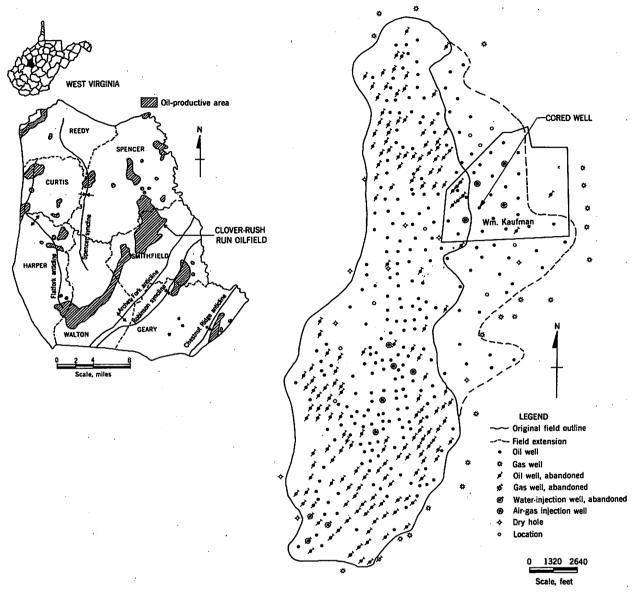


FIGURE 1. - Oil-Productive Areas in Roane County, W. Va., and the William Kaufman Lease in the Clover-Rush Run Oilfield.

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.

OFNERN LZED OFOLOGIO COLUMNI							
GENERALIZED GEOLOGIC COLUMN  SYSTEM FORMATION ROCK COLUMN DRILLERS' TERMS							
STSTEW	OR GROUP	ROCK COLUMN	DRILLERS' TERMS				
PERMIAN	DUNKARD	• • • • • • • • • • • • • • • • • • • •	1				
		••••••	WASHINGTON COAL				
	مند		·				
	MONONGA- HELA						
			PITTSBURGH COAL				
	<b>-</b>						
PENNSYLVANIAN	ਬੁ						
	CONEMAUGH						
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šYL		1 1 1 1 1					
Ž.							
PEN			BIG DUNKARD SAND				
_	ALLEGHENY		UPPER FREEPORT COAL				
		······································					
			BURNING SPRINGS SAND				
	POTTSVILLE		SALT OR ROSEDALE GAS SAND				
			SALT OR ROSEDALE GAS SAND				
		•••					
			·				
			ROSEDALE SALT SAND				
			ROSEDALE SALT SAND				
	MAUCH		MAYTON CAND				
	CHUNK		MAXTON SAND LITTLE LIME				
MISSISSIPPIAN	GREEN-		BIG LIME				
	BRIER	<i>,</i>	"KEENER" SAND				
	POCONO	······································	BIG INJUN SAND SQUAW SAND				
		····	OQUATI, SAIND				
			WEIR SAND				
			BEREA SAND				

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 oilproduction 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.

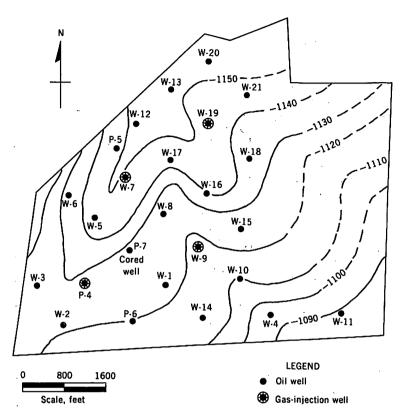


FIGURE 3. - Structure Contour Map on Top of Big Injun Sand, William Kaufman Lease, Clover-Rush Run Oilfield.

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  $3\frac{1}{2}$ -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.

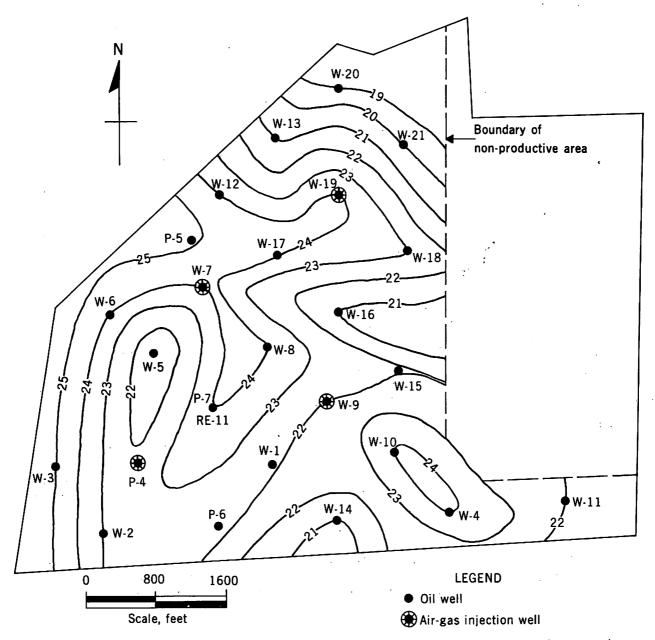


FIGURE 4. - Isopachous Map of the Big Injun Sand, William Kaufman Lease, Clover-Rush Run Oilfield.

#### 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	
Thicknessfeet	12.5	24.0	
Air permeability millidarcy	.8	.5	
Porositypercent	15.2	12.7	
Saturation:			
0ildo	8.7	7.4	
Waterdo	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  $74^{\circ}$  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.

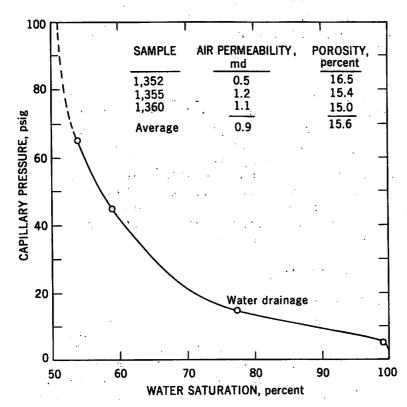


FIGURE 5. • Capillary Pressure Versus Water Saturation for the Big Injun Sand in Kaufman Well P-7, Clover-Rush Run Oilfield.

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 water-flooding 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.

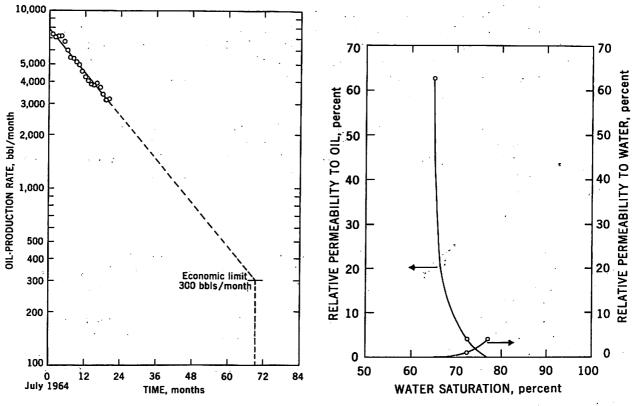


FIGURE 6. - Production Decline Curve for the William Kaufman Lease, Clover-Rush Run Oilfield.

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  $K_{\rm g}/K_{\rm o}$  curve in the laboratory failed because of the tightness of the core samples. Reasonable theoretical  $K_{\rm g}/K_{\rm o}$  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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TABLE A-1. - Core analysis results, Kaufman well P-7

	T	Air	Porosity,	Fluid sa	turation,	Oil	Salinity,
Sample	Depth,	permeability,	pct		pore space	content,	equivalent
	ft	md		Oil	Water	bbl/acre-ft	NaC1, ppm
1,304	2,140.0	<0.1	0.1	(1)	(1)	. (¹)	(1)
1,305	2,141.0	<.1	.6	-	-	· -	. <b>-</b>
1,306	2,142.0	<.1	.6	-	-	-	-
1,307 1,308	2,148.9	<.1 <.1	.1	-	-	- ,	-
1,300	2,150.4 2,151.0	<.1	4.9 5.1	· -	-		
1,310	2,151.4	<.1	4.5	-	-	-	200,000
1,311	2,152.6	<.1	6.3	-	_	-	194,000
1,312	2,161.0	<.1	5.4	_		<u> </u>	200,000
1,313	2,165.0	<.1	.4	-			159,000
1,314	2,165.6	.5	1.7	· _	_	_	
1,315	2,166.0	<.1	1.5	-	_	-	• -
1,316	2,166.4	<.1	1.5	-	-	-	-
1,317	2,167.0	<.1	2.1	-	<del>-</del> .	- '	<del>-</del>
1,318	2,167.4	<.1	1.6		-	• '	· -
1,319	2,168.0	<.1	1.9	-	<b>-</b> *	• •	146,000
1,320	2,168.5	<.1	.6	- 1			
1,321	2,169.0	.2	3.2	8.8	17.1	23	· · · · · · · · · · · · · · · · · · ·
1,322	2,169.6	.3	3.5	, l	27.0	• .	
1,323 1,324	2,170.2 2,170.9	.2 .2	5.4 6.3	4.3	27.8	18 9	13,000
1,324	2,170.9	.1	6.1	1.8 4.0	16.9 31.8	19	13,000
1,325	2,172.0	.5	8.1		. 31.0	1.9	_
1,327	2,172.5	.3	5.7	<del>-</del> .	<u> </u>	· · · ·	
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			<del>-</del>	
1,334	2,178.2	.1	11.6	. · . <u></u>	-	<u>-</u>	, <b>-</b>
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	170 000
1,337	2,180.0	<.1	3.5	-	-	-	178,000
1,338 1,339	2,180.5 2,181.0	.6 <,1	12.7 2.9	-	-	-	-
1,340	2,182.0	.1	12.4	3.5	70.1	35	<u>-</u>
1,341	2,182.5	.4	14.8	J.J	70.1	-	-
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	200,000
1,351	2,192.0 2,193.0	<.1 5	5.2	4.6	80.7	19 124	200,000
1,352 1,353	2,193.0	.5 1.0	16.5 16.5	9.6 11.0	61.3 61.5	124 142	<b>-</b>
1,353	2,194.0	.6	16.5	8.7	61.4	113	188,000
1,355	2,195.0	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	<b>-</b> ,
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
No test			7.5	7.1	JU.1		237,000

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.
- 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<sub>i</sub> = estimated original reservoir pressure = 700 psig,

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

p = some lower pressure = 400 psig,

T<sub>r</sub> = reservoir temperature = 74° F,

 $G_{ls}$  = 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,  $T_r$ ,

 $B_o/B_{o\,i}$  = adjusted differential shrinkage factor, bbl saturated oil at p per bbl saturated oil at p,  $T_r$ ,

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

CGV = corrective gas volume, cu ft gas per bbl oil at  $\mathbf{p_s}$  ,  $\mathbf{T_r}$  ,

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

Find

$$CGV = \frac{p_1 - p}{p_s - p} (G_{1s})$$

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

= 85 scf,

COV = 1 + 
$$\left[ \left( \frac{P_1 - P_s}{P_s - P} \right) \right] \left[ (B_o/B_{os} \text{ at } P_s) - (B_o/B_{os} \text{ at } P) \right] \right]$$
 (2)  
= 1 +  $\left[ \left( \frac{700 - 468}{468 - 400} \right) \right] \left[ 1.0000 - 0.9920 \right]$ 

= 1.027 bbl at  $p_i$ ,  $T_r$ /bbl at  $p_s$ ,  $T_r$ ,

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

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

$$B_o = \frac{B_o/B_{oi}}{SF} . ag{5}$$

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

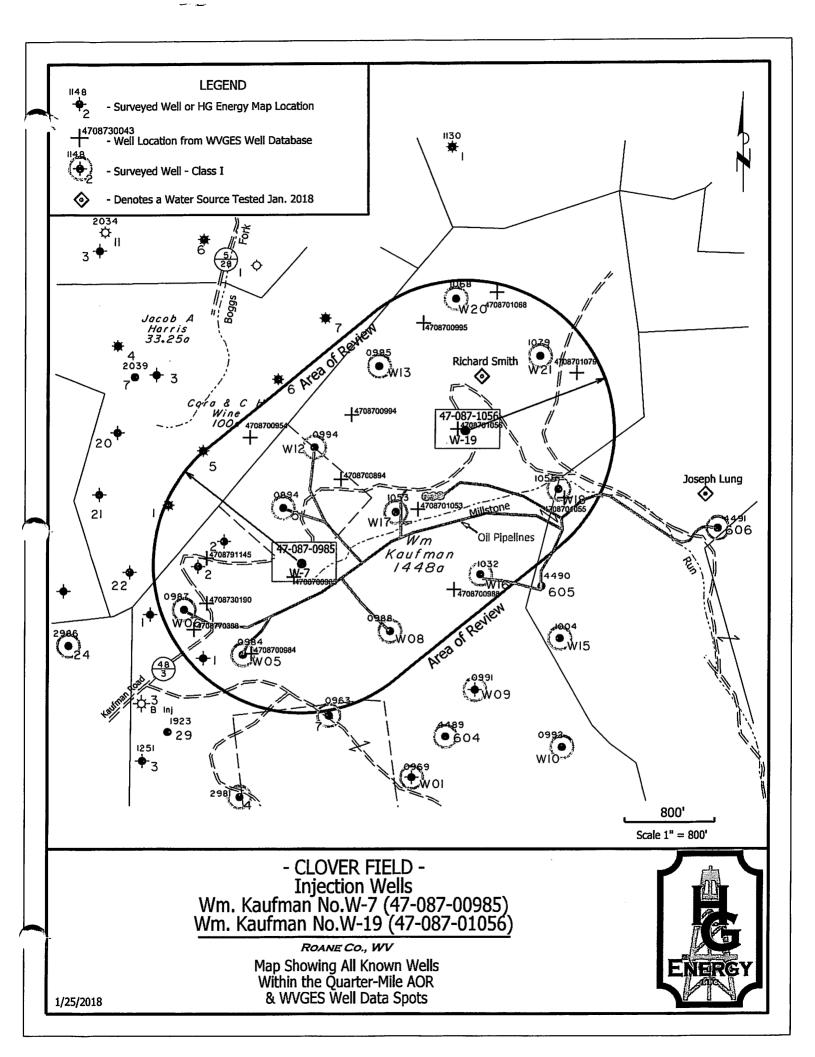
TABLE C-1. - Original and adjusted pressure-volume-temperature analyses data, Kaufman well P-7

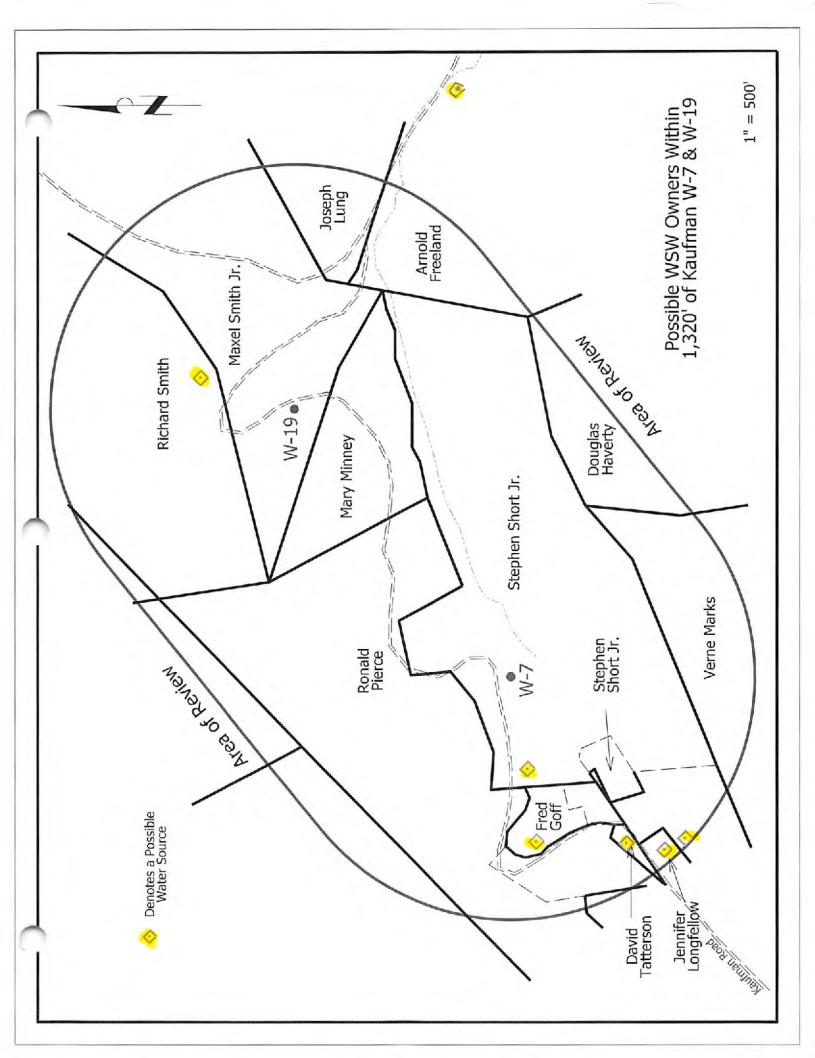
Reservoir pressure, psig1	G <sub>1 s</sub> 1	G¹ s	B <sub>o</sub> /B <sub>os</sub> 1	B <sub>o</sub> /B <sub>oi</sub> 2	B° ≤
700	- 4 10 29 68 112 166 340	0 87 92 111 149 192 244 414	- 1.0000 .9976 .9920 .9752 .9556 .9306	1.000 .974 .971 .966 .950 .930 .906	1.264 1.231 1.228 1.221 1.201 1.176 1.145 1.009

<sup>&</sup>lt;sup>1</sup>Original PVT analysis data.

<sup>2</sup>Adjusted values.

Fig No # **LEGEND** 1148 - Surveyed Well or HG Energy Map Location 4708730043 1130 - Well Location from WVGES Well Database - Surveyed Well - Class I - Denotes a Water Source Tested Jan. 2018 W20<sup>4708701068</sup> Jacob A Harris 33.25a 4708700\$95 **Bichard Smith ◈** <del>|4</del>708700994 470870095<sub>9</sub> 20 WIZ 4708700894 Joseph Lung Millstone 21 Oil Pipelines  $w_m$ 2-**4** 4708791145 47-087-0985 Kaufman 14480 22 4490 605 Area of Review <u>14</u>708730190 2986 (•) 24 0984 14708700984 W O 5 1923 4489 •604 0992-• 29 1251 "∞ด์เพ **ф**з 800' Scale 1" = 800' - CLOVER FIELD -Injection Wells Wm. Kaufman No.W-7 (47-087-00985) 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 1/25/2018







# STATE OF WEST VIRGINIA. DEPARTMENT OF MINES. OIL AND GAS DIVISION 16.

Quadrangle SPENCER WELL RECORD Permit No\_ ROA-1056 Oil or Gas Well Oil & C Company WOLF'S HEAD OIL REFINING COMPANY, Used in Drilling Address P. O. Box 1588, Parkersburg, W. Va. Left in Well Packers Wm. Kaufman Location (waters) Millstone Run Size Well No\_W-19 Elev 1060.85 District Smithfield \_County\_ Roane The surface of tract is owned in fee by Maxel Smith 10\_3/4"OD 9' 91 Otto Route Address Spencer, W. Va. 8¥ 5/8"00 4661 4661 Mineral rights are owned by Alfred M. Oppenheimer, II, 300 South Lang Avenue Address Pittsburgh 8, Pa. June 12, 1964 Drilling commenced *}27.*2.00 Drilling completed June 19, 1964 2 3/8"OD 2251.83 2251.83 Perf. bottom Date Shot\_ Liners Used: Perf. top. With, Perf. hatton Open Flow /10ths Water in Inch /10ths Merc: in. Surface to: Inch CASING CEMENTEDS 5/8"SIZE 454 Drilled w/Rotary (Show Only) Volume No Test 45" 2272 6/20/64 bbls., 1st 24 hrs. COAL WAS ENCOUNTERED AT -FEET WELL ACIDIZED. FEET. \_INCHES FEET\_ INCHES WELL FRACTURED 6/27/64 - Used: 1,050 Bbls, Water, 46,000 # Sand, 300 Gal, BDA Acid, 350# J-84, 20 Gal. Deterger and 35 Gal. Freflo
RESULT AFTER TREATMENT 01 : 20,000 Cu. ROCK PRESSURE AFTER TREATMENT\_ 400 Lbs. Fresh Water\_ Feet Salt Water. .Feet Formation Color Oil, Gas or Water Ton Bottom Depth Remarks Top Soil ٥ 10 Conductor 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 515 525 **495** Red. Rock ,515 -525 Slate. 675 Red Rock 675 735 Sand 735 -765 Red Rock . 765 . 815 Slate .840 815 Sand 840 905 Red Rock 905 925 ...925 Slate 965 Red Rock 965 985 Slate 985 1.245 Sand 1245 1350 Slate 1375 Sand 1375 1400

(over)

3.

. . .

Formation	Color	Hard or Soft	Top /0	Bottom	Oil, Gas or Water	Depth Found	Remarks
Slate Sand Slate Sand Slate Sand Slate Sand Little Lime Pencil Cave Big Lime Keener Big Injun Pay Slate			1400 1570 1620 1730 1760 1805 1920 1990 2027 2062 2078 2193 2202 2206 2235,	1570 1620 1730 1760 1805 1920 1990 2027 2062 2078 2193 2202 2235 2216 2277	011 & Gas	2115-2120	Water Show Only Show
4½" Casing	DEPTH			2272 2277			
TOTAL				2277			
			:			::	
							·

July 13

APPROVED WOLF'S HEAD OIL REFINING COMPANY, INGWINE

By Coorge/W. Widsman, (Title) Agent

FJRM No. 189 IM 2/60 M·G. 9282A

# WOLF'S HEAD OIL REFINING COMPANY, INCORPORATED SIXEMENT REPRINGUISCHONDRAMEN

## RCC.

### NEW WELL REPORT

LEASE NO. 8121	9		800	ACRES	Working Distric	Sp	encer#	4	· · _
tim.	Kaufmari			FARM	WELL No. 13-7				
. Smit	nfield	w		RICT OR	Roane	Cou			
LOCATION MADE.	Septe	sber 20	•	19 <u><b>63</b></u>	DRILLING COMMEN				
RIG COMMENCED.	Novem	ber 20,		19 <b>63</b>	DRILLING COMPLE	red . No.	vember :	27.	19.63
RIG COMPLETED	Novemi	ber 20,		1963	ретн <u>2219</u> *		SANI	Big	Injun
	Dennii	ng Drill	ling Co	Inc.	DRILLING CONTRA	ctor De	nning D	rilling	Col. ENc.
ELEVATION: FLOOR	٠ ·		GROUND	1003.40	WORK ORDER NO.	AFE :	# WH-13-	W.Va.	
				:	N RECORD				
KIND	ТОР	BOTTOM	STEEL LINE MEAS.	TEST	KIND	тор	воттом	STEEL LINE MEAS.	TEST
Clay	0	10							
Sand	10	70					<u> </u>	•	
Red Rock	70	110	<u></u>		1				
Shale .	110	130		<del></del>	ļ		<u></u>		
Sand Shale	130	172	172		ļ		<u> </u>		
Sand	200	200	<del> </del>	<del> </del>	<b>{</b>	<b> </b>	<del> </del>		
Red Rock	240	295			<b> </b>		<del> </del>		<u> </u>
Sand	295	375	<del>                                     </del>	<del></del>	<del></del>	├	ļ	<del></del>	<del></del> -
Sandy Shale	375	575			<b> </b>	<del>                                     </del>	<del>                                     </del>		
Shale	575	600	<del></del>		<del></del>	<u>.</u>	-	_	
Red Rock	600	63.0			· · · · · · · · · · · · · · · · · · ·		-	·	<del>                                     </del>
Shale	610	630							
Sand	630	635						•	
Shale	635	670							
Sand	670	705							
Sand & Shale	705	935		·					
Sand	935	1020				ļ			
Shale	1050	1040		<u> </u>	ļ				
Sand	2040	2150	<b> </b>	<del></del>	ļ	<b> </b>	<u> </u>		ļ <u>.</u>
Shale Sand	1150	1300		ļ		<u> </u>		ļ	ļ
Sand & Shale	1300 1350	1350 1435	<del> </del>		<del> </del>	<del> </del>			ļ
Sand	1435	1500	<u> </u>		ļ	<b></b>			
Shale	1500	1530			<u> </u>				
Sandy Shale	1530	1600	<del></del>	<del>'</del>	· ·			-	
Sand	1600	1665			_		<u> </u>		
Line	3665	1770							
Sand	1.770	1925							
Shale	1925	1955							
Little Lime	1955	1970							
Sandy Shale	1970	1975		ļ	ļ	ļ	ļ		
Rig Lime Keener Sand	1975 2130	2130 2141		ļ	ļ		<b> </b>		
Big Injun	21/1		<u> </u>				-		
Oil & Gas	2141	2170	ļ	Show	ļ	<del> </del>	<del> </del>		<del> </del>
Shale	2170	2219	<del>                                     </del>	W44018		<b></b> -	<del> </del>		
45" Casing		2219	2219		<u> </u>		<del>                                     </del>		<del> </del>
	<del> </del>			-	ļ <del></del>	· ·			
Total Depth	l	2219	2219		-		-		-
						<u> </u>			
			· -			Ì			
	<del> </del>		$\vdash \neg$			<del> </del>	<del>                                     </del>		<del></del>

#### NEW WELL REPORT - CONT'D

		n		SING AND T	UBIN	RECOR			_
Date of Shot	SIZE		PL	T'IN WELL			PULLED		
200 Or 0000	8-5/89	Tal.		NO. FEET 174	1NCH	TRANSFI	ER NO.	PEET	iN
Name of Torpedo Co.	±2" OD	51		2230	7			ļ	L
No. of Quarts	2-3/8"	-	. <u>,</u>	- 200	-				L
Length of Shell	Tbg.	Tal.	} +	2230	_	<u> </u>			L
Diameter of Shell	1050	Par	r.y	<del> </del> _	<del>-</del>				┞
Length of Anchor		╣				<del></del>		<u> </u>	L
Top of Shot	┪	╬─				<del></del>			H
Bottom of Shot	┪	╬		<del></del>		-			┝
Feet of Fluid in Hole When Shot	-	╬──		<del></del>	H			ļ	┝
Results:	<del>-</del>	╬			-	<del></del>			H
	┪──	1				<del></del>			H
, , , , , , , , , , , , , , , , , , , ,	┪┈──			_	$\vdash$			<u> </u>	H
	┪──			<del></del>	$\vdash$		<del></del> -		H
	-1								_
				PACKER	REC	ORD			
INITIAL PRODUCTION FIRST 24 HOURS		מאו		SIZE	D	EPTH SET		ATE SET	
Open Flow /10ths Water inInch	Steel			8-5/8" OD		172	11-51		
Volume Show Cil & Gas (Drilled w/Rotary on Rt.	Float		ar	75u OD		2188	11-29	_	
Volume Show Oil & Gas (DMILLed W/Fotary)	Guide	Shoe		PSu OD		2219	11-29	-63	
Rock Pressurelbshrs.	<b>]</b>								
Oil Ses Electric Log bbls, First 24 hrs.							<u> </u>		
ACIDIZATION OR FRACTURING RECORD	<del></del>	<del></del>	<u> </u>	C	CINIC	CEMEN		<del></del>	-
						To:	IED		-
DATE WELL ACIDIZED	*	<u>.                                    </u>	8-5/				11-21-	63.	
DATE WELL FRACTURED December 12, 1963 NAME OF COMPANY Halliburton Company		_							D.
NAME OF COMPANY HALLILAUFCON Company (List below materials used in Acidizing or Fracturing, i.e., Sand, Crud	i 01 01	<del>-</del> .	4ga	Size	219	Fr	11-29-	63	n
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and por	e Ou, Gasour mds).	10,	ľ						
Used: 900 Bhls. Gil		_		Size		Fr			D.
Used: 36,000# Sand		_	US	D IN CEME	TIM	8-5/8	OD C	ASIM:	_
Used: 300 Gal. NCA Acid Used: 550# Adamite II	·	_	25	Bags - Ce	ment	•	•		
Used: 50 Gal. Hyflo	- · · · ·	-	1	Bag - Co	lein	m Chlos	ride		_
	:	'		Camented	hore	We37 5	Samuel &	o Tre	_
			<del></del>						_
		_				·			
			USE	D IN CEME	TIM	Late CI	CAST	NG:	
		<b>-</b> .	65	Cuft Pe	zada	Cement	(Con	sistin	g
<del></del>		- 1	_						_
	•			64 72 CHE		Thinns	CEMBER	E and	
	!ı	_		of 33 Curi					
	li .	_		32 Cuft. I	ozni			<u> </u>	
1000#	jı .	- - - -			ozni			<u> </u>	;
BREAKDOWN PRESSURE 1300#	į.			32 Cuft. I	ozmi n Ge	l, bler		<u> </u>	;
BREAKDOWN PRESSURE 1300# PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING PATEMANUTE 18.9 Bbls.	įs			32 Cuft. I Halliburto Cuft. Pozz	ozmi n Ge in C	l, bler ement.		<u> </u>	;
BREAKDOWN PRESSURE 1300# PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING RATE/MINUTE 18.9 Bbls. PUMPING TIME 43 Figures	i i			32 Cuft. I Halliburt Cuft. Pozz Gals 1	ozmi n Ge in C	l, bler ement. lush	ided 2	\$ u/65	
BREAKDOWN PRESSURE 1300# PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING RATE/MINUTE, 18.9 Ebls. PUMPING TIME 43 FINITES RESULT AFTER   GAS 42,000	GU. F	- 1		32 Cuft. I Halliburto Cuft. Pozz	ozmi n Ge in C	l, bler ement. lush	ided 2	<u> </u>	
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE, 18.9 Ebls.  PUMPING TIME 43 FUNUTES  RESULT AFTER   GAS 12,000  TREATMENT   OIL 33	CU. F	s.		32 Cuft. I Halliburto Cuft. Pozz Gals 1	ozmi n Ge in C	l, bler ement. lush	ided 2	\$ u/65	
Breakdown Pressure 1300# : PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING RATE/MINUTE 18.9 Ebls. PUMPING TIME 43 Einutes RESULT AFTER   GAS 42,000 TREATMENT   OIL 33	GU. F	s.		32 Cuft. I Halliburto Cuft. Pozz Gals 1	ozmi n Ge in C	l, bler ement. lush	ided 2	\$ u/65	
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE 18.9 Ebls.  PUMPING TIME 43 HINUTES  PUMPING TIME 43 HINUTES  REGULT AFTER GAS 42,000  TREATMENT 30  ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8 <sup>st</sup> Hole from Surface to	GU. F	s.	500	32 Cuft. I Halliburt Cuft. Pozz Gals 1 Comemter	ozni n Ge ir C lui F lui F	l, bler ement. lush Halli	iburto	\$ u/65	
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE, 18.9 Ebls.  PUMPING TIME 43 FUNUTES  RESULT AFTER   GAS 12,000  TREATMENT   GIA 33	GU. F	s.	500	32 Cuft. I Halliburte Cuft. Pozz Gals I Comented te: Rotar	ozmi n Ge ir C bud F by:	l, bler ement. lush	iburto	% ы/65 n Сощ	31
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE 18.9 Ebls.  PUMPING TIME 43 HINUTES  PUMPING TIME 43 HINUTES  REGULT AFTER GAS 42,000  TREATMENT 30  ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8 <sup>st</sup> Hole from Surface to	GU. F	s.	500	32 Cuft. I Halliburte Cuft. Pozz Gals I Cemented te: Roter te: Roter	ozmi n Ge ix C lud F by:	ement.  lush  Halli  ols Use	iburto	% ы/65 n Сощ	31
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE 18.9 Ebls.  PUMPING TIME 43 Elimutes  PUMPING TIME 43 Elimutes  RESULT AFTER GAS 42,000  TREATMENT 01  ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8 <sup>st</sup> Hole free Surface to	GU. F	s.	500	32 Cuft. I Halliburte Cuft. Pozz Gals I Cemented te: Roter te: Roter	ozmi n Ge ix C lud F by:	l, bler ement. Insh Halli ols Use	iburto	% ы/65 n Сощ	- aı
BREAKDOWN PRESSURE 1300# PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING RATE/MINUTE 18.9 Ebls. PUMPING TIME 43 FIRMLES RESULT AFTER GAS 42,000 TREATMENT 33 ROCK PRESSURE AFTER TREATMENT 508 REMARKS: Drilled 10-5/8ª Hole from Surface to Drilled 7-3/8ª Hole from 172° to 221		s.	5000 No	32 Cuft. I Halliburte Cuft. Pozz Gals 1 Comenter te: Botan te: 12 - 4 Uer	ozmi n Ge ix C lud F by:	l, bler ement. Insh Halli ols Use	iburto	% ы/65 n Сощ	- aı
BREAKDOWN PRESSURE 1300# PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING RATE/MINUTE 18.9 Ebls. PUMPING TIME 43 HINUTES REGULT AFTER GAS 42,000 OIL 33 ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8" Hole from Surface to		s.	5000 No	32 Cuft. I Halliburte Cuft. Pozz Gals 1 Comenter te: Botan te: 12 - 4 Uer	ozmi n Ge ix C lud F by:	l, bler ement. Insh Halli ols Use	iburto	% ы/65 n Сощ	31
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE 18.9 Ebls.  PUMPING TIME 43 FIRMLES  RESULT AFTER   GAS 42,000  TREATMENT   OIL 33  ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-5/8" Hole from 172" to 221  Bote: This well was logged by McCullough Tool  Mote: This well was drilled according to Rule	172°.	s. s.	5000 No	32 Cuft. I Ralliburte Cuft. Pozz Gals I Gemented te: Rotar te: 12 - 4 Cer -63.	ozni n Ge dar C bad F by:	ement. lush Helli ols Use oto-sul	iburto	s w/65	31
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE 18.9 Ebls.  PUMPING TIME 43 HINUTES  PUMPING TIME 43 HINUTES  RESULT AFTER 1 GAS 42,000  TREATMENT 33  ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8" Hole from Surface to  Drilled 7-3/8" Hole from 172' to 221  Bote: This well was logged by McCullough Tool	172°.	s. s.	5000 No	32 Cuft. I Ralliburte Cuft. Pozz Gals I Gemented te: Rotar te: 12 - 4 Cer -63.	ozni n Ge dar C bad F by:	ement. lush Helli ols Use oto-sul	iburto	s w/65	31
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE 18.9 Ebls.  PUMPING TIME 43 FIRMLES  RESULT AFTER   GAS 42,000  TREATMENT   OIL 33  ROCK PRESSURE AFTER TREATMENT 508  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-5/8" Hole from 172" to 221  Bote: This well was logged by McCullough Tool  Mote: This well was drilled according to Rule	172°.	s. s.	5000 No	32 Cuft. I Ralliburte Cuft. Pozz Gals I Gemented te: Rotar te: 12 - 4 Cer -63.	ozni n Ge dar C bad F by:	ement. lush Helli ols Use oto-sul	iburto	s w/65	31
BREAKDOWN PRESSURE 1300# PUMPING PRESSURE 1700 - 2500# AVERAGE PUMPING RATE/MINUTE. 18.9 Ebls. PUMPING TIME 43 MINUTES RESULT AFTER   GAS 42,000 TREATMENT   OIL 33 ROCK PRESSURE AFTER TREATMENT. 508  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-3/8" Hole from 172" to 221  Bote: This well was logged by McCullough Tool  Mote: This well was drilled according to Rule	172°.	s. s.	5000 No	32 Cuft. I Ralliburte Cuft. Pozz Gals I Gemented te: Rotar te: 12 - 4 Cer -63.	ozni n Ge dar C bad F by:	ement. lush Helli ols Use oto-sul	iburto	s w/65	31
BREAKDOWN PRESSURE 1300#  PUMPING PRESSURE 1700 - 2500#  AVERAGE PUMPING RATE/MINUTE, 18.9 Ebls.  PUMPING TIME 43 HINUTES  RESULT AFTER   GAS 42,000  TREATMENT   OIL 33  ROCK PRESSURE AFTER TREATMENT. 508  REMARKS: Drilled 10-5/8" Hole from Surface to  Drilled 7-3/8" Hole from 172" to 221  Bote: This well was logged by McCullough Tool  Lote: This well was drilled according to Rule	172°.	s. s.	5000 No	32 Cuft. I Ralliburte Cuft. Pozz Gals I Gemented te: Rotar te: 12 - 4 Cer -63.	ozni n Ge dar C bad F by:	ement. lush Helli ols Use oto-sul	iburto	s w/65	- aı

APPROVED

w W

C C Crouser

FORM No. 299 IN 11/62 MTG. 9929

### COLF'S HEAD OIL REPINING COMPANY, INC. SOURCE: PENIN OF A COMPANY

Rea

### NEW WELL REPORT

LEASE NO. WAY	10000	81219	. (	300 ACRES	WORKING DISTRIC	, Spe	ncer 44	·	
- Mm. Kan	fran			FARM	WELL NO K-21	_ N	_ s <b>b</b>	E	w37
Smithfield					Reans	Cour	ITY _		QUAD,
LOCATION MADE_				_	DRILLING COMMEN				
RIG COMMENCED_	July	13,		19_ <b>64</b> _	DRILLING COMPLE	TED	<i>J</i> uly 19		19 64
RIG COMPLETED	July 1	13,		19_64	DEPTH 2260°		SANI	Big I	a.jun
RIG CONTRACTOR_	Caral	i D. Ja	208		DRILLING CONTRA	CTOR_G	erald D	Jones	
ELEVATION: FLOOR	R		GROUND	1045.56	WORK ORDER NO.	APB	AH-38-1	.Va.	
				FORMATIO	N RECORD				
KIND	TOP	воттом	STEEL LINE MEAS.	TEST	KIND	тор	воттом	STEEL LINE MEAS,	TEST
cp Soil	0	10	•				<u> </u>		
Conductor	30	30	10						
Send Red Rock	<u> 10</u> 35	35 60							
Sand	60	100							
Slate	100	170							
Sand	170	205							
Red Rock	205	225 300				<u> </u>			
Slate Sand	300	320		<del></del>		ļ			
Slate	320	130							
Sand	430	470	132			<b></b> -			
Slata	470	500							
Re k	500	535							
Sla _ & Shale	535	600							
Red Rock Slate	600	625							
Sand	705	749							
Slate	710	770							
Red Rock	770	785							
Send	785	820							
Slate	820	7730	7750	· 		L			
Sand	1120	1150							
Slate Lime	1150	1225 1250					<b></b>		
Slate	1250	1350				<del> </del>			
Sand	1350	1370		-	Ĭ				
Sla te	1370	1165							
Sand	1465	1530							
Slate	1530	1630							
Send	1630	1695				ļ.——			
Slate Sand	1695 1730	1730 1910				<b> </b>			
Slate	1910	2010				<b></b>		<del></del>	· · · · · · · · · · · · · · · · · · ·
Mttle Lim	201:0	2079		-					
Big Line	2079	2190				<b> </b>	i		
011 & Gae	2127	2160		Show					
011 & Gas	2175	2165		Show					
Big Injun	2190	8570 5575		S2-22					
C11 & Cas	2192 2210	5590		Show		ļ			
te Casing	ge <b>s</b> u	2260			ļ		<b> </b>		
						<del>                                     </del>			
_			1	i	ľ'	t .			ı

(OVER)

2260 2260

**epth** 

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:			11			AND T	OBIR	16 RECOR			Ĺ
Name of Torpedo Co.  No. of Quarts  Longth of Shell  Longth of Anchor  Top of Shet  Section of Shet  Longth of Shell  Longth of March  Longth of Shell  Longth	Data of Chat	SIZE	70				INC	TRANSF		FEET	11
Section of Torpedo Co.   Section	vare or shot	30-2A.n					-	1			†
ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED  DATE WELL ACIDIZED  DATE WELL ACIDIZED  ACIDIZATION OR FRACTURING RECORD  CASING CEMENTED  CASING CEMENTED  DATE WELL ACIDIZED  CASING CEMENTED  CASING	lame of Tornedo Co.		<b>\</b>				-	1			1
Case			ï					1			Ī
Diameter of Shell ength of Anchor op of Shot lection of Shot rest of Fluid in Hole When Shot lections of Shot			T								I
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in	Diameter of Shell			Tol	ley	2211					1
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in	ength of Anchor					<u> </u>		1		<u> </u>	1
PACKER RECORD  PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in	Top of Shot		<u> </u>					<b> </b>		<b></b>	ļ
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in	Sottom of Shot		<u> </u>					<u> </u>		ļ	4
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in			<b> </b> -					<u> </u>		<u> </u>	+
INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in Inch /10ths Merc. in Inch /10ths	Results:	<del>                                     </del>	⊩	·				┨──			┨
INITIAL PRODUCTION FIRST 24 HOURS    INITIAL PRODUCTION FIRST 24 HOURS   SIZE   DEPTH SET   DATE     Open Flow		-	<b> </b>			¦		1			╁
INITIAL PRODUCTION FIRST 24 HOURS    INITIAL PRODUCTION FIRST 24 HOURS   SIZE   DEPTH SET   DATE     Open Flow		┪	¦—			-	-	<del> </del>		<b> </b> -	†
INITIAL PRODUCTION FIRST 24 HOURS  Open Flow /10ths Water in			11				<del>'</del>	U.	·	11	_
Open Flow /10ths Water in					PA	CKER	RE	CORD		<u> </u>	
/ 10ths Merc in	INITIAL PRODUCTION FIRST 24 HOURS								<u> </u>	DATE SE	
Volume. Show (drilled w/Rotery) Cu.Ft.  Rock Pressure Be test bs. hrs.  Oil. Show	Open Flow /10ths Water inInch	11		X>>>	X DO	NAME OF	נומ				J
Rock Pressure No test lbs. hrs. old Shee Shee Shee 2260 7/19/64  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED DATE WELL FRACTURED JULY 21, 1964  NAME OF COMPANY HELLIDAYCON  NAME OF COMPANY HELLIDAYCON  Vater, Kerseye, Mothballs, Acid etc., giving gallons, barrels and pounds.)  Useds 15, 500 p cand  Useds 25 Usins - Hotergor  Useds 35 Usins - Hotergor  Useds 40 Useds 40 Useds	/10ths Merc. inInch						Ð				_
DATE WELL ACIDIZED.  DATE WELL FRACTURED JULY 21, 1961;  DATE WELL	Volume Enew (CF1118G W/MDEST) Cu. Ft.	-			_		_ _				_
ACIDIZATION OR FRACTURING RECORD  CASING CEMENTED  DATE WELL ACIDIZED  DATE WELL FRACTURED JULY 21, 1961  NAME OF COMPANY  (List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kensene, Mothballs, Acid., etc., giving gallons, barrels and pounds.)  USCOS 13,910 Calls, USCOS DEAG  USCOS 250 Gals, HUA  USCOS 250 Gals, HUA  USCOS 250 Gals, HUA  USCOS 35 Uslis, HUA  USC	Rock Pressure 10 1851 lbs. hrs.	Oulde		)	160	" (I)	_ļ	5560	<del>  7/1</del>	9/ <b>6</b> L	_
DATE WELL ACIDIZED  DATE WELL FRACTURED  NAME OF COMPANY  HOLLIBUSTON  (List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kernsene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  USCOL 13,500 / DEAD  USCOL 150 / DEAD  USCOL	Oilbbls., First 24 hrs.			· ·	1		1		<u> </u>		_
DATE WELL ACIDIZED  DATE WELL FRACTURED  NAME OF COMPANY  (List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kernsene, Mothhalls, Acid, etc., giving gallons, barrels and pounds.)  Useds 15,500 / Band  Useds 53,500 / Band  Useds 150 / Maile Caser  Useds	ACIDIZATION OF EPACTURING RECORD			l		C	ASIN	G CEMEN	TED		=
NAME OF COMPANY  NAME OF COMPANY  NAME OF COMPANY  Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 12, 916 Units, Vator  Useds 150 0 band	ACIDIZATION ON PRACTORING RECORD	<del></del>		·[		<u>\$</u>	31	to to		i - i - i - i - i - i - i - i -	=
NAME OF COMPANY Holliburton  (List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Used: 12,916 Units, Crator  Used: 13,500 f Dand  Used: 250 Gels HCA  Used: 25 Ualis Horris  Used: 26 Dags - Galumbia Coment  1 Bag - Calcium Chloride  Used: 16 Camented by: Ualis Service, Inc.  Used: 16 Camented by: Ualis Service, Inc.  Suga: - Heatment  Suga: - Heatment  Comented by: Ualis Service, Inc.  Suga: - Heatment  Comented by: Ualis Service, Inc.  Comented by: Ualis Service, Inc.	4m17 2h 1964		_	8-9	<b>5/8</b> °		133	_ 7	-15-6	L	
(List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Usedd. 53,500 / bend  Useds 250 Galso - HCA  Useds 25 Galso - Detergor  Useds 25 Galso - Detergor  Useds 35 Uarrels - Forfito  Cemented by: Holl Service, Inc.  USEB IF CHRESTING 8-5/8s CASIEST  USEB IF CHRESTING 8-	Holl Shrwen			hà			oko.	P1	-10-4	h	_
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.) Useds 12,918 Ualso, United Useds 53,500 p band Useds 250 Gelbo - MGA Useds 25 Ualso - Detergor Useds 150 gelbo - Detergor Useds 35 Ualso - Resident Sugge - Calcium Chloride Useds 35 Ualso - Calcium Chloride Useds 35 Ualso - Calcium Chloride Useds 35 Ualso - Detergor Useds 45 Ual		de Oil, Gasolii	<u> </u>			SIZE		FT			-
Used: \$3,500 g send Used: \$50 Gels HUA Used: \$50 Gels HUA Used: \$50 Gels HUA Used: \$50 Gels Leterger Used: \$50 Gels.	Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and	pounds.)				SIZE		FT.			٠
Useds 150 Gels HCA Useds 150 Gels Meterger Useds 35 Usis Meterger Useds 45 Uses 16 Canada Carent Uses 17 Uses 18 Canada Carent Uses 18 Cana				USB			7117	8-5/30	CASI	<u> </u>	į
Useds 150 d = MAC = 8  Useds 25 Cales = Detergor  Useds 35 Cales = Morflo  Concated by: Hell Service, Inc  USED IF CHARMING Machines  Sugge = Calmina Consat  Sugge = Aquagal  1 Bag = Limo  5 Cales = Resident  Consated by: Hell Service, Inc  Sugge = Aquagal  1 Bag = Limo  5 Cales = Resident  Consated by: Hell Service, Inc.  Pumping Pressure  Average Pumping Rate/Minute Enters  Pumping Time  Result After   Gas			_	60	Dear	n - Bu	Lit (	lenent			_
Useds 35 Units Norths  Camented by: Holl Service, Inc.  USED IN CHRESTING Life CASING:  Life Dage - Calumbda Coment  Sugge - Aquaged  1 Bag - Line  5 Oals Resident  Camented by: Holl Service, Inc.  Sugge - Calumbda Coment  Sugge - Aquaged  Camented by: Holl Service, Inc.  Sugge - Aquaged  Camented by: Holl Service, Inc.  Sugge - Calumbda Coment  Sugge - Aquaged  Camented by: Holl Service, Inc.  Sugge - Calumbda Coment  Sugge - Aquaged  Camented by: Holl Service, Inc.  Sugge - Calumbda Coment  Sugge - Aquaged  Camented by: Holl Service, Inc.			_						da		_
USEB IF CHARTING Life CASING:			_							-	_
Breakdown Pressure 300 - 2600/  Pumping Pressure 300 - 2600/  Pumping Rate/Minute Enters  Pumping Time 3000 - 2600/  Result After 3 Gas 3000 - 2000/  Result After 3 Gas 3000 - 2000/  Result After 3 Gas 30000 -	open: 35 garat - Marris		_	<u> </u>							
Sugge - Aquagel  1 Bag - Line  5 Uals Resident  Commission Breakdown Pressure 300 - 2600/  Pumping Pressure 300 - 2600/  Average Pumping Rate/Minute 1302  Pumping Time 3000  Result After   Gas 30000  Cu. ft.			_	1				-			
DREAKDOWN PRESSURE 2000/  DREAKDOWN PRESSURE 2000 - 2600/  PUMPING PRESSURE 300 - 2600/  AVERAGE PUMPING RATE/MINUTE EXTERNS  PUMPING TIME 37,000  RESULT AFTER 1 GAS 1200  CU. FT.			_	F	5 Bay	36 - C	) tu	abde Con	tas		
BREAKDOWN PRESSURE 300 - 2600/ PUMPING PRESSURE 300 - 2600/ AVERAGE PUMPING RATE/MINUTE 32-2 PUMPING TIME 37-2000 CU. FT. TREATMENT   GAS 37-2000 CU. FT.			_		5 BC	38 - A	grafi	, <b>61</b>			_
BREAKDOWN PRESSURE 3000 = 2500/ PUMPING PRESSURE 3000 = 2500/ AVERAGE PUMPING RATE/MINUSE EXTENS PUMPING TIME RESULT AFTER   GAS 37,000			_		. Bo	3 - Li	30				_
BREAKDOWN PRESSURE 3000 = 2500/ PUMPING PRESSURE 3000 = 2500/ AVERAGE PUMPING RATE/MINUSE EXTENS PUMPING TIME RESULT AFTER   GAS 37,000			_		C Na	0	200	mant			_
PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  PUMPING TIME  RESULT AFTER ) GAS.  TREATMENT   GAS.  CU. FT.			_	_		•					
PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUSE  PUMPING TIME  RESULT AFTER ) GAS  TREATMENT   GAS  CU. FT.	BREAKDOWN PRESSURE		_	Ces	annt	ed by:	A <sup>O</sup> 1	ll Servi	ee, I	ne.	
PUMPING TIME PUMPING TIME RESULT AFTER ) GAS. CU. FT. TREATMENT	Pumping Pressure										
PUMPING TIME 39 CCO RESULT AFTER ) GAS CU. FT. TREATMENT )	AVERAGE PUMPING HATE/MINUSE			<del>                                     </del>							_
	PUMPING TIME		_								_
											_
ROCK PRESSURE AFTER TREATMENTLBS.	ROCK PRESSURE AFTER TREATMENT.			Į.							
Hote: willed 840 Hole from Surface to Lik! Hote: Used 5 controlizers @ 1976'	Dotes irilled 840 Hole from Surface to	o 1321		Doto	Ū (	ma 5	onni	milion	a 6 1	9761	2
REMARKS: Spilled 6% Fole from 138 to 2200 2169 2200 2200 2200	REMARKS: Frilled 62" Tale from 192" to 2	2601			- 2	1691	820C	* 8235	•		Ť
as years of the same the on sens and any a sens a s	Notes this well was logged by Schlusbergor		•			DOF 8	984	, , 00,33			

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Еоли No. C69 IN 11/62 N.G. 1929

## HOLP'S HEAD OIL REPINIES CO., INC. SOUTHEXEMENTAL CHARGENS



#### NEW WELL REPORT

				IAEAA AAE	LL REPORT			•			
LE NO.	81219		. 80	O ACRES	WORKING DISTRICT Spancer # 4						
	idm, Ka	funan		FARM	WELL NO. 8-18	L N	s. <b>47</b> _	ε	w <b>37</b>		
	Smith	ield	DISTRIC HENWOT	T OR	Roana	Сош	NTY _		QUAD.		
				·	11				_		
LOCATION MADE	H.Y I.	·	- <del></del>	19 <b>04</b>	DRILLING COMME	NCED	June	1,	19_64_		
RIG COMMENCE	. Hay 28			1964	DRILLING COMPL	ETED	June	6,	19_ <b>6</b> &_		
RIG COMPLETED	Hay 29	).		1964	<b>ДЕРТН</b>	7'	SAN	Big In	tu <b>n</b>		
RIG CONTRACTO	_ Gerald	D. don	<b>e</b> 9		DRILLING CONTR	ACTOR	Corald	D. Jones	<b>.</b>		
ELEVATION: FLO	OOR		GROUND	875.44	WORK ORDER N	o. APR	# HH-30	Ha Vo.			
					ON RECORD						
KIND	тор	воттом	STEEL LINE MEAS.	TEST	KIND	ТОР	воттом	STEEL LINE . MEAS.	TEST		
p <b>So11</b>	0	5			Slate	2047	2097				
nductor		15	15		Lan Casing		2095	2095			
nd .	5	20	<b></b>								
d Rock	20	30		<del></del>	Total Depth	<del>- </del> -	2097	2097			
<u>nd</u> ate	30 50	100	<del>                                     </del>			<del> </del>	<del>                                     </del>				
nd	100	140									
ato	140	160			Ï						
nd	160	185									
ate	185	195									
d Rock	195	210			<u> </u>				····································		
na -	210	250			_	<del></del>					
nc	250 305	305 340				+	<del> </del>				
ate	340	390					İ				
nd	390	420					1				
d Rock	420	450									
nd	450	500	ļ		<u> </u>		ļ				
ate	500	600		<del></del>		+					
nd d Rock	600	625 650			-	+	<del> </del>				
ate	650	780				+	<del> </del>				
nd	780	800				1	<del> </del>		<del></del>		
ate	800	900					<u> </u>				
nd	900	950									
ale	950	1000			<u> </u>						
nd ate	1000	1050			_	<del> </del>	1	<u> </u>			
nd	1100	1175	<del>                                     </del>					<del>                                     </del>			
ate	1175	1200			-[	+					
nd	1200	1300				<del> </del>	<u> </u>		·		
ate	1300	1350									
nd	1350	1400					ļ				
ate	1400	1450	<del>                                     </del>		<del>_</del>	<del> </del>	<del>                                     </del>	<b></b>  .			
nd ate	1450	1500			_ <u> </u>	<del> </del>	<del> </del>				
1t Sand	1645	1725	<del>                                     </del>	Vator		<del></del>	<del>                                     </del>				
ack Slate	1725	1845	<del> </del>				<del>                                     </del>				
ttle Line	184,5	1885					†				
g Lime	1885	2005					<u> </u>				
g Injun	2005	2085		8C 4		·					
l & Gas	2009	2026		Show Only	<u></u>		I				

(OVER)

2040

2047

2035 2040 N 18

Bottom of Shot		_				_	
Feet of Flv Hole When Shot		_					
Results:		_			— -` <i>J</i> -		
		!		!			
		-		}			+
		 			li ii		<u></u>
				PACKER	RECORD		
INITIAL PRODUCTION FIRST 24 HOURS		KIND		SIZE	DEPTH SET	DATE S	ET
Open Flow /10ths Water inInch	Steel	Shoe		8-5/8" O.D.	3931	6-2-64	
/10ths Merc. inInch			9 <b>2°</b>	Liga O.D.	2064	6-6-64	
Volume_Drilled m/Rotary (Show only)Cu. Ft	1	Shoe		Lå⊓ C.D.	2095*	6-6-64	
Rock Pressure Rockhrs	·						
Oilbbls., First 24 hrs.	.			)  	 	<u> </u>	
ACIDIZATION OR FRACTURING RECOR	D			CA	SING CEMEN	TED	
				Su	rface to:		<del></del>
DATE WELL ACIDIZED 6-12-64		_	8-9	/8" SIZE _3		6-2-64	DATE
NAME OF COMPANY DOMALL			1	Size 20		6-6-64	
(List below materials used in Acidizing or Fracturing, i.e., Sand, C	Crude Oil, Gaso	line,	***	SIZE	<i>Td</i> FT	<b>U-U-U</b>	DATE
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels an ilegate 1020 Bbl. Water	nd pounds.)			SIZE			DATE
Heed: 60,000 # Band			Usec	l in Combat	ing 8-5/81	Casing:	
Used: 250 Gal. B.D.A.			55 1	Bage Marque	tto Common	Bulk Cone	nt
Used: 175 # J=98 Used: 350# J=84			1.	-5 Blended			
Used: 20 Cal. Deterger				ented by: H			
Used! 35 Gal. Freflo			Com	BITTER DY'I N	all abureon		
•							
			Use	<u>i in Cement</u>	ing bản C <sub>e</sub>	eingt	
			40	Bags Cement	·		
			6.8	aga Aquagal			
			1	ag Lime			
REFAKTOWN PRESSURE 1350#	<del></del>						
PUMPING PRESSURE 2200# 6 3200#		_		al. Resimen			
AVERAGE PUMPING RATE/MINUTE 21.4			Cem	ented by He	11 Service	. Inc.	
PUMPING TIME 50 Min.							
RESULT AFTER GAS 30,000		. FT.					
ROCK PRESSURE AFTER TREATMENT 465		BLS. LBS.				•	
	<del></del>		87 A				
REMARKS: Hote: Drilled 84" Hole from Surfac Drilled 64" Hole from 393" t			Kote	B COSAL 2	1033',2002'		10.40
PRILITED OF HOLE TRUE 3773.	0 2071			G 2004 12		) 1 / 1 · · · · · ·	740
Note: This well was logged by Schlubberger	on 6-6-64						
Note: Perforated @ 2018' with 1 - 6 way Jet	on Single	e Plai	ne by	Basin Sur	reys, Inc.		
Makes This well amo dealled according to Du	10 11	tow Q.	- 4 -	m 12 AP A-4	1030 1 0	onter 22	
Note: This well was drilled according to Ru of the code of the Department of Hine	na (11 pm	TOL O	D1 04	eion.	MOTO 49 (4)	ahen. eg	
OF MIC COME OF MIC POPUL MICHIEF OF PRICE			~~~				<del></del>
	APPR	OVED		•			
			1				

 1 JRM No. 989 1M 11/62 M·G. 9929

### WOLF'S HEAD OIL REFINIER, COMPANY, DIC. SOUTHLY BENNA OHLO COMPANY

Ree

#### NEW WELL REPORT

LEASE No. 81219 800	_ACRES	Working District Spencer # &	<del></del>
lin. Kaufman	FARM	WELL NO. 1-17 N. S. 47 E.	w_ <b>37</b>
Smithfield DISTRICT OR TOWNSHIP		Roane COUNTY	QUĄT
LOCATION MADE 4-21-	_ 19_ <b>64</b>	DRILLING COMMENCED.	5-14- 1964
RIG COMMENCED 5-11-	19_64_	DRILLING COMPLETED	5-21- 1964
RIG COMPLETED 5-14-	19_64_	DEPTH 21901 SAND E	dig Injun
RIG CONTRACTOR Gerald D. Jones		DRILLING CONTRACTOR Gerald D. Jos	368
ELEVATION: FLOOR GROUND 971	.38	WORK ORDER NO. APE # WH-29-U. Va.	

LEVATION: FLOOR	<u> </u>		GROUND		WORK ORDER NO	<u>,</u>	130-657-10		
		· ·		FORMATIO	N RECORD				
KIND	ТОР	воттом	STEEL LINE MEAS.	TEST	KIND	ТОР	воттом	STEEL LINE MEAS.	TEST
So11	0	5			Black Sand	1875	1905		L,
Casing		10	10		Sand	1905	1965		
Z Z	5	60			Little Lime	1965	1970		
Rock	80	90			Slate	1970	1980		
d	90	120	· · · · · · ·	-	011 & Gas	2020	2035		Shoer
Rock	120	130			Big Line	1980	2100		
to	130	160			Keener	2100	2110		
4	180	250			011 & Gas	2110	2122		
ce.		190		à Bailer Hr.	Big Injun	2110	2136		
Rock	250	275			011 & Gas	2125	2136		Show
te	275	300			Slate	2136	2190		† <del></del>
Rock	300	325			43n Casting		2190	2190	
te	325	340				<del>                                     </del>			<del>                                     </del>
N. C.	340	375			Total Depth	<b>—</b>	2190	2190	<del> </del>
īk 4	375	395	·			1	21,70	21,70	<del>                                     </del>
ite	395	400				<del> </del>			<del></del>
Rock	400	420				+		<u> </u>	
te	750	460			i	<del> </del>			<del>                                     </del>
Cosing	4	470	470			<del> </del>	<u> </u>		<del> </del>
d d	460	500	710		:	<del> </del>			
te	500	600				<del> </del>			<del></del>
Rock	600	640				<del>- </del> -			-
to	840	780				-			
Rock	780	800			1				
to & Shelle	800	860		*		ļ			
Look Merre	860	890				<del> </del>			
te	890	900			! !	<del> </del>			
	_					<del> </del>			
i Rock	900	915				+			
Rock	920	930	-			<del> </del>			
to to the total to	930	1035				<del></del>			-
<u> </u>	1035	1115				<del> </del>			
te	1115	1195				<del>                                     </del>			
						<del>                                     </del>			
nd nte	1195	1285				ļ			
Rock	1285 1335				<u></u>				
		1355				<del> </del>			<u> </u>
to	1355	1400			<u> </u>	<b>_</b>			ļ
चे विकास	1400	1440				<b></b>			
					·	ļ			
ita	1465 1500	1500				ļ			
						ļ			
xi	1580	1675				<u> </u>			
te	1675	1700				<u> </u>			
nd	1700	1875							

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# NEW WELL REPORT - CONTINUED

RANSFE	PA	10 470 2204 CKER SIZE	REC	TRANSFER  CORD	DATE	
D. S. Pal	PA	10 470 2204 CKER SIZE 5/80	00 00 .00	CORD DEPTH SET		
e Dar	PA	CKER SIZE	00 .00	EPTH SET	DATE	
Tal.	PA 43	CKER SIZE	REC	EPTH SET	DATE	
e Jar	PA 43	CKER SIZE	REC	EPTH SET	DATE	
o lar	8-4	5/80 n		EPTH SET	DATE	
o lar	8-4	5/80 n		EPTH SET	DATE	
o lar	8-4	5/80 n		EPTH SET	DATE:	
o lar	8-4	5/80 n		EPTH SET	DATE :	
o lar	8-4	5/80 n		EPTH SET	DATE :	
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o lar	8-4	5/80 n		EPTH SET	DATE :	
o lar	8-4	5/80 n		EPTH SET	DATE	1
o lar	8-4	5/80 n		EPTH SET	DATE	
o lar	8-4	5/80 n		EPTH SET	DATE :	
o lar	8-4	5/80 n		EPTH SET	DATE 1	
o lar	44	5/8¤	<u>                                   </u>		DATE	
lar	44	9	+			BET
	44	9	- 1	470	5-16-	
9	42	7	<del></del>	21591	5-22-	
	-		4	2190	5-22-	64
	11					
	<u>"</u>					
			CINC	GENERAL		
				CEMENT		
۱.,	- /			e tot	r 44	41
يطال	2/B"	Size	<i>P.</i> 70	FT	5-16-	-
'é4	R	SIZE	219	01 <sub>FT.</sub>	5-22-	-66
-						
<u> </u>		SIZE		FT		
Use	ed in	Cenent	tine	8-5/gn	Casins	
1.					-	
	_			GENERALINE		
2.1	Bago_	Aquaeo	<b>L</b>			
4	HA-5		•			
Cer	pente	d by He	2111	burton		
l l			_	_	ang	
40	Bago	Reg. (	Cens	mt		
3 -	- 100	Bent	onit	•		
50	4 14-					
1						
Cer	<u>nente</u>	d by De	orel	1		
1						
				•		
				-14		
2134						
		ed 5 C		91, 2048		
	10 2 4 Ca Us 40 3	Used in 100 Rags 2 Rags 4 HA=5 Comente Used in 40 Rags 3 - 100 505 Lin	Used in Cenema 100 Rage Port. 2 Rage Aquage 4 HA=5 Comented by Hamed in Coment 40 Rage Reg. 3 - 100# Benta	Used in Comenting 100 Rags Portland 2 Rags Aquagel 4 HA-5 Comented by Halli Used in Comenting 40 Rags Rog. Come 3 - 100# Bentonit 50# Lime	Used in Comenting 8-5/80 100 Rage Portland Coment 2 Rage Aquagel 4 HA-5 Comented by Halliburton Used in Comenting 40 Cas 40 Rage Reg. Coment 3 - 100# Bentonite	A HA-5 Comented by Halliburton Used in Comenting Agn Chaing An Bage Reg. Coment 3 - 100/ Bentonite 50/ Line

EUPERINT ENDENT

FORM No. 989 IN 11/62 N.G. 9929

# HOLF'S HEAD OIL REFIRING CO. INC. SOMEDHORSHING HOLD MARKET

Rec 1

### NEW WELL REPORT

LEASE NO.	81219		800	ACRES	Working District	Г <u></u>	Spencer	# <b>4</b>	•
	Wm. Kauf	non		FARM	WELL NO. W-16	. N	s <b>_1</b> 7	E	w <u>. 37</u>
	Smithfie	14	DISTRICT C		Roane	Cou	NTY		QUAD.
LOCATION MAD	₃ <u>3-23</u>	<u>-</u>		1964	DRILLING COMMEN	CED	4-29-		19 64
RIG COMMENCE	ED <u>11-27</u>	•		19 <b>6</b> L	. DRILLING COMPLET	reD	5-9-		19 <b>6</b> 4
RIG COMPLETE	<u> </u>	-		1964	. DEPTH. 2371		SANI	Big	Injun
RIG CONTRACT	or Gers	ld Jenes			DRILLING CONTRAC	TOR	Cerald d	ones	
ELEVATION: FL	LOOR		ROUND L	162.93	WORK ORDER NO.	AFB	# kH-28-	H.Va.	
				FORMAT	ION RECORD				
KIND	ТОР	воттом	STEEL LINE	TEST	KIND	TOP	воттом	STEEL	TEST

ELEVATION: FLOC	R		GROUND	1162.93	WORK ORDER NO	APE	*H-28-	₩.VQ.	
				FORMATI	ON RECORD				
KIND	ТОР	воттом	STEEL LINE MEAS.	TEST	KIND	ТОР	воттом	STEEL LINE MEAS.	TEST
p <b>Soil</b>	C	10			Slate	2020	2115		
Casing		10'	10'		Little Lime	21.15	2167		
t Rock	20	20			Pencil Cave	2167	2175		
n <b>d</b>	20	50			Big Line	2175	2300		
ate	50	100			Injun Send	2300	2330		
d Rock	100	125			Oil & G as Pa		2330		
ndbr	125	170			Slate	2330	2371		Lög
ate	170	500			han Cesing			2365	
nd	200	270							
A Rock .	270	280			Total Depth		2371	2371	
ate	280	300							1
d Hock	300	320							
e <b>t</b> e	320	380				S.	7		
4	360	385			i				
te _ hell	385	400							
nd	ft00	450	•		1	1			
sto	450	500							
d Rock	500	520							
ate	520	530							
d Rock	530	560							
Casing		571'	571'						
ete	560	760							····
nd	760	790	i		Ì				
d Rock	790	800							· · · · · · · · · · · · · · · · · · ·
ate	600	870	1						
1 Rock	870	900		. ,					
nd.	900	930		<del></del>	i i		-		
ter	<del> </del>	9301			- <u>"</u>				-
ate	930	1185	,		<u> </u>			·	
nd	1185	1220			Ì				<b></b>
ste	1220	1320			· ·				<u> </u>
nd	1320	130							<del>                                     </del>
ate	1340	11,00		<u> </u>	1				<u> </u>
ad	11,00	1535						-	
et e	1535	1555							
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#### NEW WELL REPORT - CONTINUED

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INITIAL PRODUCTION FIRST 24 HOURS  PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  INITIAL PRODUCTION FIRST 23 HOURS  INITIAL PRODUCTION FIRST 250B  INITIAL PRODUCTION FIRST 250B  INITIAL PRODUCTION FIRST 250B  INITIAL PRODU	me of Torpedo Co.	11	11	-	11	<del> </del>	<b> </b>			┢
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po of Shot them of Shot them of Shot them of Shot te of Fluid in Hole When Shot sults:    PACKER RECORD		11	Talle	7	230B	├	<b> </b>			⊦
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  NIND  PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  NIND  SIZE  DEPTH SET  DATE SET  PRET COLLER  ACIDIZATION OR FRACTURING RECORD  DATE WELL FRACTURED  MAKE OF COMPANY  RAILIBURGE  FT. Used in Cestenting & Goadings  BO B age Cement  J Bage Ha-5 Blended 25  Cemented by Halliburten Co.  Used in Cestenting & Casings  HO Bage Aquage  J G Bl. Recibent  GENERALDON PRESSURE  100  DURSH NO CESSENIE  MO Bage General  S G Bl. Recibent  GENERALDON PRESSURE  1100  DURSH NO CESSENIE  MO Bage General  S G Bl. Recibent  Cessented by Well-Service, Inc.  CESSENTED  THEATMENT OIL  CESSENTED  MO BOLL   <u> </u>	TD8.	ļ	-	<b>!</b>	<del> </del>	<u> </u>			H	
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Den Flow / 10ths Water in. Inch / 10ths Merc. in. Inch / 10ths M	p or Snot	┩	-		<b>}</b>	-	<b> </b>		<del></del>	┝
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  INITIAL PRODUCTION FIRST  INITI		<del>  </del>	<u> </u>		<b> </b>	-			<u> </u>	┝
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INITIAL PRODUCTION FIRST 24 HOURS    NIND					 	<u> </u>	<u>!</u>	l)		<u> </u>
INITIAL PRODUCTION FIRST 24 HOURS    NIND	· ·			PA	CKER	REC	CORD			
/10ths Merc. in	INITIAL PRODUCTION FIRST 24 HOURS	KI	ND	1	<del></del>			D	ATE SET	
John Merc. in   Inch   Volume Drilled W/Rotery   Cu. Ft.   Guide Shoe   183° 0.D.   2338° 5-10-61.   Cu. Ft.   Guide Shoe   183° 0.D.   2355° 5-10-61.   Cu. Ft.   Guide Shoe   183° 0.D.   Cu. Ft.   Guide Shoe   183° 0		-		0.0	< /p=	<del>-</del>	<del>+</del>			-
Volume. Drilled w/Rotery Co. F. Rock Pressure. Sone Taken ibs. hrs.  ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  CASING CEMENTED  Surface to:  Surface to:  Surface to:  Surface to:  Surface to:  Surface to:  Size 573. Fr. 5-1-6/h  Like below materials used in Addizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 1000 Fb). Water  Useds 1000 Fb). Water  Useds 1000 AlaCa 55  Useds 25 G al. Agua Frac  Useds 25 G al. Agua Frac  Useds 25 G al. Agua Frac  Used in Committing 8° Casings  Useds 100 Balls Water  Used in Committing 8° Casings  Used in Committing by Casings  Deads 25 G al. Agua Frac  Used in Committing by Casings  Deads 15 Gal. Ror Flow-II  Committed by Halliburton Co.  Used in Committing by Casings  100 Bags Gement  Committed by Well Service, inc.  EREAKDOWN PRESSURE 1100  PUMPING PRESSURE 1100  PUMPING TIME.  RESULT AFTER GAS 111, 000 CU. Fr. TREATMENT OIL 15 Bbls. BBLS.  ROCK PRESSURE AFTER TREATMENT, 520  LBS.  Hotes U sed & Contralizeers 9 2111, secons and pounds.)  Hotes U sed & Contralizeers 9 2111, secons and pounds.)  Water Result After Treatment, 520  ROCK PRESSURE AFTER TREAT	_	1,———				一				
ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  DAYE WELL ACIDIZED  DAYE WELL ACIDIZED  DAYE WELL FRACTURED May 15, 1969  NAME OF COMPANY RElliburton  List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 1000 Ebl. Water  Useds 1000 WAC-8  Useds 200 Gal. MGA 158  Useds 250 Gal. AGAN Frac  Useds 100 Gal. HOT Flow-II  Comented by Halliburton Co.  Used 1n Comenting 8° Casings  Bo B agn Coment  Generated by Halliburton Co.  Used 1n Comenting 12° Casings  100 Gal. HOT Flow-II  Comented by Halliburton Co.  Used 1n Comenting 12° Casings  100 Bags Genent  6 Bags Aquagal  5 C al. Resiment  Comented by Wellofservice, inc.  C		1				$\dashv$				
ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  CASING CEMENTED  Surface to:				VENE	$\dashv$		75	ALC: U		
ACIDIZATION OR FRACTURING RECORD  CASING CEMENTED  Burface to:  Burfac		1		1		寸				
Surface to:  Surface to:  Soft Well Acidized  NAME OF COMPANY Ralliburter  List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerossen, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Weeds 1000 Ebl. Water  Useds 1000 WAC-8  Useds 100 Gal. MCA 158  Useds 20 Gal. Acqua Frac  Useds 25 Gal. Acqua Frac  Useds 10 Gal. Hor First-II  Cemented by Halliburton Co.  Used in Cementing 8th Casings  80 Bags Cement  3 Bags HA-5 Blanded 28  Cemented by Halliburton Co.  Used in Cementing 14th Casings  10 Bags Cement  4 Bags Acquagel  5 Gal. Reciment  Cemented by Welleservice, Inc.  Breakbown Pressure  1100  PUMPING PRESSURE  TREATMENT  OIL  15 Bols.  BBLS.  ROCK PRESSURE AFTER TREATMENT, 520  LBS.  EMARKS: Notes Drilled W/Rotary  Rotes U sed 1, Centralisers 9 2111,	/#####################################	11		ي دين						_
DATE WELL FRACTURED MSY 15, 106h  NAME OF COMPANY Relliburton  List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kernsen, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 1000 Ebl. Water  Useds 1000 Fbl. Water  Useds 100 Gal. MGA 15g  Useds 20 Gal. MGA 15g  Useds 20 Gal. Acqua Frac  Useds 20 Gal. Acqua Frac  Useds 10 Gal. Hor Flow-II  Used 10 Canneting 8° Gasings  60 B age Coment  3 Bage Ha-5 Blanded 2g  Comented by Halliburton Co.  Used 11 Comenting has Casings  ho Bage Genent  6 Bage Aquegel  5 G al. Resiment  Comented by WelloService, Inc.  Breakbown Pressure 1550 - 2700  Average Pumping Pressure 1550 - 2700  Average Pumping Rate/Minute  Pumping Time.  Comented by WelloService, Inc.  Breakbown Pressure 1100  Pumping Pressure After Treatment 500  LBS.  Rock Pressure After Treatment 520  LBS.  Hotes U sed is Centralisers 9 2111,	ACIDIZATION OR FRACTURING RECORD				C	ASING	G CEMENT	ED		
DATE WELL FRACTURED MSY 15, 1961.  NAME OF COMPANY.  Ralliburton  List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kerossee, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 1000 Ebl. Water  Useds 1000 Ebl. Water  Useds 1000 MAC-8  Useds 25 G al. Aqua Frac  Useds 25 G al. Aqua Frac  Useds 100 Gal. Hor Flow-II  Used 10 Canneting 8° Casings  60 B age Coment  3 Bage Ha-5 Blanded 25 Cemented by Halliburton Co.  Used 11 Comenting has Casings  10 Bage Genent  6 Bage Aquagel  5 G al. Resiment  Comented by WelloService, Inc.  Breakbown Pressure 1550 - 2700  Average Pumping Pressure 1550 - 2700  Average Pumping Rate/Minute  Pumping Time.  RESULT Africe   Gas 111,000 Cu. Ft. Treatment Oil 15 Eble. BBLS.  ROCK Pressure Africe Treatment, 520 LBS.  EMARKS: Notes Drilled W/Rotary  Notes U sed 1 Centralisers 9 2111, 500 Cu. Ft. Treatment 520 LBS.				*******	B	nete	ce to:			
NAME OF COMPANY Halliburton  List below materials used in Actidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Water Lood Bbl. Water  Useds 18000 # Sand 20-10  Useds 1000 # NAC-8  Useds 25 0 al. Aqua Frac  Used 1000 # NAC-8  Used 10 Cement    Bage Ha-5 Blended 28  Cemented by Halliburton Co.  Used 11 Cementing 12 Casings  by Bage Genent  6 Bage Aquagel  5 G al. Acciment  Cemented by WelloService, Inc.  Breakbown Pressure    1550 - 2700  Average Pumping Rate/Minute    Breathent    111,000    Cemented by WelloService, Inc.  Breathent    Oil	DATE WELL ACIDIZED		- le-	5/8*				1-61		
List below materials used in Acidizing or Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 1000 Ebl. Water  Useds 1000 J Sand 20-10  Useds 1000 J Sand 20-10  Useds 1000 MAC-8  Used 11 Comenting 8° Gosings  by Bage Ha-5 Blended 28  Cemented by Halliburton Co.  Used 11 Comenting 1½° Casings  by Bage Genent  6 Bage Aquagel  5 G al. Acciment  Cemented by WelleService, Inc.  Breakbown Pressure 1550 - 2700  Average Pumping Rate/Minute 28  Pumping Time.  Result After   Gas 111,000 cu. Ft.  TREATMENT   Oil 15 Bbls. sbls.  Rock Pressure After Treatment 520 lbs.  EMARKS: Notes Drilled w/Rotary  Rotes U sed 1, Centralisers 6 2111,			-							
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds.)  Useds 1000 Fbl. Water  Useds 1000 Fbl. Water  Useds 1000 Fbl. Mac 15%  Used 10 Gal. Mac 15%  Used 11 Cements  Cemented by Halliburton Co.  Used 11 Cementing 12° Casings  10 Bags Gement  6 Bags Aquagal  5 G al. Resiment  Cemented by WelloService, Inc.  EREAKDOWN PRESSURE 1550 - 2700  AVERAGE PUMPING PRESSURE 1100  PUMPING TIME CAS 111,000 CU. FT.  TREATMENT OIL 15 Bbls. BBLS.  ROCK PRESSURE AFTER TREATMENT, 520 LBS.  EMARKS: Notes Brilled W/Rotary  Notes U sed 1 Cemtralisers © 2111',	TARE OF CORPANI	le Oil Gesolin			Size 🎩		Fr <b>5=</b>	10-6t		_c
Used: 1000 Bh. Water Used: 100	Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and a	nounds.)	",					• *		
Used: 100 Gal. MCA 15% Used: 100 MAC-8  Used: 25 G al. Agua Free Used: 10 Gal. Nor Flew-II  Used: 10 Gal. Nor Flew-II  Used: 11 Comenting 12 Gasing: 10 Bage Genent  6 Bage Aquagel  5 G al. Resiment  Cemented by WelloService, Inc.  Pumping Pressure 1550 - 2700  Average Pumping Rate/Minute 289  Pumping Time 110,000 cu. Ft. Treatment Oil 15 Eble. BBLs.  ROCK Pressure After Treatment, 520 LBs.  EMARKS: Notes Drilled w/Rotary  Hotes U sed 1 Centralizers © 2111',					C		ET			_C
Used: \$5 0 al. Agen Free  Used: \$5 0 al. Agen Free  Used: 10 Gal. Nor Flow-II  Cemented by Halliburton Co.  Used in Comenting the Casing:  10 Bags Coment  6 Bage Aquagel  5 G al. Resiment  Cemented by WelloService, Inc.  Pumping Pressure 1550 - 2700  Average Pumping Rate/Minute th Himses  Pumping Time.  REBULT AFTER   GAS 111,000 CU. FT.  OIL 15 Bbls. BBLs.  ROCK Pressure After Treatment 520  LBS.  EMARKS: Hotes Drilled w/Rotary  Hotes U sed i Centralisers © 2111's	m - a - 1 Conno 11 o - a - a - a - a - a - a - a - a - a -				-512E					
Used: 25 0 el. Aqua Frac Used: 25 0 el. Aqua Frac Used: 10 0el. Hor Flow-II  Cemented by Halliburton Co.  Used: 1n Cementing 10 Casing:  10 Bage Genent  6 Bage Aquagel  5 0 el. Resiment  Cemented by WelloService, Inc.  Breakbown Pressure 1550 - 2700  Average Pumping Pressure 1550 - 2700  Average Pumping Rate/Minute 11, ccc cu. Ft.  Treatment Oil 15 Eble. BBLs.  Rock Pressure After Treatment 520  LBS.  EMARKS: Hotes Drilled w/Rotary  Hotes U sed 1 Centralisers © 2111's	aregi itoogo a saug sa-ito		u.					ngı		
Used in Comenting in Gasings  10 Bags Coment  6 Bage Aquegel  5 G al. Resiment  Comented by Halliburton Co.  Used in Comenting in Gasings  10 Bags Coment  6 Bage Aquegel  5 G al. Resiment  Comented by WelloService, Inc.  Pumping Pressure  1550 - 2700  Average Pumping Rate/Minute  Pumping Time.  Result After   Gas 111,000 cu. ft.  Oil 15 Bbls. BBls.  Rock Pressure After Treatment 520 lbs.  EMARKS: Notes Drilled W/Rotary  Rotes U sed i Contralisers © 2111's	Used: 300 Cal. MGA 15%		- [	ed in	Caron	ting		ngı		
Used in Comenting Line Gasings  LO Bage Goment  6 Bage Aquagel  5 G al. Resiment  Comented by WelloService, Inc.  Breakdown Pressure 1550 - 2700  Average Pumping Rate/Minute 229  Pumping Time Result After   Gas 111,000 cu. ft. Oil 15 Eble. BBLs.  Record Pressure After Treatment 520 LBs.  EMARKS: Notes Drilled w/Rotary Rotary Rotary Resident Comented by Rationization Co.  Used in Comenting Line Gasings  Comented by Rationization Co.  Used in Comenting Line Gasings  LO Bage Goment  Comented by WelloService, Inc.	Used: 300 Gal. MCA 15% Used: 100/ WAC-8		<b>- 80</b>	ed in Bag	Copen B Come	ting nt	8º Cosi	ngı		
BREAKDOWN PRESSURE 1100  BREAKDOWN PRESSURE 1550 - 2700  PUMPING PRESSURE 1550 - 2700  AVERAGE PUMPING RATE/MINUTE 289  PUMPING TIME.  RESULT AFTER 1 GAS 111,000 CU. FT.  TREATMENT OIL 15 Eble. BBLS.  ROCK PRESSURE AFTER TREATMENT 520  LBS.  EMARKS:Notes Drilled w/Rotary  HO Bage Gement  6 Bage Aquegel  5 G al. Resiment  Cemented by WelloService, Inc.  CEMENTED by WelloService, Inc.	Used: 300 Cal. HGA 15% Used: h00% WAC-8 Used: 25 G el. Agua Frac		- <u>80</u>	B ago	Copeni s Come NA-5 B	ting nt lend	8" Casi ed 2%		•	_
6 Bage Aquagel 5 G al. Resident  Cemented by Welloservice, Inc.  Breakdown Pressure 1550 - 2700  Average Pumping Pressure 1550 - 2700  Average Pumping Time.  Pumping Time.  Result After   Gas 111,000 cu.ft.  Oil 15 Eble. BBLs.  Rock Pressure After Treatment 520 LBs.  EMARKS: Notes Drilled w/Rotary  Breakdown Pressure Agreement 1500  EMARKS: Notes Drilled w/Rotary  Breakdown Pressure 1000  Cemented by Welloservice, Inc.	Used: 300 Cal. HGA 15% Used: h00% WAC-8 Used: 25 G el. Agua Frac		- <u>80</u>	B ago	Copeni s Come NA-5 B	ting nt lend	8" Casi ed 2%		•	_
6 Bage Aquagel 5 G al. Resident  Cemented by Welloservice, Inc.  Breakdown Pressure 1550 - 2700  Average Pumping Pressure 1550 - 2700  Average Pumping Time.  Pumping Time.  Result After   Gas 111,000 cu.ft.  Oil 15 Eble. BBLs.  Rock Pressure After Treatment 520 LBs.  EMARKS: Notes Drilled w/Rotary  Breakdown Pressure Agreement 1500  EMARKS: Notes Drilled w/Rotary  Breakdown Pressure 1000  Cemented by Welloservice, Inc.	Used: 100 Gal. HGA 15% Used: 100 Gal. HGA 15% Used: 100 Gal. HGA Free Used: 10 Gal. Hor Free		- 80 3 - Ce	ed in B ago Bago Sente	Coments Comments Bit A - 5	ting nt lend alli	8" Casi ed 2% burton C	0.	•	_
SC al. Resiment  Camented by WelloService, Inc.  BREAKDOWN PRESSURE 1550 - 2700  AVERAGE PUMPING RATE/MINUTE 289  PUMPING TIME.  RESULT AFTER   GAS 111,000 CU. FT.  TREATMENT   OIL 15 8ble. BBLS.  ROCK PRESSURE AFTER TREATMENT 520  EMARKS: Notes Drilled w/Rotary  SC al. Resiment  Camented by WelloService, Inc.  Camented by WelloService, Inc.  EMARKS: Notes by WelloService, Inc.  Semanted by WelloService, Inc.  Camented by WelloService, Inc.  SEMANTED 1550 - 2700  CU. FT.  BBLS.  Hotes U sed is Centralisers 9 21111.	Used: 300 Cal. HGA 15% Used: 100% NAC-8 Used: 25 G al. Aqua Frac			ed in Begg Begg mente ed in	Gagenta B Camer HA-5 B d by H Camer	ting nt lend alli ting	8" Casi ed 2% burton C	0.	•	_
Cemented by WelloService, Inc.  BREAKDOWN PRESSURE 1550 - 2700  PUMPING PRESSURE 1550 - 2700  AVERAGE PUMPING RATE/MINUTE 11 Minutes  PUMPING TIME. 11 Minutes  RESULT AFTER OIL 15 8bls. 8bls.  ROCK PRESSURE AFTER TREATMENT 520  LBS.  EMARKS: Notes Drilled w/Rotary  Cemented by WelloService, Inc.	Used: 300 Cal. HGA 15% Used: 100% NAC-8 Used: 25 G al. Aqua Frac		- 80 3 - Ce - Us	Bage Bage Bage Bage	Gagenta B Camera HA-5 B d by H Comera General	ting nt lend alli ting t	8" Casi ed 2% burton C	0.	•	
BREAKDOWN PRESSURE 1100  PUMPING PRESSURE 1550 - 2700  AVERAGE PUMPING RATE/MINUTE 229  PUMPING TIME.  RESULT AFTER TREATMENT OIL 15 Ebls. BBLS.  ROCK PRESSURE AFTER TREATMENT, 520 LBS.  EMARKS: Notes Drilled w/Rotary Rotes U sed & Centralisers 9 2111's.	Used: 300 Cal. HGA 15% Used: h00% WAC-8 Used: 25 G el. Agua Frac		- 80 3 - Ce - Us	Bage Bage Bage Bage	Gagenta B Camera HA-5 B d by H Comera General	ting nt lend alli ting t	8" Casi ed 2% burton C	0.	•	
BREAKDOWN PRESSURE 1100  PUMPING PRESSURE 1550 - 2700  AVERAGE PUMPING RATE/MINUTE 229  PUMPING TIME.  RESULT AFTER TREATMENT OIL 15 Ebls. BBLS.  ROCK PRESSURE AFTER TREATMENT, 520 LBS.  EMARKS: Notes Drilled w/Rotary Rotes U sed & Centralisers 9 2111's.	Used: 300 Cal. HGA 15% Used: h00% WAC-8 Used: 25 G el. Agua Frac		- 80 3 Ce Us 140	Bago : Bago : mente ed in Bago : Bago :	Gagent S Camer HA-5 B d by H Camer Comer Aquaga	ting nt lend sili ting t	8" Casi ed 2% burton C	0.	•	
PUMPING PRESSURE 1550 - 2700  PUMPING PRESSURE 1550 - 2700  AVERAGE PUMPING RATE/MINUTE 285  PUMPING TIME.  RESULT AFTER AS 111,000 CU. FT.  TREATMENT OIL 15 Eble. BBLS.  ROCK PRESSURE AFTER TREATMENT 520 LBS.  EMARKS: Notes Drilled w/Rotary Rotes U sed & Centralisers 6 2111's	Used: 300 Cal. HGA 15% Used: h00% WAC-8 Used: 25 G el. Agua Frac		3 Ce Us 40 6	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
AVERAGE PUMPING RATE/MINUTE  PUMPING TIME.  RESULT AFTER   GAS 111,000 CU. FT.  OIL 15 Ebls. BBLS.  ROCK PRESSURE AFTER TREATMENT, 520 LBS.  EMARKS: Notes Drilled w/Rotary  Rotes U sed i Centralisers © 2111's	Used: 100 Cal. MCA 15% Used: 100% WAC-8 Used: 25 C al. Aqua Free Used: 10 Cal. Nor Flor-II		3 Ce Us 40 6	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
PUMPING TIME.  PUMPING TIME.  TREATMENT   GAS 111,000 CU. FT.  TREATMENT   OIL 15 Eble. BBLs.  ROCK PRESSURE AFTER TREATMENT 520 LBS.  EMARKS: Notes Drilled w/Rotary Notes U sed is Centralizers © 2111's	Used: 100 Cal. MCA 15% Used: 100% MAC-8 Used: 25 C al. Aqua Free Used: 10 Cal. Nor Flor-II		3 Ce Us 40 6	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
RESULT AFTER   GAS 111,000 CU. FT. OIL 15 Bbls. BBLs. ROCK PRESSURE AFTER TREATMENT 520 LBS.  EMARKS: Notes Drilled w/Rotary Notes U sed is Centralizers © 2111's	Used: 100 Cal. MCA 15% Used: 100 F NAC-8 Used: 25 C al. Aqua Free Used: 25 C al. Aqua Free Used: 10 Cal. Nor Flor-II  BREAKDOWN PRESSURE 1100 PUMPING PRESSURE 1550 - 2700		3 Ce Us 40 6	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
TREATMENT OIL 15 Eble.  ROCK PRESSURE AFTER TREATMENT 520  EMARKS: Notes Drilled w/Rotary  Hotes U sed is Centralizers © 2111's	Used: 300 Gal. MGA 15% Used: 100 WAC-8 Used: 25 G al. Aqua Frag Used: 25 G al. Aqua Frag Used: 100 Gal. Nor Flow-II  BREAKDOWN PRESSURE 1100 PUMPING PRESSURE 1550 - 2700 AVERAGE PUMPING RATE/MINUTE 11. Manuage		3 Ce Us 40 6	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
ROCK PRESSURE AFTER TREATMENT 520 LBS.  EMARKS: Notes Drilled w/Rotary Notes U sed & Centralisers © 2111',	Used: NO Cal. MCA 15% Used: 100 VAC-8 Used: 25 G al. Aqua Free Used: 25 G al. Aqua Free Used: 10 Gal. Hor Flow-II  BREAKDOWN PRESSURE 1550 - 2700 AVERAGE PUMPING RATE/MINUTE 229 PUMPING TIME. BESULT: ASSER 1 GAS.		80 3 Ce Us 1,0 6	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
EMARKS: Note: Drilled w/Rotary Note: U sed & Centrelisers @ 2111',	Used: 300 Cal. MCA 15% Used: 100 WAC-8 Used: 25 G al. Agua Frac Used: 100 Cal. Hor Flow-II  BREAKDOWN PRESSURE 1100 PUMPING PRESSURE 1550 - 2700 AVERAGE PUMPING RATE/MINUTE 11 MINUTES PUMPING TIME. RESULT AFTER 1 GAS 111,000		80 3 Ce Us 140 6 Ce	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
EMARKS: Note: Drilled w/Rotary Rote: U sed 4 Centralisers © 2111.	Used: 300 Gal. MCA 15% Used: 1000 WAC-8 Used: 25 G al. Agua Frac Pumping Pressure 1100 Pumping Pressure 1550 - 2700 Average Pumping Rate/Minute 229 Pumping Time 111, 000 Treatment Gas 111, 000 OIL 15 Ebls.	88L	80 3 Ce Us 140 6 5 Ce	Bage Bage Bage Bage Bage Bage	Comen iiA-5 B d by H Comen Comen Aquage	ting at lend alli ting t	8º Gasi ed 2% burton C	o. ing:		
	Useds 200 Gal. MGA 15% Useds 25 G al. Agua Frag Useds 26 G al. Agua Frag Useds 26 G al. Agua Frag Useds 26 G al. Agua Fra	88L	80 3 Ce Ua 1,0 6 5 Ce	Bags Eage 1 1 Bags Bags Bags Bags Bags Bags Bags Bags	Generalis Comments of the Comm	ting nt lend alli ting t lent oll oll o	8" Cosi ed 25 burton C lie Cos	ings		
	Useds 100 Gal. MCA 15% Useds 100% MAC-8 Useds 25 G al. Agua Frag Useds 10 Gal. Hor Flow-II  Breakbown Pressure 1100 Pumping Pressure 1550 - 2700 Average Pumping Rate/Minute 11 Kinutes Pumping Time 11 Kinutes Treatment OIL 15 Eble. ROCK Pressure After Treatment 520 EMARKS: Notes Drilled W/Rotary		80 3 - Ce Us - LO 6 - 5 - Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia-5 8 d by H Cement General Aquage Acesim d by W	ting nt lend alli ting t lent control control control	8" Cosi ed 25 burton C lie Cos	o. inge		_
	Useds 100 Gal. MGA 15% Useds 100 Gal. MGA 15% Useds 25 G al. Agua Frag Useds 25 G al. Agua Frag Useds 10 Gal. Nor Flow-II  Breakdown Pressure 1550 - 2700 Average Pumping Rate/Minute 289 Average Pumping Rate/Minute 11, 000 Treatment Gas 11, 000 Coll Treatment State Walled W/Rotary  EMARKS: Notes Drilled W/Rotary  Notes This well was Logged by McCallough To		80 3 - Ce Us - LO 6 - 5 - Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia-5 8 d by H Cement General Aquage Acesim d by W	ting nt lend alli ting t lent control control control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 84° hole from surface to 571'	Useds 100 Gal. MGA 15% Useds 100 Gal. Mac-8 Useds 25 G al. Agua Frag Useds 100 Gal. Nor Flow-II  Breakdown Pressure 1550 - 2700 Pumping Pressure 1550 - 2700 Average Pumping Rate/Minute 11 Minutes Pumping The 1 Gas. 111,000 Coll 15 Bbls.  Rock Pressure After Treatment 520 EMARKS: Notes Drilled w/Rotary  Notes This well was Legged by McCullough Totals 11 Mas Legged		80 3 - Ce Us - LO 6 - 5 - Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia-5 8 d by H Cement General Aquage Acesim d by W	ting nt lend alli ting t lent control control control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 84° hole from surface to 571'	Used: 200 Cal. MCA 155 Used: 250 Cal. Aqua Frac Call Call Call Call Call Call Call Call		80 3 - Ce Us - LO 6 - 5 - Ce	Bage Bage Bage Bage Bage Bage Bage Bage	General Section of the Comment of th	ting nt lend alli ting t lent control control control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 64" hale from 571' to 2371' Note: Drilled 64" hale from 571' to 2371'	Used: 200 Cal. MCA 15% Used: 250 Cal. Aqua Frae Used: 250 Cal. Aqua Frae Used: 100 Cal. Hor Flor-II  Breakdown Pressure 1500 - 2700 Pumping Pressure 1550 - 2700 Pumping Pressure 1550 - 2700 Pumping Time 1550 - 111,000 Pumping Time 15 Cas 111,000 Pressure After Treatment 520 Pressure After Treatment 520  EMARKS: Note: Drilled w/Rotary  Note: This well was Logged by McCallough Total Cast Drilled 64° hale from 571° to 2371°  Note: Drilled 64° hale from 571° to 2371°		80 3 Ce Us 140 6 5 Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia Section of the Comment of	ting nt lend alli ting t lent control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 64" hale from 571' to 2371' Note: Drilled 64" hale from 571' to 2371'	Used: 100 Gal. MCA 15% Used: 100% MAC-8 Used: 25 G al. Agua Frac Used: 100 Gal. Hor Flow-II  Breakdown Pressure 1500 - 2700 Average Pumping Rate/Minute 289 Average Pumping Rate/Minute 44 Minutes Pumping Time 15 Gas 111,000 Treatment 01 15 Eble. Rock Pressure After Treatment 520 EMARKS: Note: Drilled w/Rotary Note: This wall was Legged by McCulleugh Tot Hote: Drilled 64 hale from 571° to 2371°		80 3 Ce Us 140 6 5 Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia Section of the Comment of	ting nt lend alli ting t lent control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 64" hale from 571' to 2371' Note: Drilled 64" hale from 571' to 2371'	Used: 100 Gal. MCA 15% Used: 100% MAC-8 Used: 25 G al. Agua Frac Used: 100 Gal. Hor Flow-II  Breakdown Pressure 1500 - 2700 Average Pumping Rate/Minute 289 Average Pumping Rate/Minute 44 Minutes Pumping Time 15 Gas 111,000 Treatment 01 15 Eble. Rock Pressure After Treatment 520 EMARKS: Note: Drilled w/Rotary Note: This wall was Legged by McCulleugh Tot Hote: Drilled 64 hale from 571° to 2371°		80 3 Ce Us 140 6 5 Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia Section of the Comment of	ting nt lend alli ting t lent control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 64" hale from 571' to 2371' Note: Drilled 64" hale from 571' to 2371'	Used: 100 Gal. MCA 15% Used: 100% MAC-8 Used: 25 G al. Agua Frac Used: 100 Gal. Hor Flow-II  Breakdown Pressure 1500 - 2700 Average Pumping Rate/Minute 289 Average Pumping Rate/Minute 44 Minutes Pumping Time 15 Gas 111,000 Treatment 01 15 Eble. Rock Pressure After Treatment 520 EMARKS: Note: Drilled w/Rotary Note: This wall was Legged by McCulleugh Tot Hote: Drilled 64 hale from 571° to 2371°		80 3 Ce Us 140 6 5 Ce	Bage Bage Bage Bage Bage Bage Bage Bage	Generalia Section of the Comment of	ting nt lend alli ting t lent control	8" Casi ed 2% burton C light Cas Service,	o. inge		
Hote: Drilled 61° hole from surface to 571' Note: Drilled 61° hole from 571' to 2371' Note: Perforations: Triple Frac - H tch Cutter © 2261'	Used: 100 Gal. MCA 15% Used: 100 WAC-8 Used: 25 G al. Agua Frac Used: 100 Gal. Hor Flow-II  BREAKDOWN PRESSURE 1550 - 2700 PUMPING PRESSURE 1550 - 2700 PUMPING TIME 239 PUMPING TIME 11 Minutes RESULT AFTER AFTER TREATMENT 501 EMARKS: Note: Drilled w/Rotary  HOVE: This wall was Logged by McCullough Total State of S71' Note: Drilled 64° hale from Surface to 571' Note: Perforations: Triple Frac - H tch Cur	o). Co. on	80 3 - Ce Us - 40 6 - 5 - Ce - S. S. No	B age Bage mente ed in Bage Bage al. Bage to: U 2	General Section of the Comment of th	ting nt lend alli ting t ent elle	8" Casi od 2% burton C like Cas Service,	inge	2333.4	_
Hote: Drilled 61 hole from surface to 571' Note: Drilled 62 hole from 571' to 2371' Note: Perforations: Triple Frac - H tch Cutter © 2261' Note: This well was Drilled according to Rule 11, under Section 13 of Article 4 Chapter 22	Used: 100 Gal. MCA 15% Used: 100 Gal. McA-8 Used: 25 G al. Agua Frac Used: 100 Gal. Mor Flow-II  Breakbown Pressure 1550 - 2700 Pumping Pressure 1550 - 2700 Pumping Time 289 Pumping Time 11 Minutes Pressure After Treatment 520  EMARKS: Note: Drilled w/Rotary  Note: This well was Legged by McCullough Total Bots: Drilled 64° hale from Suffice to 571° Note: Perforations: Triple Frac - H tch Cur	ol Co. on	80 3 - Ce Us - 10 6 - 5 Ce - Ce - S - Ro - S - Ro	Begginente Eage Eage Eage Eage Eage Eage Eage Eag	General Section of the Comment of th	ting nt lend alli ting t ent elle	8" Casi od 2% burton C like Cas Service,	inge	2333.	
Hote: Drilled 64" hale from 571' to 2371' Note: Drilled 64" hale from 571' to 2371' Note: Perforations: Triple Frac - H <sub>e</sub> tch Cutter © 2261'	Used: 200 Cal. MCA 155 Used: 250 al. Aqua Frae Used: 250 al. Aqua Frae Used: 250 al. Aqua Frae Used: 100 Cal. Hor Flow-II  PRESERVED TO THE TO THE TO THE TO THE TREATMENT THE TREATMENT TO THE TREATMENT THE TREATMENT THE TREATMENT THE TREATMENT THE Wall was Legged by McCallough To Hote: Drilled 84° hole from surface to 571° Note: Perforations: Triple Frae - H tch Cur  Note: This well was Drilled according to Rui	ol Co. on	80 3 - Ce Us - 10 6 - 5 Ce - Ce - S - Ro - S - Ro	Begginente Eage Eage Eage Eage Eage Eage Eage Eag	General Section of the Comment of th	ting nt lend alli ting t ent elle	8" Casi od 2% burton C like Cas Service,	inge	2333.	
Hote: Drilled 61 hole from surface to 571' Note: Drilled 61 hole from 571' to 2371' Note: Perforations: Triple Frac - H tch Cutter 0 2261' Note: This well was Drilled according to Rule 11, under Segtion 13 of Article 4 Chapter 22	Used: 200 Cal. MCA 155 Used: 250 al. Aqua Frae Used: 250 al. Aqua Frae Used: 250 al. Aqua Frae Used: 100 Cal. Hor Flow-II  PRESERVED TO THE TO THE TO THE TO THE TREATMENT THE TREATMENT TO THE TREATMENT THE TREATMENT THE TREATMENT THE TREATMENT THE Wall was Legged by McCallough To Hote: Drilled 84° hole from surface to 571° Note: Perforations: Triple Frae - H tch Cur  Note: This well was Drilled according to Rui	ol Co. on	80 3 - Ce Us - LO 6 - 5 - Ce - S - Ce - S - Ce - S - Ce - Ce - S - Ce - Ce - Ce - Ce - Ce - Ce - Ce - Ce	Begginente Eage Eage Eage Eage Eage Eage Eage Eag	General Section of the Comment of th	ting nt lend alli ting t ent elle	8" Casi od 2% burton C like Cas Service,	inge	2333.	

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### WOLF'S HEAD OIL REFINING CO, INC.

RCC

#### **NEW WELL REPORT**

LEASE No. 81219		_ACRES	WORKING DISTRICT Span	ncer # 4
Wm. Kausman	<u>.                                    </u>	_FARM	WELL NOW-20 N S	s. 47 E. w. 37
Smithfield	DISTRICT OR TOWNSHIP		Roane County	QUAD.
LOCATION MADE	May 21,	1964	DRILLING COMMENCED.	June 27, 1964
RIG COMMENCED	Juna 26,	1964_	DRILLING COMPLETED	July 8, 1964
RIG COMPLETED	June 27,	19 <b>64</b>	DЕРТН. 22551	SAND Big Injun
RIG CONTRACTOR	Gerald D. Jones		DRILLING CONTRACTOR	Gerald D. Jones
ELEVATION: FLOOR	GROUND		WORK ORDER NO. AFE # W	i-32-W. Va.

#### FORMATION RECORD STEEL LINE MEAS. BTEEL LINE MEAS. KIND воттом TOP TEST KIND TOP BOTTOM TEST 30 So11 0 10 Sand 1400 1470 onductor 9 Slate 9 1470 1505 10 20 <u>late</u> Sand 1505 1525 Slate 1525 20 <del>80</del> und. 1575 late 80 100 Sand 1575 1625 100 md 145 Slate 1625 1685 1685 late 145 195 Sand 1720 1720 ed Rock 195 215 Slate 1780 295 330 215 Sand <u>ınd</u> 1780 1910 Water late 295 Black Slate 1910 1995 Little Lime 1995 2032 ed Rock 330 350 350 370 Pencil Cave 2032 2063 late ed Rock 370 395 Big Lime 2063 2170 Lat! 395 410 Keener 2170 2193 430 ad in-a 410 Oil & Gas 2170 2175 Show 011 & Cas 430 450 437 2180 2193 Show md 450 475 475 500 late Big Injun 2193 2213 ed Rock 2202 011 & Cas 2193 Show late 500 520 Slate 2213 2255 ind 520 540 4ga Casing 2253 2253 2253.9 560 ed Rock 565 565 Total Depth 2255 2255 Drillers 560 ete 580 600 <u>ınd</u> 625 600 <u>late</u> 625 650 ad Rock 650 700 late 700 760 ınd 760 late 795 **B25** 795 ad Rock 865 Late 825 865 900 <u>ınd</u> 900 925 Late d Rock 925 940 940 955 late d Rocki 955 975 975 1000 ınd 1000 1065 Late ed Rock 1065 1090 1090 1125 und ate 1125 1165 ınd 1165 1200 1250 1200 late 1250 1300 <u>ınd</u>

(OVER)

Water

1400

1300

lat/

#### NEW WELL REPORT - CONTINUED

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INITIAL TORPEDO RECORD  Date of Shot  Jame of Torpedo Co.						UBIN	G RECOR		
	SIZE	-	PU NSFER	או ד	WELL FEET	Іінсн	·	PULLED	PEET
ame of Torpedo Co.	10 0/17					********	TRANSFE	R NO.	PERI
ame of Torpedo Co.	10 3/4" 8 5/8"0	D.D.			9	-	-		
				L.M.		.00	<del> </del>		
Io. of Quarts	43°O.D.			lley			1		
ength of Shell	2 3/0"0	<u>.u.</u>	78.	11ey	2260	.00	<del> </del>		
Diameter of Shell				!	<u> </u>	<u> </u>	l		
ength of Anchor		<u> </u>			ļ	<u> </u>	ļ		
op of Shot		<u> </u>				_	<u> </u>		ļ
ottom of Shot	_ -	<u> </u>				<u> </u>	<u> </u>	_	<u></u>
eet of Fluid in Hole When Shot							ļ		<del></del>
esults:		<u> </u>					<b> </b>		
· · · · · · · · · · · · · · · · · · ·	_			'	<u> </u>		<u> </u>		
and the second of the second o	_			!			<u> </u>		
	1	]				1			
				ВΑ	CKER	DEC	COPD		
INITIAL PRODUCTION FIRST 24 HOURS	11	ND	il i		SIZE		DEPTH SET	<del></del>	DATE SE
	<del></del>								
Open Flow /10ths Water inInch	Steal S		!		/8nO.I		_437		-28-6
/10ths Merc. inInch	Float C		T.		O.D.	<u></u>  -	2226		-6-64
Volume Show (Drilled H/Rotary) Cu. Ft.	Guide 9	<b>UOS</b>		42"	O.D.	_ļ_	2253,96	<u> </u>	-8-64
Rock Pressure. No Test lbs. hrs.	ļ							<u> </u>	
Oilbbls., First 24 hrs.	11							l	
			1		W- 9-0				
ACIDIZATION OR FRACTURING RECORD				.,			G CEMEN	TED	
DATE WELL ACIDIZED							ce to:		
DATE WELL FRACTURED 7-15-64		_	8 5	/8º	SIZE	<u> 437</u>	Рт	6-28-	-64
NAME OF COMPANY Hallsburton			1				96- <sub>T.</sub>	7_0/4	La.
(List below materials used in Acidizing or Fracturing, i.e., Sand, Cro	ude Oil, Gasolin	ie.	42"		SIZE	422	•У9≃т	/=-0/et	<u>¥4.</u>
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and	pounds.)	-•			_		_		
Used: 35,500 Gals. Water		_			Size				_\
Used: 48,500 # Sand 20-40		_	Used	in	Cement	ing	8 5/8°	Casi	ig:
lised: 300 Gal. 4GA 15%	- mant		75 B	AGR	_ 2:11	Cer	aent		
Used: 500# NAC-8		·	1	_					
Used: 35 Gal. Korflo Used: 20 Gal. KWENDER Aquafrac		-	2.Ba	g <u>e -</u>	Calci	um	Chloride	1	
Used: AV Gal. AMEAGER ACCEPTED		-	Cene	nted	by: k	e11	Service	<u>In</u>	35
		-	lleed	in	Cemand	ing	43" Cas	inge	
		_	•						
		_	45 B	age	<u> — Сет</u> е	nt	<del> </del>		
		_	6 Ba	<u> 89</u>	Baro	d A	gnagel		
		_		_	Lime				
		_							
			Ceme	nted	bys	iell	Service	In:	Ci
BREAKDOWN PRESSURE 1200#									
Pumping Pressure 2000 - 3000			l						
AVERAGE PUMPING RATE/MINUTE 18.8		_							
PUMPING TIME 45 Hin.		_							
RESULT AFTER   GAS 40,000	CU. F	т.							
OIL SV	BBL	.s.	<u> </u>				•		
ROCK PRESSURE AFTER TREATMENT 340	LB	s.							
	1001		W-A-	- 11-	- 1 F /	A	3.4		V20.1
REMARKS: Note: Drilled 82" Hole from Surface			MOEG				raliser	•	
Drilled 61" Hole from 437" to	2255!			21	30',	2161	2193	6.2	228
	~ ~ /:	- 001	''						
	2 Yourself (	5 44;	27	Oth	. nepu	<u> </u>			
Note: This Well was logged by Lane Wells on							<u> </u>		
	Cutter								
Note: This Well was logged by Lane Wells on Note: Perforated © 21783 Triple Frac Notch									
								•	
								·	
Note: Perforated @ 2178} Triple Frac Notch		lan '	Cac+.4		12 60	A = 4.5	ole ( )	The sale	
Note: Perforated @ 2178 Triple Frac Notch	ile 11, un					Arti	cle 4, (	Chapb	er ^^
Note: Perforated @ 2178} Triple Frac Notch	ile 11, un					Arti	cle 4, (	Chapb	er
Note: Perforated @ 2178 Triple Frac Notch	ile 11, un	1 Gas				Arti	cle 4, (	Zhapb	er

FOR# No. 969 IM 2/60 M'G. 9252A

# HOLF'S HEAD OIL REFINING COMBANY, INCORPORATED SOMETHER REMINISHES GOMBANY



#### NEW WELL REPORT

					51(1				
LEASE NO. 812	19		800	ACRES	WORKING DISTRICT	r <u>Sp</u>	encer #1		
m. Kaufa	ien			FARM	WELL NO. W-6	. N	s <u>47</u>	E	w <b>38</b> _
Emithfield	<u> </u>		DistrTown:	ICT OR RESHIP	ene ene	Coun	<del>τν</del>		QUAD.
LOCATION MADE	Noves	ber 12,		19 63	DRILLING COMMEN	CEDD	cember	lı,	19 <u>63</u>
RIG COMMENCED.	Novembe	r 29.		19 <b>63</b>	DRILLING COMPLET	ED DEC	ceaber 1	2,	19 <u>63</u>
RIG COMPLETED	Decembe	or 4,		19_ <b>63</b> _	<sub>ДЕРТН</sub> 2335'		SAND	Big	Injun
RIG CONTRACTOR	enning	urillin	g Co.,	Inc.	DRILLING CONTRAC	TOR Det	nning Dr	illing	Co.,Inc.
ELEVATION: FLOOR	· · · · · · · · · · · · · · · · · · ·		GROUND	1132.36	WORK ORDER NO.	afe <i>g</i> wi	1-10-W.	a•	
				FORMATIO	N RECORD				
KIND	тор	воттом	STEEL LINE MEAS.	TEST	KIND	TOP	воттом	STEEL LINE MEAS.	теят
Shale	0	407	407						
Red Rock	407	574							
Sand	575	735							
Shale	735	750							
Red Rock	750	790							
Shale	790	820				<u> </u>			
Sand	820	830			<u> </u>	ļ	<b> </b>		
Sandy Saale	830 11,25	1425 16k0				ļ			
	16k0	1665	ļi	<del></del>			-		
Send Shale	1665	1725			-				
Sand	1725	1805							
Red_Sock	1805	1810							
Se hale	1810	1855							
Sen	1855	2015							
Sand & Shale	2015	2104							_
Little Lime	2104	2150							
Big Lime	2150	2255					ļ		
Keener Sand	2255	2270							
Big Injun	2270	2295		<b>60</b>			ļ		
011 & Cas Lime & Shale	2270 2295			Show	<b> </b>	<u> </u>			<del> </del>
ligh Casing	5677	2335	2335			<del> </del> -	-		
4S_ AROTHE		: 5,737 	-222			<del> </del>			-
Total Depth	<del>                                     </del>	2335	2335			<del>                                     </del>			- <del></del>
TANKT MARKE	<b></b>					$\vdash$			
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### NEW WELL REPORT - CONT'D.

INITIAL TORPEDO RECORD	<b> </b>	1			ABIN	G RECOR	PULLED		_
Date of Shot	SIZE	TRANSF		FEET	INCH	<del></del>		FEET	IIN
Date of Snot	8-5/8°	Eall		110	-				۳
Name of Torpedo Co.	မြော ဂျာ	Tall		2379		ļ			Τ
No. of Quarts	2-3/8		<b>V</b>						T
Length of Shell	Tog.	Tall	lσ	2345	-	1			r
Diameter of Shell						1			r
Length of Anchor		 							r
Top of Shot	-							1	T
Bottom of Shot						1			T
Feet of Fluid in Hole When Shot				_	_				T
Results:									Γ
		ļ							T
									Γ
						1			Γ
				ACKED	DE/	COPD			
INITIAL PRODUCTION FIRST 24 HOURS		ND		ACKER SIZE		DEPTH SET	Т	DATE SET	=
INITIAL PRODUCTION FIRST 24 HOURS						<del></del> *	-		-
Open Flow /10ths Water inInch	Steel S			<u>5/8° od</u> P od		1:07	12-6	<u>-03</u> 13-63	_
/10ths Merc. inInch Volume_Show 011 & Gas ( brilled s/Rotary). Ft.	Float C			# OD		2304	_	13-63	_
	Ouide S	1100	42	- 00	-	23351	150	נטיינב	_
Rock Pressure None Taken lbs. hrs.	.			<del></del>	-		<del> </del> -		-
Oil See Kleckric Log bbls., First 24 hrs.	<u> </u>		-11		\_				=
ACIDIZATION OR FRACTURING RECORD				C	ASIN	G CEMEN	TED		
				S	urfc	ce to:			_
DATE WELL ACIDIZED 12-26-63		-	8-5/8	n size	1:07	Fт. <b>12</b>	-6-63	ļ	
NAME OF COMPANY COURT		- 1					_		-
(List below materials used in Acidizing or Fracturing, i.e., Sand, Cru	ide Oil. Gasolin	e.	78 <u>0                                    </u>	SIZE _2	335	Fт. <b>12</b>	<u>-13-0</u>	3	_
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pe	ounds).			Size.		Fт		,	_
Used: 37500 Gals. Hater		_	100 0				20 010		-
Used: 58,000 Lbs. Sand Used: 300 Gal. Hud Acid		- ⊩				90 8-5/8	o CAS	T 000	_
Used: 40 Gal. Freflo		-  _	50_	Bags -	Ceme	ent			
Used: 35 G.1. Deterger		-  _	1	Bag - C	alc	lum Chlo	ride		
Used: 400 Îbs. J-84				Cener	ted	by: Wel	1 Ser	vice.	Ī
Used: 200 lbs. J-98		_							_
<del></del>		-  -							_
		-  _	NRRD	IN CEFIL	ATI	10 fign c	ASI NU	8	_
		-	65 ca	. ft. F	OBn.	Lx Cemer	at (Co	nsist	ı
		-	of	33 cu.	ñ.	of Colu	mbia	Cenen	_
		_  -							
		_				fo Pozz			
BREAKDOWN PRESSURE 1200#		_  _	Hal	ll. Gel	. b	Lended 2	# wit	h 65	π
Pumping Pressure 1300 - 1700 Lbs.		_	of	Posmix	Cem	ent.			
AVERAGE PUMPING RATE/MINUTE 32 Bb18.		_   _	Kon o	als	Marci	Fluch			_
Pumping Time 27 minutes Regult After } Gas 38000									-
RESULT AFTER   GAS JOURN TREATMENT   OIL 32	CU. F	I—	Ce	mented	pà:	ilallib	irton	Compa	Ö
ROCK PRESSURE AFTER TREATMENT 495	LB								
		<del> '-</del>				······			=
REMARKS: Drilled 10-5/8" Hole from Surface to		No	te	Rotary	Tool	Le Used.	,		
irilled 7-7/8" Hole from 407' to 23	35'•	Nc	te:	Used 18	<b>-</b> !	5' Secti	ions c	of Rote	-
						39 B-Z		inits	ŧ
				l# Hall	1bu	rton Hel	ld-A.		
Note: This well was logged by KcCullough	Tool Com	but ou	Dece	mber 13	, 1	963.			_
Note: This well was drilled according to					of	Article	4, G	apter	-
	nes, 011 s	nd Gae	41V	ision .					_
of the Code of the Department of Mis									_
of the Code of the Department of Fig.									-
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of the Code of the Department of Ma					•				į
of the Code of the Department of Fig.	APPRO	VED		-					į
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FORM No. 989 IM 2/60 H'G. 9282A

# WOLF'S HEAD OIL REFINING COMPANY, INCORPORATED

### NEW WELL REPORT

LEASE NO. 812	19		800	ACRES	WORKING DISTRIC	. Spe	mcer #	4	
/ lin.	Kauftan			FARM	WELL NO. W-5	_ N	s. 47	E,	w 38
				ICT OR SHIP	Roane	•			
					DRILLING COMMEN				
RIG COMMENCED	Octobe	er 18,	<del>.</del>	19_63_	DRILLING COMPLE	TED	stober 2	7,	19 <b>63</b>
RIG COMPLETED.	Octobe	er 19,		19_63_	DEPTH 2270		SAND	Big I	njun
RIG CONTRACTO	Pennii	ng Drill	ing Co.	, Inc.	DRILLING CONTRA	CTOR. Der	ning Dr	illing (	o., Inc.
ELEVATION: FLO	OR		GROUND	1040.47	WORK ORDER NO.	APE A	MH-8-W	.Va.	
		,		FORMATIO	N RECORD	т			<del></del>
KIND	ТОР	воттом	STEEL LINE MEAS.	TEST	KIND	ТОР	воттом	STEEL LINE MEAS.	TEST
le & Shell Rock	65	65							
M work	155	250	260			<del> </del> -	<del> </del>	-	
nd & Shale	260	365				<u> </u>			
le & RedRo		535							
d & Shale	535	1325	-		ļ	↓			
d le	1325	1370	<del> </del>			<del> </del>			
d & Shale		1996	<del> </del>			<del> </del>			
d & Lime	1996	2060							
Lime	2060	2170							
, gamd	2102	2118		Show Only		<b>_</b>			_
ner Sand	2170	2190	<u> </u>			<del> </del>			
40	2190	2210	<del>                                     </del>			<del> </del>		-	
entl & b	2210	2233							
le & Lime	2233	2270							
Casing		2270	2270		<u> </u>	ļ	ļ		
tal Depth		2270	2270	1					
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### NEW WELL REPORT - CONT'D.

INITIAL TORPEDO RECORD			CAS	ING AND 1	UBIN	G RECOR	0		三
INTIAL TORPEDO RECORD	SIZE	<u> </u>		IN WELL			PULLED		
Date of Shot	H		NBFER N		INCH	TRANSFE	R NO.	FEET	INC
	8-5/8*	297		262	=	ļ			⊢-
Name of Torpedo Co.	4-1/2"	Tal	17	2276	1	ļ			<u> </u>
No. of Quarts	2-3/8º	<u> </u>			₩	<u> </u>			<u> </u>
Length of Shell	Jupque	Tal	ly	2294		ļ			
Diameter of Shell		l			╀	ļ	·		<u> </u>
Length of Anchor		<u> </u>			<b>_</b>	<u> </u>			ـــ
Top of Shot		<u> </u>			<u> </u>				<u> </u>
Bottom of Shot	JI	<u> </u>							$ldsymbol{f eta}$
Feet of Fluid in Hole When Shot		<u> </u>		_				L	<u></u>
Results:	ــــــــــــــــــــــــــــــــــــــ	<u> </u>				<u> </u>			ᆫ
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		1			Ι	1	1		
				DACKED	DEC	2000			
	11			PACKER					
INITIAL PRODUCTION FIRST 24 HOURS		ND		SIZE		DEPTH SET		ATE SET	
Open Flow /10ths Water inInch	Steel S			9-5/8°00		260	1	<del>20-63</del>	
/10ths Merc., inInch	Flost (	ملله		₩ 9.5#		2238		27-63	
Volume Show Oil & Gas (Drilled w/Rotary) Ou, Ft.	Guide 8	hos	بالــــــــــــــــــــــــــــــــــــ	<u>480 9.5#</u>		2270	10-	27-63	
Rock Pressurelbshrs.	1								
Oil *See Electric Log bbls., First 24 hrs.									
									=
ACIDIZATION OR FRACTURING RECORD					ASING	G CEMENT	red		
<b>5 W</b>					Suri	lace to:			
DATE WELL ACIDIZED 11- 8-63		_	8-5/	BD SIZE _	260	FT1	0-50-	63	_DA:
NAME OF COMPANY DOWNELL		_	1		2220	1	0.27	49	
(List below materials used in Acidizing or Fracturing, i.e., Sand, Cru	de Oil. Gasolir	ie.	4-1/	SIZE _	E IV	Fт <del></del>	0-27-	9)	_Dv.
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and po			Í	SIZE		<u></u> Fт			
Used: 870 Fbls. Cil								<u> </u>	.DAT
Used: 43,000# Sand		_		D IN CER			CAS		<i>3</i>
Used: 300 Gals. Dowell X-Service			30	Page -	Cemer	nt			
Used: 300 Gale. Mud Acid		_				014	D T-		
Used: 40 Gals. Freflo				enented	ey r	Gelette	D. 80	DER	
		_							
to the state of th		_	USE	D IN CEN	ENTI	50 L-1/2	D CAS	ING:	
		_							
			40	Base	Dame '	1 1120 1 200			
		-		Bage -		land Com	ent		
		_		Bage -		land Com	ent		
		_ _ _	500	Gals -	Mad 1	land Com		A	
			500	Gals -	Med ! Hall:	land Com Flush Lburton	Weld-		
	4		500	Gals -	Med ! Hall:	land Com Flush	Weld-		
	÷	 - - - -	500	Gals -	Hall: Bake:	land Com Flush Lburton	Weld- liser	8	
BREAKDOWN PRESSURE 2500 to 3150#			500 1	Gals -	Hall: Bake: 5' S	land Com Flush Lburton r Centra estions	Weld- liser	8	
BREAKDOWN PRESSURE 2500 to 3150#		    	500 1 3	Gals -	Hall: Bake: 5' S Clear	land Com Flush Iburton r Centra ections	Weld- liser of Ro	e to-lia	 
BREAKDOWN PRESSURE  PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  20.5 Bals.  PUMPING TIME  43 HIMSTER		     	500 1 3	Gals -	Hall: Bake: 5' S Clear	land Com Flush Iburton r Centra ections	Weld- liser of Ro	e to-lia	<u> </u>
BREAKDOWN PRESSURE  PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  A3 RIMITES  PUMPING TIME  A3 RIMITES  RESULT AFTER 1 GAS. 35,000	CU. 1	       	500 1 3	Gals -	Hall: Bake: 5' S Clear	land Com Flush Iburton r Centra ections	Weld- liser of Ro	e to-lia	<u> </u>
BREAKDOWN PRESSURE  PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  PUMPING TIME  A3 RIBBUTS  RESULT AFTER  TREATMENT  ON  30	CU. I		500 1 3	Gals -	Hall: Bake: 5' S Clear	land Com Flush Iburton r Centra ections	Weld- liser of Ro	e to-lia	<u></u>
BREAKDOWN PRESSURE PUMPING PRESSURE AVERAGE PUMPING RATE/MINUTE A3 HIMMES PUMPING TIME A3 HIMMES RESULT AFTER GAS. 35,000	ВВІ		500 1 3	Gals -	Hall: Bake: 5' S Clear	land Com Flush Iburton r Centra ections	Weld- liser of Ro	e to-lia	<u> </u>
BREAKDOWN PRESSURE 2600 to 3150# PUMPING PRESSURE 2600 to 3150# AVERAGE PUMPING RATE/MINUTE 20.5 Bols. PUMPING TIME  RESULT AFTER   GAS 35,000 TREATMENT   OIL 30  ROCK PRESSURE AFTER TREATMENT 480	BBI	<b>.s.</b>	500 1 3	Gals -	Hall: Bake: 5' S Clear	land Com Flush Iburton r Centra ections	Weld- liser of Ro	e to-lia	<u> </u>
BREAKDOWN PRESSURE 2500 to 31508 PUMPING PRESSURE ATE/MINUTE 20.5 Bals. PUMPING TIME 43 RIBBITS RESULT AFTER GAS 35,000 TREATMENT OIL 30 ROCK PRESSURE AFTER TREATMENT 480  REMARKS: DF111ed 10-5/8# Role from Surface to	260°	<b>.s.</b>	9000 11 33 16	Gals -	Hadi Hall: Bake: 5' Se Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro mrton	e to-lia	<u></u>
BREAKDOWN PRESSURE 2600 to 3150# PUMPING PRESSURE ATE/MINUTE 20.5 Bols. PUMPING TIME 43 RIMINUTE 8 PUMPING TIME 43 RIMINUTE 8 RESULT AFTER GAS 35,000 TREATMENT OIL 30 ROCK PRESSURE AFTER TREATMENT 480	260°	<b>.s.</b>	9000 11 33 16	Gals -	Hadi Hall: Bake: 5' Se Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro mrton	e to-lia	<u> </u>
BREAKDOWN PRESSURE  2000 to 31508  PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  PUMPING TIME  AS A 35,000  TREATMENT  OIL  ROCK PRESSURE AFTER TREATMENT  REMARKS: Drilled 10-5/8" Role from Surface to Drilled 7-7/8" Hole from 260° to 22	260'	.S.	9000 1 3 18	Gals - Ib Comented	Mud   Hall: Bake: 5' S. Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro mrton	e to-lia	<b>11</b>
BREAKDOWN PRESSURE 2500 to 31508 PUMPING PRESSURE ATE/MINUTE 20.5 Bals. PUMPING TIME 43 RIBBITS RESULT AFTER GAS 35,000 TREATMENT OIL 30 ROCK PRESSURE AFTER TREATMENT 480  REMARKS: DF111ed 10-5/8# Role from Surface to	260'	.S.	9000 1 3 18	Gals - Ib Comented	Mud   Hall: Bake: 5' S. Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro mrton	e to-lia	<u> </u>
BREAKDOWN PRESSURE  2000 to 31508  PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  PUMPING TIME  AS A 35,000  TREATMENT  OIL  ROCK PRESSURE AFTER TREATMENT  REMARKS: Drilled 10-5/8" Role from Surface to Drilled 7-7/8" Hole from 260° to 22	260'	.S.	9000 1 3 18	Gals - Ib Comented	Mud   Hall: Bake: 5' S. Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro mrton	e to-lia	<u> </u>
BREAKDOWN PRESSURE 2500 to 31508  PUMPING PRESSURE 2500 to 31508  AVERAGE PUMPING RATE/MINUTE 20.5 Bals.  PUMPING TIME 43 HIMS 35,000  RESULT AFTER GAS 35,000  ROCK PRESSURE AFTER TREATMENT 480  REMARKS: Drilled 10-5/8" Role from Surface to Drilled 7-7/8" Hole from 250° to 227	260' 70'	.s. 18.	900 1 3 18	Gals - Ib Commuted Note: E	Had ! Hall: Baker 5' S Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
BREAKDOWN PRESSURE 2500 to 3150% PUMPING PRESSURE ATE/MINUTE 20.5 Bals. PUMPING TIME 43 HIMSTS RESULT AFTER GAS 35,000 TREATMENT 30  ROCK PRESSURE AFTER TREATMENT 480  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 250° to 227  Note: This well was logged by McCullough To	o 260' 70' col Compa	s. is.	900 1 3 18	Gals - Ib Commuted Note: E	Had ! Hall: Baker 5' S Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
BREAKDOWN PRESSURE  PUMPING PRESSURE  AVERAGE PUMPING RATE/MINUTE  PUMPING TIME  AS A STATEM  OIL  ROCK PRESSURE AFTER TREATMENT  REMARKS: Drilled 10-5/8" Hole from Surface to  Drilled 7-7/8" Hole from 250° to 227	o 260' 70' col Compa	s. is.	900 1 3 18	Gals - Ib Commuted Note: E	Had ! Hall: Baker 5' S Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
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BREAKDOWN PRESSURE 2500 to 3150% PUMPING PRESSURE ATE/MINUTE 20.5 Bals. PUMPING TIME 43 HIMSTS RESULT AFTER GAS 35,000 TREATMENT 30  ROCK PRESSURE AFTER TREATMENT 480  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 250° to 227  Note: This well was logged by McCullough To	o 260' 70' col Compa	s. is.	900 1 3 18	Gals - Ib Commuted Note: E	Had ! Hall: Baker 5' S Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
BREAKDOWN PRESSURE 2500 to 3150% PUMPING PRESSURE ATE/MINUTE 20.5 Bals. PUMPING TIME 43 HIMSTS RESULT AFTER GAS 35,000 TREATMENT 30  ROCK PRESSURE AFTER TREATMENT 480  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 250° to 227  Note: This well was logged by McCullough To	o 260' 70' col Compa	s. is.	900 1 3 18	Gals - Ib Commuted Note: E	Had ! Hall: Baker 5' S Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
BREAKDOWN PRESSURE 2500 to 3150% PUMPING PRESSURE ATE/MINUTE 20.5 Bals. PUMPING TIME 43 HIMSTS RESULT AFTER GAS 35,000 TREATMENT 30  ROCK PRESSURE AFTER TREATMENT 480  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 250° to 227  Note: This well was logged by McCullough To	o 260' 70' col Compa	s. is.	900 1 3 18	Gals - Ib Commuted Note: E	Had ! Hall: Baker 5' S Clear by:	land Com Flush Iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
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BREAKDOWN PRESSURE 2500 to 3150% PUMPING PRESSURE 2500 to 3150% AVERAGE PUMPING RATE/MINUTE 20.5 Bals. PUMPING TIME 43 HIMSTS RESULT AFTER GAS 35,000 TREATMENT 30 OIL 30 ROCK PRESSURE AFTER TREATMENT 480  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 250° to 227  Sote: This well was logged by McCullough To	o 260' 70' col Compa	ny on	500 1 3 18 Notes	Gals - Ib Commuted Note: E	Had 1 Hall: Baker 5' S Clear by:	land Com Flush iburton r Centra ections ners Hallib	Weld- liser of Ro wrton	to-Hal	
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# BOUTHARENDUOLESCOMPANY, INC.

### **NEW WELL REPORT**

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LEASE NO. 81219			800	ACRES	WORKING DISTRIC	т <u> Вре</u>	acer #h		
Kan fine	<u>n</u>			FARM	WELL N	. N	s <b>L7</b> _	E	w <b>37</b>
Smithfiel	4		Distr Town	ICT OR ROS	<b>7.</b> 0	Cour	1774		QUAD.
LOCATION MADE				ti .	DRILLING COMMEN			. 17,	
RIG COMMENCED_	Decembe	er 13,		1 <b>553</b>	DRILLING COMPLET	red dann	ory 13,		19 <b>.64</b>
RIG COMPLETED_	necesper	r 17,		19 <b>63</b>	DEPTH 2130		SANE	. <u>Big I</u>	njun
Rig. Contractor	Dennin	will:	ing Co.,	IBe.	DRILLING CONTRA	CTOR De	nning 4	illing	Co. Inc.
					AFRA				
ELEVATION: FLOOR	R		GROUND		WORK ORDER NO.	HII-1-0	• 49•		
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#### NEW WELL REPORT - CONT'D.

Ope of Shot ettern of Shot etter of Shot etter of Fluid in Hole When Shot lesults:    PACKER RECORD		<b> </b>		ASING AND T	UBING REC		
Ame of Toppedo Co.  Lo of Quarts  Los of Quarts  Los of Quarts  Los of Quarts  Los of Shell  Limited o	)_1f CL_1	SIZE			INCH TOAN		
Content   Cont	/ale of 9Bot	p d fon	····			en NO.	1
DATE WELL ACIDIZATION OR FRACTURING RECORD  1	1 f T1- C-						-
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow / 10ths Water in			OM OU	- Ede t			╢
DATE WELL ACIDIZATION OR FRACTURING RECORD  DATE WELL FRACTURED  LOSS SURGE  L			<del>2011-</del>	9220			╢
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow / Jobs Water in		108.	wirth	2317			╢
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow / John Water in	Diameter of Shell				-		-∦
DATE WELL PRACTURED  DATE WELL	ength of Anchor	_			<b>├</b>		-⊪
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow / 10ths Water in	Top of Shot	_			<u> </u>		<b>-</b>
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  Open Flow / 10ths Water in	Sottom of Shot				<del>                                     </del>		
PACKER RECORD  INITIAL PRODUCTION FIRST 24 HOURS  NIND  SIZE  DEPTH SIT  DATE SE  DEPTH SIT  DATE SE  SECOL 2397° 1-11-61  PLOT COLLET  JOHN Mater in Inch  JOHN Mater in Inch  JOHN Mater in Inch  JOHN COLLET  JOHN COLLET  Rock Pressure. None Taken  ACIDIZATION OR FRACTURING RECORD  DATE WELL FRACTURED  L-22-01  DATE WELL FRACTURED  SUFFERD 40°  SIZE  Fr.  USKIP IN CEMERATIED  SIZE  SIZE  FR.  USKIP IN CEMERATION  SIZE  SIZE  FR.  USKIP IN CEMERATION  SIZE  CASING CEMERATIED  SIZE  SIZE  SIZE  FR.  USKIP IN CEMERATION  SIZE  SIZE  SOC  SIZE  S	Feet of Fluid in Hole When Shot						Щ
INITIAL PRODUCTION FIRST 24 HOURS    Simple   Size   Depth Set   Date Set   D	Results:						
INITIAL PRODUCTION FIRST 24 HOURS    Simple   Size   Depth Set   Date Set   D							JI
INITIAL PRODUCTION FIRST 24 HOURS    Simple   Size   Depth Set   Date Set   D	<u> </u>	'					
INITIAL PRODUCTION FIRST 24 HOURS    Simple   Size   Depth Set   Date Set   D					<u> </u>		<u> </u>
INITIAL PRODUCTION FIRST 24 HOURS    Simple   Size   Depth Set   Date Set   D				BACKER	PECOPD		·
Open Flow /10ths Water in				.1			
Open Now Pressure 100 to 100 t	INITIAL PRODUCTION FIRST 24 HOURS						
Volume. Show Cil & Ges (Brilled W/Rotary) L. Ft. Rock Pressure. Nome Taken lbs.  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED DATE WELL FRACTURED Halliburton Company (List below materials used in Acidizing of Fracturing, i.e., Sand, Crude Cil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).  Useds 10,000 Galle. Nator  Useds 200 Clas. Sand  Useds 30 Gals. Suds  Comented by: Wall Service, inc.  Useds 30 Gals. Suds  Comented by: Wall Service, inc.  Sussessing Cement  Soc - Gals. Suds  Comented by: Wall Service, inc.  Soc - Gals. Suds  Comented by: Doubli  Ester Suds  Comented by: Doubli  Comented by: Doubli  Comented by: Doubli  Ester Suds  Comented by: Doubli  Comented by: Doubli  Comented by: Doubli  Ester Suds  Comented by: Doubli  Comented by: Doubli  Comented by: Doubli  Ester Suds  Comented by: Doubli  Coment	Open Flow /10ths Water inInch						
Volume Shore Cil & Gas (irilled w/hotory). Ft. Rock Pressure Note Taken lbs. hrs.  Cil. ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED  DATE WELL ACIDIZED  L-22-61  DATE WELL FRACTURED  L-26-65  FT. 12-20-63  DATE WELL FRACTURED  SURED IN CASING CEMENTED  SURED IN CEMENTIED  SURED IN CEMENTIED  L-22-61  DATE WELL FRACTURED  L-22-61  DATE WELL FRACTURED  L-22-61  DATE WELL FRACTURED  L-22-61  DATE WELL ACIDIZED  L-22-61  L-22-61  L-22-62  DATE WELL FRACTURED  L-22-63  DATE WELL FRACTURED  L-22-63  DATE WELL FRACTURED  L-22-61  L-22-61  L-22-61  L-22-61  L-22-61  L-22-63  L-22-63  L-22-63  L-22-63  L-22-63  L-22-63  L-22-63  L-22-63  L-22-63  L-22-61  L-22-62  L-22-63  L-	/10ths Merc. inInch						
ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED  DATE WELL FRACTURED  L=22-5L  NAME OF COMPANY  Halliburton Company  (List below materials used in Acidizing of Fracturing, Le., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothbells, Acid, etc., giving gallons, barrels and pounds).  Useds 15,000 Lbs. Sand  Useds 30 Cole. Suds  Useds 30 Cole. Suds  Useds 30 Cole. Suds  Useds 30 Uses Asia 15 Max  Cemented by: Well Service, Inc.  USED IF CRIEFFIED Life CASING:  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doubl  Average Pumilis RAME/MINUTE  Pumping Pressure  Average Pumilis RAME/MINUTE  Pumping Time  Result After Treatment  Oil. Solds  Bals.  Rock Pressure After Treatment  Lbs.  Casing Cemented  512-20-63  Lbs.  52227  F. 1-11-6L  Lbs.  Size FT.  1-20-63  Lbs.  Size FT.  1-11-6L  Size FT.  1-20-63  Size FT.  1-20-63  Size FT.  1-11-6L  Size FT.  1-20-63  Size FT.	value Show Oil & Gos (Brilled w/Rotory)	Outdo 8	boe	Tign OD	2027	1-	14-64
ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED  DATE WELL FRACTURED  L=22-5L  NAME OF COMPANY  Halliburton Company (List below materials used in Acidizing of Fracturing, Le., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothbells, Acid, etc., giving gallons, barrels and pounds).  Useds 15,000 Lbs. Sand  Useds 30 Cole. Suds  Useds 30 Cole. Suds  Useds 30 Cole. Suds  Useds 30 Uses Asia 15 Max  Cemented by: Well Service, Inc.  USED IF CRIEFTIND Life CASING:  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doubl  Average Pumilis RAME/MINUTE  Pumping Pressure  Average Pumilis RAME/MINUTE  Pumping Time  Result After Treatment  Oil. Solds  Bals.  Rock Pressure After Treatment  Lbs.  Casing Cemented  Suffers 68 F. 12-20-63  Lbs.  Size 265 F. 12-20-63  Lbs.  Size 7. 1-11-6L  Lbs.  Size FT.  USED III CRIEFTIND 8-5/8° CA'IL  USED III CRIEFTIND 8-5/8° CA'IL  USED III CRIEFTIND 8-5/8° CA'IL  USED III CRIEFTIND Life CASING:  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  500 - Cals. Und Acid  Cemented by: Doublis  65 - Bage Cement  1 - Bag Celoium Chlorido  1 - Bag Cement  1 - Bag Celoium Chlorido  1 - Bag Cement  1 - Bag Cem	Rock Pressure None Taken lbs. hrs.			][:	_		
ACIDIZATION OR FRACTURING RECORD  ACIDIZATION OR FRACTURING RECORD  DATE WELL ACIDIZED  DATE WELL FRACTURED  1-22-61  NAME OF COMPANY  Halliburton Company  (List below materials used in Acidizing of Fracturing, Le., Sand, Crude Oil, Gasoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).  Useds 10,000 0gle. Water  Useds 15,000 Lise. Sand  Useds 30 Cales. Suds  Useds 30 Cales. Suds  Useds 30 Cales. Suds  Useds 30 Oiles. Reid 155 RCA  USED 18 CEMERTING 8-5/8° CA 11  ST Bage Cement  1 - Bag Calcium Chloride  Cemented by: Well Service, Ind  USED 18 CEMERTING Ligh CASING:  65 - Bage Cement  500 - Gales. Find Acid  Cemented by: Lossill  Breakdown Pressura 1600 to 21005  Pumping Pressure  Average Pumping Rhighminute  Average Pumping Rhighminute  30,060  Result After Treatment  Oil Bals.  Rock Pressure After Treatment  Lise.  Casing Cemented  502 ft. 12-20-63  Liste 865/8° Size 266 ft. 12-20-63  Liste 12-20-63  Liste 865/8° Size 266 ft. 12-20-63  Liste 965/8° Size		1		1			
DATE WELL ACIDIZED  DATE WELL FRACTURED 1-22-514  NAME OF COMPANY Hall1burton Company  NAME OF COMPANY Hall1burton  NAME OF COMPANY HALL BURTON  NAME OF COMPANY HALL1burton  NAME OF COMPANY H							
DATE WELL ACIDIZED  DATE WELL FRACTURED  1-22-514  NAME OF COMPANY  Relliburton Company  (List below materials used in Acidizing of Fracturing, i.e., Sand, Crude Oil, Gasoline, Water, Kerosene, Molthballs, Acid, etc., giving gallons, barrels and pounds).  Useds 15,000 Lts. Sand  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Comented by: Well Service, Inc.  Useds 30 Qals. Suds  Useds 40	ACIDIZATION OR FRACTURING RECORD	<u> </u>					
DATE WELL FRACTURED 1-22-50;  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). Useds 15,000 Lbs. Sand Useds 25 Qols. Suds Useds 30 Qols. Suds Useds 4 Qols. Fr. 122-05 Uses Suze 7 T. 1-11-61 Uses 12 Qols. Fr. 1-11-6	D		- 1	•			_
NAME OF COMPANY Reall Buffor 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). Useds 10,000 0,1e. Water Useds 15,000 Lbs. Sand Useds 30 Cols. Suds Useds 30 Use. Bars 155 MCA Useds 30 Use. Bars 155 MCA Useds 30 Use. Bars 155 MCA Useds 350 Lbs. WAU-8  Comented by: Well Service, Inc USED IS CENERATION Light CASTED:  65 - Bags Coment  500 - Cals. Flad Acid  Comented by: Loss III  BREAKDOWN PRESSURE AVERAGE PUMPING PRESSURE AVERAGE PUMPING FRESSURE TREATMENT OIL  SOUR  CU. FT.  BBLS.  ROCK PRESSURE AFTER TREATMENT  LBS.  Drilled 10-5/8* Hole from Surface to 266*  Liste: Rotary Tools Used.	1 99_A1.		- 8-9	/8 <sup>8</sup> SIZE	266 <sub>FT</sub>	12-20	-63
(List below materials used in Acidizing of Fracturing, i.e., Sand, Crude Oil, Casoline, Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).  Useds 10,000 Ogle. Water Useds 150 Usle. Sand Useds 30 Ogle. Sude Useds 30 Usle. Raid 155 MCA Useds 30 Usle. Raid 155 MCA Useds 350 List. WAU-8  Cemented by: Well Service, inc USED IS CENERALISE Light CASTED:  65 - Bage Cement  500 - Cale. Mad Acid  Cemented by: Worll  Breakdown Pressure Average Pumping Fine Minute Pumping Time 30,600  Result After 30,600  Result After Treatment Oil Solf  Rock Pressure After Treatment List.  Drilled 10-5/8* Hole from Surface to 266*  Liste: Rotary Tools Used.			hila		1.27	1-1/2	<b>-Kh</b>
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pounds).  Useds 10,000 Ogle. Nator Useds 15,000 Libs. Sand Useds 30 Ogle. Suds Useds 30 Ogle. Suds Useds 30 Uses. Acid 155 MCA  Uses 15 Cemented by: Well Service, inc USED 15 CEMENTED 16 CASTROS  65 Bags Cement  500 - Cols. Fad Acid  Cemented by: Dosell  Cemented by: Dosell  Source 150 Cemented by: Dosell  Comented by: Dosell  Com	TAME OF COMPANY	de Oil Gasoline	1 -	SIZE	Fт.		
Used: 15,000 Los. Sand Used: 15,000 Los. Sand Used: 30 Gols. Buds Used: 300 Use. Horflo Used: Horflo Used: Horflo Use: Horflo Us			'	_			
Used: 15,000 Lbs. Sand  Used: 30 Cals. Horflo  Used: 30 Use. Base Cement  1 - Bag Calcium Chloride  Cemented by: Well Service, Im  USED: 15 CEMENTING Life CASTRO:  USED: 16 CEMENTING Life CASTRO:  OS - Bage Cement  SO - Cals. Flad Acid  Cemented by: Losell  SO - Cals. Flad Acid  Cemented by: Losell  Frankcown Pressure  Average Pumping English Minute  Pumping Time  Result After 30,000  Result After Treatment  OIL BBLS.  Rock Pressure After Treatment  Drilled 10-5/8 Hole from Surface to 266'  Bote: Rotary Tools Used.	Useds 10,000 Cale. Water		<del>                                     </del>	SIZE	FT.	r/0n n	***
Used: 10 Cale. Horflo Used: 30 Cale. Suds Used: 30 U 18. Asid 155 MCA Used: 300 U 18. Asid 155 MCA Used: 350 LBs. MAU-8  Cemented by: Well Service, Inc USED IN CEMENTING Light CASHIG:  65 - Bage Cement  500 - Cale. Find Acid  Cemented by: Lowell  Soo - Cale. Find Acid  Cemented by: Lowell  FREAKDOWN PRESSURE AVERAGE PUMPIGS FAME/MINUTE  PUMPING TIME RESULT AFTER CASHIG:  OIL SOOF BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8* Hole from Surface to 266*  Este: Rotary Toole Used.	Upeds 45,000 Lbs. Sand		-   L	PRN IN CHA	Kuino e-	5/0" C	W. Tr
Used: 30 Oals. Suds Used: 300 U.B. AGE 155 HCA  USED: IE CERESTRO LOS CASTROS  65 - Bage Cement  500 - Gals. Find Acid  Cemented by: Lowell  Company Compan			-   - 5	5 - Begs C	ement		
Used: 300 U.S. Asia 153 MLA  Used: 350 LBs. MAU-8  Cemented by: Well Service, Important to Compare the Compare Co	Used: 30 Gals. Suds		-   <del></del>			orido	
DEED 15 CENESTINO LG* CASTES.  65 - Bage Cement  500 - Cals. Find Acid  Cemented by: Lowell  Breakdown Pressure 1000 to 2000;  Pumping Pressure Average Pumping Final Minute  Pumping Time 30,000  Result After } Gas 30 buls.  Cu. FT.  Dil. 500f BBLS.  Rock Pressure After Treatment LBS.  Drilled 10-5/8* Hole from Surface to 266* Notes Retary Tools Used.	Used: 300 0 10. Acid 155 ACA		_	<u> </u>	NO ZODA GILL	W 200	
65 - Bage Cement  500 - Gals. Find Acid  Cemented by: Lowell  Breakdown Pressure 1000 to 24005  Pumping Pressure 20 mile.  Average Pumping Emily Minute  Pumping Time 30,000  Result After } Gas 38 mile.  OIL 5005 BBLs.  Rock Pressure After Treatment LBs.  Drilled 10-5/8° Hole from Surfece to 266° Settles Retary Tools Used.	Used: 350 LOS. MAC-0			Cemented	by: Well	Servi	co, in
65 - Bage Cement  500 - Gals. Find Acid  Cemented by: Lowell  Breakdown Pressure 1000 to 24005  Pumping Pressure 20 mile.  Average Pumping Emily Minute  Pumping Time 30,000  Result After } Gas 38 mile.  OIL 5005 BBLs.  Rock Pressure After Treatment LBs.  Drilled 10-5/8° Hole from Surfece to 266° Settles Retary Tools Used.			- 132	BD IN CERE	BETHO LOS	CASITE	G e
BREAKDOWN PRESSURE 1000 to 2100 Pumping Pressure 20 male.  Average Pumping Pressure 20 male.  Average Pumping Time 30,000  Result After } Gas 38 mile.  OIL 500 BBLs.  ROCK PRESSURE After Treatment LBs.  Drilled 10-5/8 Hole from Surfect to 266 Gets Retary Tools Used.		5					-
Comested by: Lossil  Breakdown Pressure 1600 to 22000  Pumping Pressure 20 buls.  Average Pumping Entity Note:  Pumping Time 30,000  Result After } Gas 30 buls.  Col. Ft. Treatment Oil 88Ls.  Rock Pressure After Treatment Lbs.  Drilled 10-5/8s Hole from Surfeco to 2601  Este: Rotary Tools Used.			-   `	-			
BREAKDOWN PRESSURE 20 DDIE.  AVERAGE PUMPING PRESSURE 20 DDIE.  AVERAGE PUMPING DATE MINUTE  PUMPING TIME 30,666  RESULT AFTER }  OIL 500 BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8° Hole from Surfece to 266° Settles Retary Tools Used.		-	_   500	- Cols. #	bloa bu		
BREAKDOWN PRESSURE 20 DDIE.  AVERAGE PUMPING PRESSURE 20 DDIE.  AVERAGE PUMPING DATE MINUTE  PUMPING TIME 30,666  RESULT AFTER }  OIL 500 BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8° Hole from Surfece to 266° Settles Retary Tools Used.			-	Commend	Born Curry	.99	
BREAKDOWN PRESSURE 1000 to 21005  PUMPING PRESSURE 20 10016.  AVERAGE PUMPING MATE/MINUTE  PUMPING TIME 30,000  RESULT AFTER GAS 30 5016.  COL. FT. TREATMENT OIL SOUT BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8 <sup>B</sup> Hole from Surface to 260 <sup>1</sup> Listes Retary Tools Used.		<del></del>	-	- Ceremon	by tobe	7&A	
BREAKDOWN PRESSURE 1000 to 21005  PUMPING PRESSURE 20 10016.  AVERAGE PUMPING MATE/MINUTE  PUMPING TIME 30,000  RESULT AFTER GAS 30 5016.  COL. FT. TREATMENT OIL SOUT BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8 <sup>B</sup> Hole from Surface to 260 <sup>1</sup> Listes Retary Tools Used.			-				
BREAKDOWN PRESSURE 1000 to 21005  PUMPING PRESSURE 20 10016.  AVERAGE PUMPING MATE/MINUTE  PUMPING TIME 30,000  RESULT AFTER GAS 30 5016.  COL. FT. TREATMENT OIL SOUT BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8 <sup>B</sup> Hole from Surface to 260 <sup>1</sup> Listes Retary Tools Used.			-				
PUMPING PRESSURE 20 DDIS.  AVERAGE PUMPING MINUTE  PUMPING TIME 30,000  RESULT AFTER   GAS 30 DDIS.  OIL SOOF BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8 Hole from Surface to 2661  Listes Retary Tools Used.			-				
AVERAGE PUMPING ENTERMINUTE  PUMPING TIME  RESULT AFTER 7  OIL  SOOF  ROCK PRESSURE AFTER TREATMENT  LBS.  Drilled 10-5/8* Hole from Surfect to 266*  LESTER ROCKS ROCKS TOOLS Used.	Breakdown Pressure for the Stone						
PUMPING TIME 30,000  RESULT AFTER } GAS 38 BULE. CU. FT.  OIL 5000 BBLS.  ROCK PRESSURE AFTER TREATMENT LBS.  Prilled 10-5/8º Hole from Surfect to 266° Gette: Rotary Tools Used.	Pumping Pressure		-				
RESULT AFTER } GAS 38 Bule. CU. FT. OIL 500# BBLS. ROCK PRESSURE AFTER TREATMENT LBS.  Prilled 10-5/8º Hole from Surfece to 266° Note: Retary Tools Used.	Pumping Pressure	_	<u> </u>				
ROCK PRESSURE AFTER TREATMENT LBS.  Drilled 10-5/8 <sup>B</sup> Hole from Surfect to 266 <sup>1</sup> Note: Rotary Tools Used.	PUMPING TIME 30.000		-				
Prilled 10-5/8" Hole from Surface to 266' Hote: Rotary Tools Used.	PUMPING PRESSURE 20 DUID 20 DUID AVERAGE PUMPING FATE/MINUTE PUMPING TIME 30,000 RESULT AFTER } GAS 30 DUID	CU. FI	- - -		-		
	BREAKDOWN PRESSURE 1000 to 21,005  PUMPING PRESSURE 20 0019  AVERAGE PUMPING TIME 30,000  RESULT AFTER GAS 30 0005						
	BREAKDOWN PRESSURE 1000 to 21,005  PUMPING PRESSURE 20 0019  AVERAGE PUMPING TIME 30,000  RESULT AFTER GAS 30 0005	BBLE	ı.				
MATTER 1-1/0, until 11-nt soo, to stim.	PUMPING PRESSURE AFTER TREATMENT SOLUTION TO SELECT SELECT SOLUTION TO SELECT SOLUTION TO SELECT SOLUTION TO SELECT SELECT SOLUTION TO SELECT SOLUTION TO SELECT SOLUTION TO SELECT SELECT SOLUTION TO SELECT SOLUTION TO SELECT SOLUTION TO SELECT SELE	BBLE	i	tos Peter	Tools lie	and .	
	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 UDIS.  AVERAGE PUMPING TAMEMINUTE 20 UDIS.  AVERAGE PUMPING TAMEMINUTE 20 UDIS.  RESULT AFTER 30,000 ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8 <sup>B</sup> Hole from Surface 1		130				
	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 uble.  AVERAGE PUMPING EMISMINUTE 20 uble.  PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  DETILLED 10-5/8* Hole from Surface 10  REMARKS:  DETILLED 7-1/8* Hole from 200 to 21	LB6 2661	i.	ter 5 Cent	ralizero		
notes ubbrox on, or e-2/on cosmul and mending neform schurt, oh contractor.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 uble.  AVERAGE PUMPING EMISSIMINUTE 20 uble.  AVERAGE PUMPING EMISSIMINUTE 20 uble.  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT 5005  ROCK PRESSURE AFTER TREATMENT 5005  BELLARDES 10-5/8* Hole from Surface 1	LB6 2661	i.	ter 5 Cent	ralizero		
notes ubbrox on, or e-2/on castus ass described negatir of contractor.	PREAKDOWN PRESSURE 1000 to 21005  PUMPING PRESSURE 20 uble.  AVERAGE PUMPING EMISSIMINUTE 20 uble.  PUMPING TIME 30,000  RESULT AFTER 3 55 bule.  TREATMENT OIL 5005  ROCK PRESSURE AFTER TREATMENT.  PETILED 10-5/8* Hole from Surface to 210 and 250	LB6 2661	i.	ter 5 Cent	ralizero		
	PUMPING PRESSURE  AVERAGE PUMPING TIME  PUMPING TIME  RESULT AFTER  TREATMENT  OIL  ROCK PRESSURE AFTER TREATMENT  PUMPING TIME  OF 111ed 10-5/8° Hole from Surface to 200° to	70, res	ik	iter & Cent	ralisere	tieed.	
Note: This well drilled according to Hals 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. INTERMINUTE PUMPING TIME 30,000  RESULT AFTER   GAS 30 0019.  ROCK PRESSURE AFTER TREATMENT 5005  REMARKS: Drilled 10-5/8° Hole from 80f600 to 20  Note: Approx. 30° of 6-5/8° caping was decreased to 10-5/8° caping was decreased to 10-5/	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. MINUTE PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8º Hole from Surface to 20  Botes Approx. 30° of 6-5/8° eneing was de 10-5/8° eneing was	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hole 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 2100f PUMPING PRESSURE 20 DOID.  AVERAGE PUMPING EMISSIONE 20 DOID.  PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8° Hole from 80f to 20  Botes Approx. 30° of 6-5/8° Chaing was decided in the cold of t	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hals 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. MINUTE PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8º Hole from Surface to 20  Botes Approx. 30° of 6-5/8° eneing was de 10-5/8° eneing was	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hals 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. MINUTE PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8º Hole from Surface to 20  Botes Approx. 30° of 6-5/8° eneing was de 10-5/8° eneing was	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hals 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. INTERMINUTE PUMPING TIME 30,000  RESULT AFTER   GAS 30 0019.  ROCK PRESSURE AFTER TREATMENT 5005  REMARKS: Drilled 10-5/8° Hole from 80f600 to 20  Note: Approx. 30° of 6-5/8° caping was decreased to 10-5/8° caping was decreased to 10-5/	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hals 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. MINUTE PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8º Hole from Surface to 20  Botes Approx. 30° of 6-5/8° eneing was de 10-5/8° eneing was	Le 11. unde	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hule 11, under Section 13 of Article 8, Chapter 22 of the Code of The Department of Hines, Cil and Ges Mylsion.	BREAKDOWN PRESSURE 1000 to 2100f PUMPING PRESSURE 20 DOID.  AVERAGE PUMPING EMISSIONE 20 DOID.  PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8° Hole from 80f to 20  Botes Approx. 30° of 6-5/8° Chaing was decided in the cold of t	Lec 2661	ad repu	ir by Cent	rativers	tiend.	
Note: This well drilled according to Hals 11. under Section 13 of Article h.	BREAKDOWN PRESSURE 1000 to 21005 PUMPING PRESSURE 20 0019.  AVERAGE PUMPING EMTS. MINUTE PUMPING TIME 30,000  RESULT AFTER 30,000  ROCK PRESSURE AFTER TREATMENT.  Drilled 10-5/8º Hole from Surface to 20  Botes Approx. 30° of 6-5/8° eneing was de 10-5/8° eneing was	Lec 2661	ad repu	ir by Cent	rativers	tiend.	

8. M

FORM No. 989 IM 2/40 MIG. 9282A

# LTIP'S HEAD OIL SEPTEME CORPUS, DECORPORATED

#### NEW WELL REPORT

				MEAA AAEF	L REPORT				
LEASE NO. 602	19		600	ACRES	Working Distric	<u>.</u>	octor (	9 4	
	Penfiner			FARM	WELL NO. W-12	_ N	_ s_ <b>47</b>	E	w_ <b>37</b>
Sm21	Lichtei		DISTR	•	Reane	Coun			QUAD
				19.63	DRILLING COMMEN			59 <b>,</b>	
IG COMMENCED.	Octobe	r 26,		1969	DRILLING COMPLE	TED B	overber	6,	19 63
				19.63	DEPTH 2330°				
				, Inc.	DRILLING CONTRA				
				•	li .				
LEVATION: FLOC	OR		GROUND		WORK ORDER NO.	ave o		2.VO.	
KIND	тор	воттом	STEEL LINE MEAS.	TEST	N RECORD	тор	воттом	STEEL LINE MEAS.	TEST
d & Stale	0	130	MEAS.					MEAS.	
Hoek:	129	185							
ß	165	205							
Hodk	205	225							
đ	225	<b>a50</b>							
le	350	275							•
ß	275	725					<u> </u>	<u> </u>	
Rock	325	335				<u> </u>	<u> </u>		
4	335	344	340				<u> </u>		
Rock	345	699	<del> </del>		ļ	<u> </u>	1		
e Shelle Bock	630	730	ļ.—.			╀	<u> </u>		
e cours	9720	965			ļ	<del> </del>	<del> </del> -	<del>  </del>	
	995	1616	<del> </del>			<del> </del>	<u> </u>	1	<del></del>
<u>,                                    </u>	IMA	1365	-		<del> </del>	+	<del> </del>	+	
ile .	1389	1435	<del> </del>		1	<del> </del>	1		
<b>d</b>	1439	1510	<del></del>		1	<del> </del>	<del> </del>		
to	1310	1730				<del> </del>	1	<del> </del>	
10	1730	1915	<del>                                     </del>		1		1	<del>                                     </del>	
d .	1919	1955				1	T		
10	1955	235					1		
the Line	2035	21.90							
19	2150	2155							
đ	21.95	2158							
10	3193	2185			<u></u>			<u>L.</u>	
Lieu	2220	2294		C. C.			·	·	
ner Sand	3295	2910	ļ	States Only		ļ	ļ		
injud	2030	2339	Ļ		<u> </u>	1	ļ	<del>                                     </del>	
G 608	2315		ļ		ļ	<del> </del>	ļ	ļl	
हित स्टाइ विक	2335	2330 2330	ļ	<b>_</b>	ļ	<del> </del>	<del> </del>	<del>                                     </del>	
	4333	2377	2377		<b> </b>	<b>_</b>	<del> </del>		
	<b>_</b>	-911	311		<b>-</b>	<u> </u>	<del> </del>		
del Depth		2330	2530		ļ	-			
	-				<u> </u>	-	<del> </del>	<del> </del>	
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### NEW WELL REPORT - CONT'D.

INITIAL TORPEDO RECORD			CA	SING	AND TO	יצוום כ		_	<u> </u>	J
		1	PU	T IN	WELL		1	PULLED	OUT	_
Date of Shot	SIZE	TRA	NSFER	NO.	FEET	INCH	TRANSFE	R NO.	FEET	J
	9-5/88	2011	<b>37</b>		242	-	<u> </u>			T
Iame of Tomado Co	A TOTAL	Tall			2392	3	l			†
lame of Torpedo Co.	2-3/8°	-	<b>v</b>		72		<b> </b>			+
o. of Quarts	-	-			- ADM	_	<del> </del>			+
ength of Shell	Rabang	2577	<b>V</b>		3999	3	<b> </b>		<b> </b>	4
Diameter of Shell		<u> </u>				<u> </u>			<u></u>	ل
ength of Anchor	1									
op of Shot	1									٦
	1	╟──					<b> </b>		<u> </u>	┪
ottom of Shot	┨───	<b> </b>					<del> </del>		<u> </u>	۲
eet of Fluid in Hole When Shot	ļ	ļ			ļ		<u> </u>		<u> </u>	4
esults:	1	1								┙
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,	<b></b>	1					1			٦
	4	<u> </u>			<u></u>	<del>'</del>	<del></del>		<del>:</del>	=;
				PA	CKER	REC	ORD			
INITIAL PRODUCTION FIRST 24 HOURS	K	ND	i	<del></del>	SIZE		EPTH SET		ATE SE	= T
	Steal S				(B) (B)	-+-	340		19-63	_
Open Flow /10ths Water inInch				_					<del></del>	_
	Float C		,	150		_	2357		7-63	
Volume Show (\$1 0 005 (Orilles u/Rotory) Inch	Bolde E	000		<b>73</b> 0	(II)		2977	11-	7-63	
Volume	1					_		1		_
Rock Pressure lbs. hrs.				-		+		<del>                                     </del>		-
Oilbbls., First 24 hrs.	ــــــــــــــــــــــــــــــــــــــ				······					=
ACIDITATION OF THE OFFICE PROPERTY.						SIN	G CEMEN	TEC		=
ACIDIZATION OR FRACTURING RECORD						121NC	J CEMEN	15.0		-
DATE WELL ACIDIZED.				4an		010			40	
DATE WELL ACIDIZED		-	<u>8-5,</u>	/ <del>U</del>	SIZE	240	, Fт	417-157	Q)	_
NAME OF COMPANY HALLSBurton Corpora		-	4-3	Ann		2977	)	11- 7	40	
List below materials used in Acidizing or Fracturing, i.e., Sand, Crude	Oil Casali	_	4-4	-	Size	wri	Fт		~ <i>y</i>	_
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and pou		ic,								
Breds 633 Pole. QL	u.u.,.				SIZE		—Fт. —		_	
Vects 45,000 Sand		-		<b>29. I</b>		7715	0.0-6/0	5 6 V	EA.	۰
best 30 dele. Hyllo		- 1		<b>20</b>		A	-4			_
Used: 600% tiderake II		- 1			868 - I					
Goede 300 Cale. His Actio				Ĉ.	rented	BYS	Gerel	4 D.	iones	_
		-				_				_
		-								
			13	91	D GENERAL	d) · ·	D APO C	VOILED	A.	
		_		200	Sel e	. 00.	4 (2)			_
·		-	7	900		- 100	d Fluch	l		
				65 (	ent.	- Po	meda Co	nent	(Cons	Ī
<del> </del>				-					-	
		_		•	ענ זמ	<b>JUST</b>	. Celur	DUB V	فالتبريقة	•
· · · · · · · · · · · · · · · · · · ·		_			33 Gat	<b>b.</b> 0	f Poend	<b>3</b> Δ &	1 80	Ľ
445		_								_
Breakhown Breesung				1	burton	Cel	•)			
BREAKDOWN PRESSURE 1500 to 3100		_		(D)	- Rod	200	11 (1)00	noma /	3 6 6	-
OMPTING I ALUGUNA		-		-						_
AVERAGE PUMPING RATE MINITE		_			110	œ.	)			
PUMPING TIME 40,000		_		14	[h99	-	ton tol	AA		-
RESULT AFTER   GAS	cu.									_
OIL	BB				Cenan	tot	bys Ba	Mbe	rton (	Ĉ
ROCK PRESSURE AFTER TREATMENT.		18.								-
Drilled 10-5/8° Hole from Surface to	9661			Elne.	on Re	kauc	Brole	Rect.		_
					••			VE031		
navitar A-Ne. unto stor the. to the	W.									
										-
REMARKS: Drilled 10-5/8" Hole from 255 to 258  Britist 7-7/8" Hole from 255 to 258  Brites This well was hopped by Schlusberger	101.					6037	aloog '	væd.		

11, W

FCRM No. 989 IM 2/60 MIG. 9282A

### WOLF'S HEAD OIL REFINING COMPANY, INCORPORATED BOOLTH TIBER WATCH TO THE WATCH



### NEW WELL REPORT

LEASE NO. 81219			800	ACRES	WORKING DISTRICT	Spe	mcer#	4	
Vim. Ka	ufran				WELL NO. W-13				
Smithi	deld		Distr Town		Roane			•	QUAD.
LOCATION MADE	Octobe	er 3,		19_63_	DRILLING COMMENS	EDN	overber	10,	19_ <b>63</b>
RIG COMMENCED	Novem	oer 8,		19_63_	DRILLING COMPLET	ED	ovember.	17,	1963
RIG COMPLETED	Novem	ber 10,		19_ <b>63</b>	<b>ДЕРТН</b> 2313 <sup>1</sup>				
RIG CONTRACTOR_	Denni	ng Drill	ing Co	, Inc.	DRILLING CONTRAC	TORDel	ming D	rilling	Co., Inc.
ELEVATION: FLOOR			GROUND	1096.461	WORK ORDER NO.	AFE #	WH-25-1	√a.	
,				FORMATIO	N RECORD		•		_
KIND	тор	воттом	STEEL LINE MEAS.	TEST	KIND	тор	воттом	STEEL LINE MEAS.	TEST
Clay & Shale	0	350	350						
ShalekRedRock	350	400					<u> </u>		
Sand & Shale	400	690							
Sand Red Rock	690	735 740							-
Shale	735 740	785							-
Sand & Shale	785	790		-		<del></del>	-	-	
Sand	790	805							
Shale	805	880							
Red Rock	880	930							
Sand & Shale	930	1120							•
Sand	1120	1135							
Shake	1135	1145				_			_
Sand	1145	1480			<u> </u>				
Shale Red Rock	1480	1490							
Shale	1500	1535							
Sand	1535	1815	٠.						
Shale & Lime	1815	1870							
Sand	1870	2025							
Shale	2025	2050							
Sand	2050	2065							
Little Lime	2065	2110							
Pencil Gave	2110	2115					<b> </b>	ļ	
Big Lime	2115	2235 2250	<del> </del>				<del> </del>	<u> </u>	
Rig Injun	2235 2250	2265				,		<b>-</b>	
Oil & Gas	2253	2261	-	-			<b>-</b>	<u> </u>	
Shale	2265	2313							
48" Casing		2313	2313					Ĺ	
Total Depth		2313	2313						
	<u> </u>							·	
		<del> </del>	ļ		····				
	<del> </del>	<del> </del>	ļ		· · · · · · · · · · · · · · · · · · ·			<u> </u>	
						<u> </u>	<b>†</b>		
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						<u> </u>	ļ		
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-					1				

### NEW WELL REPORT - CONT'D.

INITIAL TORPEDO RECORD	INITIAL TORPEDO RECORD					G RECOR			
D. (0)	SIZE	<b> </b>	PUT IN V			( <del></del>	PULLED OU		
Date of Shot		-	FER NO.		INCH	TRANSFE	R NO. F	EET	INCH
	8-5/8"	Tally	L	354		ļ	_		
Name of Torpedo Co.	48 CD	Tally	<b>7</b>	2330	10				
No arts	2-3/8=	<u> </u>			<u></u>				
Lens of Shell	Tog.	Tally	7	2333	6				
Diameter of Shell									
Length of Anchor		i			$\vdash$				
Top of Shot	<b></b>	( <del></del>						-	
Bottom of Shot					<del> </del>		<del></del>		
	-	<del></del>			-	<del>                                      </del>			
Feet of Fluid in Hole When Shot		<u> </u>				<b> </b>			
Results:	-	ľ				ļ			
	-	ľ <u></u>			ļ	ļ	_		
	_	ļi			<u> </u>				
	1	<u> </u>				1	!		
•			120.0	CKED	DEC	.OBD			
INITIAL DEPOSIT OF THE PARTY OF	11		PA	CKER			· · · · · · · · · · · · · · · · · · ·		
INITIAL PRODUCTION FIRST 24 HOURS	KI	ND		SIZE		EPTH SET	DATE		
Open Flow /10ths Water inInch	Steel S			/8¤0Đ		350	11-11-		
/10ths Merc. inInch	Ploat C		48"			2293	11-18-	-63	
Volume Show Oil & Gas (Drilled w/Rotary) Lu. Ft.	Guide S	hoe	45"	OD_	_	2313	11-18-	-63	
Rock Pressurelbshrs.							+		
Oil * See Electric Log bbls., First 24 hrs.						-			
On Olis, First 24 hrs.									
ACIDIZATION OR FRACTURING RECORD		Ì		CA	SING	CEMENT	rĖD		
				Surf	200	tor			
DATE WELL ACIDIZED		ءا –	3-5/8° .				1-11-63		
DATE WELL FRACTURED November 27, 1963		- ├~	-7/9	31ZE	<u> </u>	Fт <del>_</del>	1-11-0)		DATE
NAME OF COMPANY DOWN!		-   4	<b>4-1/2"</b> .	3176	2313	Fr. 1	1-18-63		DATE
(List below materials used in Acidizing or Fracturing, i.e., Sand, Crud	le Oil, Gasolin	е, 🗀							DAIL
Water, Kerosene, Mothballs, Acid, etc., giving gallons, barrels and por Used: 775 Bbls. Oil	inds).			31ZE		Fт			DATE
		- I E	NI CREE	CEMON	TING	8-5/8"	CASTNO		
Used: 48,000# Sand Used: 50 Gals - Freflo		_   <del>-</del>	•					_	—
Used: 450# Adomite II		-	50 Bag	8 - Ce	ment				
Used: 350 Gals. HDA Acid		-	Comen	ted by	. 16	iell Ser	wice. To	10.	
Journal of the second		-							
		-			<u> </u>				
-( )		-   <u>u</u>	ISED IN	CEMEN	TING	4-1/2"	CASING	1	
		_  -	45 Da	^					
		_  -	65 Bay						
			500 Ga	<u> Le - M</u>	had F	lush			
		-	7.4	W-114	<b>8</b>	W-74			
1 1	:	_				on Weld			
			18 -	51 Se	ctio	ns of R	oto-Wall	L	
BREAKDOWN PRESSURE 1350#	-	_		Clean	ars.				
Pumping Pressure 2800 to 3400#		-  -							
		-  _	<u> 4 — </u>	Centr	alis	ers			
AVERAGE PUMPING RATE/MINUTE TO DOLES. PUMPING TIME AA HIRITAS		-							
TOMPING TIME		_  -							
BERLIT ACTED ) GAR JISTU	CU. F	- 1	C(	mente	d by	rs Hall	1burton	Com	any
TREATMENT 22		- '							
TREATMENT OIL 33	BBL								
TREATMENT 22	BBL								
TREATMENT OIL 33 ROCK PRESSURE AFTER TREATMENT 497	LB	s	-A P		<b>9</b> 1	- Need			
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8* Hele from Surface to	350¹.	s	ote: R	otary	Tool	s Used.			
TREATMENT OIL 33  ROCK PRESSURE AFTER TREATMENT 497	350¹.	s	ote: R	otary	Tool	s Used.	•	- i	
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8* Hele from Surface to  Drilled 7-7/8* Hole from 350' to 231	350'. 3'.	s. L			Tool	s Used.		· · · ·	
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8* Hele from Surface to	350'. 3'.	s. L			Tool	Ls Used.	•	· · · · ·	
REMARKS: Drilled 10-5/8* Hole from Surface to Drilled 7-7/8" Hole from 350' to 231	350'. 3'.	s. L			Tool	Ls Used.	•		
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8* Hole from Surface to Drilled 7-7/8* Hole from 350' to 231  Note: This well was logged by Schlumberger	350'. 3'.	s.   No iber 12	2, 1963	•			. Chapte	or 22	2.
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 350' to 231  Note: This well was logged by Schlumberger  Note: This well was drilled according to R	350'. 3'. on Novem	No.	2, 1963 Section	13, 0			, Chapte	or 22	2,
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8* Hole from Surface to Drilled 7-7/8* Hole from 350' to 231  Note: This well was legged by Schlumberger	350'. 3'. on Novem	No.	2, 1963 Section	13, 0			, Chapte	or 22	2,
ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 350' to 231  Note: This well was logged by Schlumberger  Note: This well was drilled according to R	350'. 3'. on Novem	No.	2, 1963 Section	13, 0			, Chapte	or 22	2,
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ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 350' to 231  Note: This well was logged by Schlumberger  Note: This well was drilled according to R	350'. 3'. on Novem	No No ober 12 Inder S	2, 1963 Section	13, 0			, Chapte	or 2	2,
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ROCK PRESSURE AFTER TREATMENT 497  REMARKS: Drilled 10-5/8" Hole from Surface to Drilled 7-7/8" Hole from 350' to 231  Note: This well was legged by Schlumberger  Note: This well was drilled according to R	350'. 3'. on Movemule 11, uss, Oil &	No No ober 12 Inder S	2, 1963 Section Division	13, 0	f Ax				2,

11-13

### **DBPix Evaluation**

**HG ENERGY** 

12/20/2017

**KAUFMAN PROJECT** 

SITE: (KPI) Kaufman Produced Water

Sample Time: 1300

Reading Time: 1304

Readings: pH = 6.39 Temp= 8.2 Cond = 167.4

D.O. = 1.85

GPS = 38 45 27.8 and 81 15 48.7 =/- 21ft

Flow = 250 mis / 90sec

Out of pipe in building (filtered)

SITE: (KJL) Kaufman Joseph Lung

Sample Time: 1420

Reading Time: 1424

Readings: pH= 7.81 Temp= 12.8 Cond= 792us

D.O. =1.74

GPS = 38 45 13.3 and 81 15 17.0 +/- 27ft Let Run 3 minutes

out of bathroom sink

SITE: (KRAS) Kaufman Richard A Smith

Sample time: 1630

Reading Time: 1635

Readings: pH= 7.39 Temp= 12.5 Cond = 408us

D.O. = 2.97

GPS = 38 45 38.0 and 81 15 42.1 +/-11ft

Let Run 3 minutes

outside spigot on side of home

Field Meters Used: pH/Temp/Cond = BIOFM1 D.O. = BIOFM4D



Improving the environment, one client at a time...

3029-C Peters Creek Road

Roanoke, VA 24019

TEL: 540.777.1276

REI Consultants, Inc. PO Box 286 Beaver, WV 25813 TEL: (304) 255-2500 Website: www.reiclabs.com

1557 Commerce Road, Suite 201 16 C

Verona, VA 24482 TEL: 540.248.0183 16 Commerce Drive Westover, WV 26501 TEL: 304.241.5861

Monday, January 15, 2018

Roger Heldman HG ENERGY LLC 5260 DUPONT RD PARKERSBURG, WV 26101

TEL: (

(304) 420-1107

FAX:

RE: KAUFMAN UNIT WATER SAMPLING

Work Order #: 17122738 Dear Roger Heldman:

REI Consultants, Inc. received 4 sample(s) on 12/20/2017 for the analyses presented in the following report.

Sincerely,

Jimmy Suttle

**Project Manager** 

(304) 250-6234



### **REI Consultants, Inc. - Case Narrative**

WO#: 17122738

Date Reported: 1/15/2018

Original

Client:

**HG ENERGY LLC** 

**Project:** 

KAUFMAN UNIT WATER SAMPLING

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP and/or VELAP requirements for parameters clearly designated as PA, VA, PAVA, or VELAP in the column labeled NELAP.

Please note if the sample collection time is not provided on the Chain of Custody, the default recording will be 0:00:00. This may cause some tests to be apparently analyzed out of hold.

All tests performed by REIC Service Centers are designated by an annotation on the test code. All other tests were performed by REIC's Main Laboratory in Beaver, WV.

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#### **DEFINITIONS:**

MCL: Maximum Contaminant Level

MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix. Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).

NA: Not Applicable

ND: Not Detected at the PQL or MDL

PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.

Qual: Qualifier that applies to the analyte reported.

TIC: Tentatively Identified Compound, Estimated Concentration denoted by "J" qualifier.

Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

#### QUALIFIERS:

X: Reported value exceeds required MCL

B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL

E: Analyte concentration reported that exceeds the upper calibration standard. Greater uncertainty is associated with this result and data should be considered estimated.

H: Holding time for preparation or analysis has been exceeded.

- J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.
- S: % REC (% recovery) exceeds control limits

#### **CERTIFICATIONS:**

Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, NCDWQ 466, PADEP 68-00839, VADCLS(VELAP) 460148 Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460148, PADEP 68-00839 Roanoke, VA: VADCLS(VELAP) 460150

Verona, VA: VADCLS(VELAP) 460151 Morgantown, WV: WVDHHR 003112M, WVDEP 387

### REI Consultants, Inc. - Analytical Report

WO#: 17122738

Date Reported: 1/15/2018

Original

Client:

**HG ENERGY LLC** 

**Collection Date:** 

12/20/2017 1:00:00 PM

Project:

KAUFMAN UNIT WATER SAMPLING

Date Received:

12/20/2017

Lab ID:

17122738-01A

Matrix:

Waste Water

Client Sample ID:

**KPW** 

Site ID:

SPENCER, WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed N	ELAP	
METALS BY ICP-Low Level			Method: EPA 200.7 Rev. 4.4 (1994)				Analyst: EP		
Barium	86.1	0.300	0.500	NA		mg/L	12/28/2017 5:00 PM	PAVA	
Iron	53.7	0.100	0.500	NA		mg/L	12/26/2017 7:40 PM	PAVA	
Magnesium	2,460	0.500	5.00	NA		mg/L	12/26/2017 7:40 PM	PAVA	
Manganese	0.986	0.0300	0.0500	NA		mg/L	12/26/2017 7:40 PM	PAVA	
Sodium	40,800	300	1,000	NA		mg/L	1/3/2018 8:30 AM	PA/VA	
HARDNESS			Method: SM2340 B-1997				Analyst: EP		
Hardness, Total (As CaCO3)	37,900	100	100	NA		mg/L	12/28/2017 5:00 PM	VA	
ANIONS by ION CHROMATOGRA	APHY		Method: EPA 300.0, Rev.2.1 (1993)			Analyst: CF			
Chloride	94,000	1,000	5,000	NA		mg/L	12/26/2017 10:16 AM	PAVA	
SPECIFIC GRAVITY			Method: SM2710 F-2004			Analyst: SF			
Specific Gravity	1.107 @ 22/4°C	NA	NA	NA		NA	12/21/2017 3:16 PM		
CONDUCTIVITY @ 25 °C			Method: SM2510 B-1997			Analyst: KY			
Specific Conductivity	140,000	NA	NA	NA		µmho/cm	12/21/2017 6:23 PM	PAVA	
TOTAL DISSOLVED SOLIDS			Method: SM2540 C-1997			Analyst: KY			
Total Dissolved Solids	119,000	50	100	NA		mg/L	12/21/2017 7:00 PM	PAVA	
ALKALINITY to pH 4.3			Method: SM2320 B-1997			Analyst: VS			
Alkalinity, Total (As CaCO3)	108	1.0	20.0	NA		mg/L	12/22/2017 9:49 AM	PAVA	
pH - LAB TEST, HOLD TIME EXF	PIRED:		Method: SM4500-H+-B-2000			Analyst: VS			
рН	6.47	NA	NA	NA	н	SU	12/22/2017 9:49 AM		
ORGANIC CARBON, TOTAL			Method: SM5310 C-2000				Analyst: VS		
Total Organic Carbon	1.62	0.20	1.00	NA		mg/L	12/27/2017 1:14 PM	PAVA	