

OILFIELD RESEARCH LABORATORIES

536 NORTH HIGHLAND - CHANUTE, KANSAS 66720 - PHONE (316) 431-2650

November 26, 1982

Triple-I Energy Corporation
8100 Marty, Suite 117
Overland Park, Kansas 66204

Gentlemen:

Enclosed herewith is the report of the analysis of the rotary core taken from the Nolin Lease, Well No. 33, located in Linn County, Kansas and submitted to our laboratory on November 19, 1982.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES

Sanford A. Michel

SAM/rmc

5 c to Overland Park, Kansas

Oilfield Research Laboratories
GENERAL INFORMATION & SUMMARY

Company Triple-I Energy Corporation Lease Nolin Well No. 33
 Location E $\frac{1}{2}$, SW $\frac{1}{4}$
 Section 23 Twp. 19S Rge. 22E County Linn State Kansas

Elevation, Feet

Name of Sand.....

Cattleman

Top of Core

653.0

Bottom of Core

669.4

Top of Sand

653.0

Bottom of Sand

667.8

Total Feet of Permeable Sand

13.4

Total Feet of Floodable Sand

7.1

Distribution of Permeable Sand: Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 9	4.2	4.2
30 - 60	2.8	7.0
60 - 85	5.0	12.0
113 - 347	1.4	13.4

Average Permeability Millidarcys

55.6

Average Percent Porosity

20.1

Average Percent Oil Saturation

51.4

Average Percent Water Saturation

27.5

Average Oil Content, Bbls./A. Ft.

817.

Total Oil Content, Bbls./Acre

10,953.

Average Percent Oil Recovery by Laboratory Flooding Tests

10.6

Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.

171.

Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre

1,213.

Total Calculated Oil Recovery, Bbls./Acre

See "Calculated Recovery"
Section

-2-

The core was sampled and the samples sealed in plastic bags by a representative of the client.

FORMATION CORED

The detailed log of the formation cored is as follows:

<u>Depth Interval, Feet</u>	<u>Description</u>
653.0 - 654.4	Alternate layers gray shale and brown sandstone.
654.4 - 656.2	Brown sandstone.
656.2 - 658.9	Brown sandstone with widely scattered gray shale partings.
658.9 - 659.4	Gray shale.
659.4 - 660.4	Dark brown sandstone.
660.4 - 660.6	Gray shale.
660.6 - 661.0	Dark brown sandstone.
661.0 - 661.2	Gray shale.
661.2 - 662.0	Brown sandstone.
662.0 - 663.8	Alternate layers gray shale and brown sandstone.
663.8 - 665.5	Dark brown sandstone.
665.5 - 666.5	Grayish dark brown shaly sandstone.
666.5 - 667.0	Gray sandy shale.
667.0 - 667.8	Grayish brown shaly sandstone.
667.8 - 669.0	Gray shale.
669.0 - 669.4	Black sandy limestone.

LABORATORY FLOODING TESTS

The sand in this core responded to laboratory flooding tests, as a total recovery of 1,213 barrels of oil per acre was obtained from 7.1 feet of sand. The weighted average percent oil saturation was reduced from 48.2 to 37.6, or represents an average recovery of 10.6 percent. The weighted average effective permeability of the samples is 5.84 millidarcys, while the average initial fluid production pressure is 18.1 pounds per square inch (See Table V).

By observing the data given in Table IV, you will note that of the 15 samples tested, 8 produced water and oil, and 2 samples water only. This indicates that approximately 53 percent of the sand represented by these samples is floodable pay sand.

CALCULATED RECOVERY

It would appear from a study of the core data, that efficient primary and waterflood operations in the vicinity of this well should recover approximately 2,460 barrels of oil per acre. This is an average recovery of 346 barrels per acre foot from 7.1 feet of floodable sand analyzed in this core.

These recovery values were calculated using the following data and assumptions:

Original formation volume factor, estimated	1.05
Reservoir water saturation, percent, estimated	15.0
Average porosity, percent	20.6
Oil saturation after flooding, percent	37.6
Performance factor, percent, estimated	50.0
Net floodable sand, feet	7.1

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Triple-I Energy Corporation Lease Nolin Well No. 33

Sample No.	Depth, Feet	Effective Porosity Percent	Percent Saturation			Oil Content Bbls. / A Ft.	Perm., Mill.	Feet of Sand		Total Oil Content	Perm. Capacity Ft. X md.
			Oil	Water	Total			Ft.	Cum. Ft.		
1	653.6	16.5	55	39	94	704	8.0	1.4	1.4	986	11.20
2	654.5	21.1	57	24	81	933	31.	0.8	2.2	746	24.80
3	655.4	19.1	33	31	64	489	35.	1.0	3.2	489	35.00
4	656.3	22.0	46	21	67	785	82.	0.8	4.0	628	65.60
5	657.4	19.6	38	39	77	578	31.	1.0	5.0	578	31.00
6	658.4	21.2	47	26	73	773	62.	0.9	5.9	696	55.80
7	659.5	23.1	53	21	74	950	113.	1.0	6.9	950	113.00
8	660.8	24.3	51	15	66	961	346.	0.4	7.3	384	138.40
9	661.6	22.5	43	28	71	751	78.	0.8	8.1	601	62.40
10	662.6	14.5	14	69	83	158	7.5	1.0	9.1	158	7.50
11	663.4	20.5	60	21	81	954	70.	0.8	9.9	763	56.00
12	664.4	21.8	81	9	90	1370	84.	0.7	10.6	959	58.80
13	665.3	21.6	72	16	88	1207	82.	1.0	11.6	1207	82.00
14	666.4	19.7	75	17	92	1146	1.8	1.0	12.6	1146	1.80
15	667.4	20.1	53	12	65	827	2.4	0.8	13.4	662	1.92

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company		Triple-I Energy Corporation		Lease		Nolin		Well No.		33	
Depth Interval, Feet		Feet of Core Analyzed		Average Permeability, Millidarcys		Permeability Capacity Ft. x Md.					
653.0 - 662.0		8.1		66.3		537.20					
662.0 - 667.8		5.3		39.2		208.02					
653.0 - 667.8		13.4		55.6		745.22					

Depth Interval, Feet		Feet of Core Analyzed		Average Percent Porosity		Average Percent Oil Saturation		Average Percent Water Saturation		Average Oil Content Bbl./A. Ft.		Total Oil Content Bbls./Acre	
653.0 - 662.0		8.1		20.5		47.0		28.8		748		6,058	
662.0 - 667.8		5.3		19.5		58.1		25.4		924		4,895	
653.0 - 667.8		13.4		20.1		51.4		27.5		817		10,953	

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RESULTS OF LABORATORY FLOODING TESTS

TABLE IV

Company			Triple-I Energy Corporation			Lease			Nolin			Well No.			33		
Sample No.	Depth, Feet	Effective Porosity Percent	Original Oil Saturation		Oil Recovery		Residual Saturation		Volume of Water Recovered cc*	Effective Permeability Millidarcys**	Initial Fluid Production Pressure Lbs./Sq./In.						
			%	Bbbls./A. Ft.	%	Bbbls./A. Ft.	% Oil	% Water				Bbbls./A. Ft.					
1	653.6	16.6	55	708	13	167	42	55	98	1.57	15						
2	654.5	21.0	57	929	16	261	41	46	10	0.15	45						
3	655.4	19.2	33	492	3	45	30	59	416	6.67	20						
4	656.3	22.0	46	785	14	239	32	57	266	4.65	15						
5	657.4	19.1	39	578	0	0	39	40	0	Imp.	-						
6	658.4	21.0	47	766	7	114	40	53	368	6.60	20						
7	659.5	23.2	53	954	15	270	38	48	232	2.83	10						
8	660.8	24.1	51	954	14	262	37	48	212	27.74	10						
9	661.6	22.4	43	747	4	70	39	53	188	11.06	10						
10	662.6	14.4	14	156	0	0	14	70	0	Imp.	-						
11	663.4	20.5	60	954	0	0	60	26	32	0.50	40						
12	664.4	21.9	81	1376	0	0	81	13	26	0.37	45						
13	665.3	21.4	73	1212	0	0	73	17	0	Imp.	-						
14	666.4	20.1	74	1154	0	0	74	19	0	Imp.	-						
15	667.4	20.3	52	819	0	0	52	14	0	Imp.	-						

Notes: cc—cubic centimeter.

*—Volume of water recovered at the time of maximum oil recovery.

**—Determined by passing water through sample which still contains residual oil.

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SUMMARY OF LABORATORY FLOODING TESTS

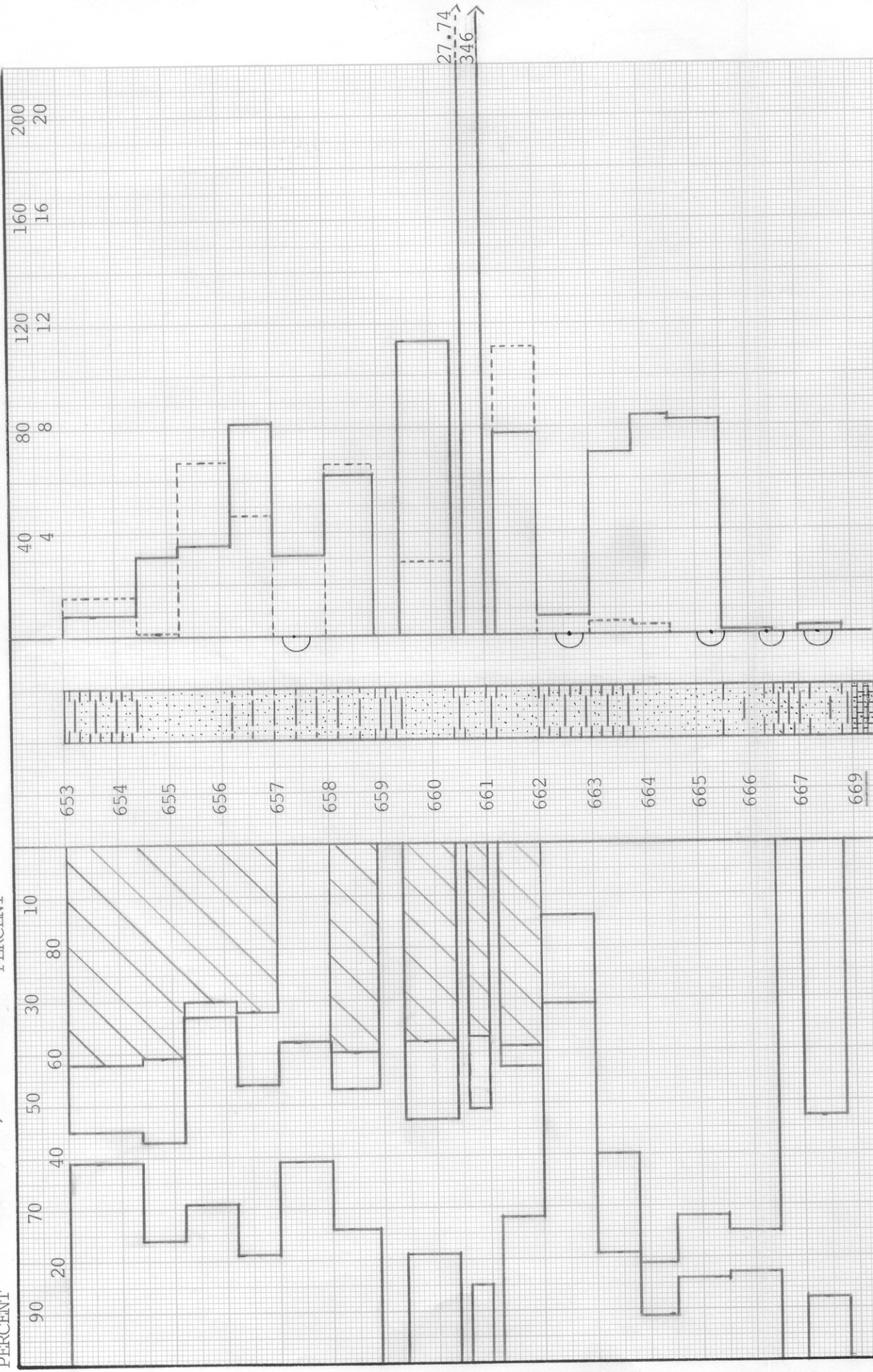
TABLE V

Company	Triple-I Energy Corporation	Lease	Nolin	Well No.	33
Depth Interval, Feet	653.0 - 662.0				
Feet of Core Analyzed	7.1				
Average Percent Porosity	20.6				
Average Percent Original Oil Saturation	48.2				
Average Percent Oil Recovery	10.6				
Average Percent Residual Oil Saturation	37.6				
Average Percent Residual Water Saturation	52.9				
Average Percent Total Residual Fluid Saturation	90.5				
Average Original Oil Content, Bbls./A. Ft.	772.				
Average Oil Recovery, Bbls./A. Ft.	171.				
Average Residual Oil Content, Bbls./A. Ft.	601.				
Total Original Oil Content, Bbls./Acre	5,478.				
Total Oil Recovery, Bbls./Acre	1,213.				
Total Residual Oil Content, Bbls./Acre	4,265.				
Average Effective Permeability, Millidarcys	5.84				
Average Initial Fluid Production Pressure, p.s.i.	18.1				

NOTE: Only those samples which recovered oil were used in calculating the above averages.

WATER SAT., PERCENT $\longleftrightarrow$ OIL SAT., PERCENT

PERMEABILITY, IN MILLIDARCYs
 --- EFFECTIVE PERMEABILITY TO WATER, IN MILLIDARCYs
 --- PERMEABILITY TO WATER, IN MILLIDARCYs



KEY:

SANDSTONE

SHALE

SANDY LIMESTONE

SHALY SANDSTONE

SANDSTONE WITH SHALE PARTINGS

667

669

KEY:



SANDSTONE



SHALE



SANDY SHALE



IMPERMEABLE TO WATER



SANDY LIMESTONE



SHALY SANDSTONE



SANDSTONE WITH SHALE PARTINGS



ALTERNATE LAYERS OF SANDSTONE AND SHALE



FLOODPOT RESIDUAL OIL SATURATION

TRIPLE I ENERGY CORPORATION

NOLIN LEASE

WELL NO. 33

LINN COUNTY, KANSAS

DEPTH INTERVAL, FEET	FEET OF CORE ANALYZED	AVERAGE PERCENT POROSITY	AVG. OIL SATURATION PERCENT	AVG. WATER SATURATION PERCENT	AVERAGE PERMEABILITY, MILLIDARCYS	CALCULATED OIL RECOVERY BBLs. / ACRE
653.0 - 662.0	8.1	20.5	47.0	28.8	66.3	
662.0 - 667.8	5.3	19.5	58.1	25.4	39.2	
653.0 - 667.8	13.4	20.1	51.4	27.5	55.6	2460 (PRIMARY AND WATERFLOODING)

OILFIELD RESEARCH LABORATORIES
CHANUTE, KANSAS
NOVEMBER, 1982 PDC