ANALYSIS
CONSULTING
SALES
SERVICE

J-LABS, INC.
WATER SERVICES

TECK:LABS DIVISION

P. O. BOX 489
Bradford, PA 16701
Tel. 814-368-6087

NOV 1985
RECEIVED

November 20, 1985

Case No. 84366

Lenape Resources
Attention: Mr. John Holko
26 Harvester Avenue
Batavia, NY 14020

Subject: Brine Samples Received November 12, 1985

Gentlemen:

Analysis results from the subject samples are recorded on the attached sheets. Test procedures, to the best of our knowledge, conform to specified procedures except where otherwise noted, (i.e. API-calculations). API procedures have been applied where standard procedures do not seem applicable due to the brine strengths.

Should there be any questions on this information or if further discussion is required in any regard, please do not hesitate to contact our office.

Very truly yours,

J-LABS, INC.
TECK:LABS DIVISION

John S. Mitchell gc

John S. Mitchell

JSM/gc
Encs:

Case No. 84300

WATER ANALYSIS RESULTS

ANALYSIS
CONSULTING
SALES
SERVICE

J-LABS, INC.
WATER SERVICES

P. O. BOX 489
Bradford, PA 16701
Tel. 814-368-6087

TECK:LABS DIVISION

CLIENT: Lenape Resources

SYSTEM:

Sample No.		85K89	85K90	85K91	85K92
Date Sampled		11-12-85	11-12-85	11-12-85	11-12-85
Time Sampled		9:30 a.m.	11:15 a.m.	1:55 p.m.	2:15 p.m.
Date Received		11-12-85	11-12-85	11-12-85	11-12-85
Location:		LCR #16	LCR #20	LCR #184	LCR #238
Appearance When Sampled					
Appearance After Standing					
Carbonate		0	0	0	0
~~xxxx~~ Bicarbonate		7	22	276	20
Temperature	°F				
pH		4.7	4.6	6.3	5.3
Carbon Dioxide	CO_2	NA*	NA*	NA*	NA*
Dissolved Oxygen	O_2	Trace	Trace	1.3	Trace
Residual Chlorine	Cl_2				
Hydrogen Sulfide	H_2S	<0.1	<0.1	<0.1	<0.1
Turbidity	NTU				
Alkalinity to Phenolphthalein	as $CaCO_3$				
Alkalinity to Methyl Orange	as $CaCO_3$	6	18	226	16
Chlorides	Cl	200,000	168,000	186,000	190,000
Total Hardness	$CaCO_3$				
Calcium	Ca	41,200	36,800	38,400	40,000
Magnesium	Mg	2,670	3,400	1,940	1,220
Sulfates	SO_4	310	340	340	210
Phosphate	PO_4				
Manganese	Mn	85	95	96	87
Iron (Total)	Fe	352	1,080	1,520	402
Iron (Dissolved)	Fe				
Total Solids (Dissolved)	(API)	321,000	269,000	300,000	306,000
Suspended Solids					
Specific Gravity (60 °F)		1.210	1.180	1.205	1.205
Specific Conductance, umhos/cm.		212,000	207,500	205,000	209,000
Barium		<10	<10	<10	<10
Sodium	(API)	77,000	60,000	73,000	75,000

Results expressed in mg/liter - "ND" means not determined.

Sulfite	<2	<2	<2	<2

*NA = High Concentrations of Hydrolyzable Metals Precludes Meaningful Titration. Possible Mineral Acid Presence Also.

Case No. 84366

WATER ANALYSIS RESULTS

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WATER SERVICES

P. O. BOX 489
Bradford, PA 16701
Tel. 814-368-6087

TECK:LABS DIVISION

CLIENT: Lenape Resources SYSTEM:

Sample No.		85K93	85K94	85K95	85K96
Date Sampled		11-12-85	11-12-85	11-12-85	11-12-85
Time Sampled		2:30 p.m.	8:00 a.m.	9:00 a.m.	8:30 a.m.
Date Received		11-12-85	11-12-85	11-12-85	11-12-85
Location:		LCR #21	LCR #285	LCR #229	LCR #279
Appearance When Sampled					
Appearance After Standing					
Carbonate		0	0	0	0
Bicarbonate		20	51	29	54
Temperature	°F				
pH		4.8	4.8	4.6	5.1
Carbon Dioxide	CO_2	NA*	NA*	NA*	NA*
Dissolved Oxygen	O_2	Trace	1.0	Trace	0.6
Residual Chlorine	Cl_2				
Hydrogen Sulfide	H_2S	<0.1	<0.1	<0.1	<0.1
Turbidity	NTU				
Alkalinity to Phenolphthalein	as $CaCO_3$				
Alkalinity to Methyl Orange	as $CaCO_3$	16	42	24	44
Chlorides	Cl	188,000	164,000	198,000	166,000
Total Hardness	$CaCO_3$				
Calcium	Ca	39,600	34,000	40,800	32,400
Magnesium	Mg	2,430	2,430	1,940	3,160
Sulfates	SO_4	270	450	350	430
Phosphate	PO_4				
Manganese	Mn	97	83	68	71
Iron (Total)	Fe	430	981	592	895
Iron (Dissolved)	Fe				
Total Solids (Dissolved)	(API)	302,000	264,000	319,000	267,000
Suspended Solids					
Specific Gravity (60 °F)		1.210	1.185	1.190	1.185
Specific Conductance, umhos/cm.		206,000	209,000	202,500	200,500
Barium		<10	<10	<10	<10
Sodium	(API)	71,800	62,800	77,800	64,500

Results expressed in mg/liter "ND" means not determined.

Sulfite	<2	<2	<2	<2

*NA = High Concentrations of Hydrolyzable Metals Precludes Meaningful Titration. Possible Mineral Acid Presence Also.

WATER ANALYSIS RESULTS

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J-LABS, INC.
WATER SERVICES

P. O. BOX 489
Bradford, PA 16701
Tel. 814-368-6087

TECK:LABS DIVISION

CLIENT: Lenape Resources SYSTEM:

Sample No.		85K97	85K98		
Date Sampled		11-12-85	11-12-85		
Time Sampled		9:45 a.m.	8:00 a.m.		
Date Received		11-12-85	11-12-85		
Location:		LCR #253	LCR #183		
Appearance When Sampled					
Appearance After Standing					
Carbonate		0	0		
~~Odor~~ Bicarbonate		59	41		
Temperature	°F				
pH		5.8	5.7		
Carbon Dioxide	CO_2	NA*	NA*		
Dissolved Oxygen	O_2	0.0	0.0		
Residual Chlorine	Cl_2				
Hydrogen Sulfide	H_2S	<0.1	<0.1		
Turbidity	NTU				
Alkalinity to Phenolphthalein	as $CaCO_3$				
Alkalinity to Methyl Orange	as $CaCO_3$	48	34		
Chlorides	Cl	210,000	196,000		
Total Hardness	$CaCO_3$				
Calcium	Ca	56,800	56,000		
Magnesium	Mg	5,350	970		
Sulfates	SO_4	170	190		
Phosphate	PO_4				
Manganese	Mn	0.27	0.23		
Iron (Total)	Fe	18.9	18.0		
Iron (Dissolved)	Fe				
Total Solids (Dissolved)	(API)	333,000	314,000		
Suspended Solids					
Specific Gravity (60 °F)		1.225	1.220		
Specific Conductance, umhos/cm.		205,000	200,000		
Barium		<10	<10		
Sodium	(API)	60,700	60,800		
Sulfite		<2	<2		

Results expressed in mg/liter - "ND" means not determined.

*NA = High Concentrations of Hydrolyzable Metals Precludes Meaningful Titration. Possible Mineral Acid Presence Also.

ATTACHMENT H

Operating Data

I. Data Outline

Average Daily Rate:	12.5 Bbl/Min	525 GAL/MIN
Maximum Daily Rate:	14.0 Bbl/Min	588 GAL/MIN
Average Daily Volume:	400 Bbl/Day	
Maximum Daily Volume:	2,000 Bbl/Day	
Average Injection Pressure:	0 psig (Surface)	
Maximum Injection Pressure:	250 psig (Surface)	

II. Injection Pressure Analysis

Using an average fracture gradient of 0.86 psi/ft., which was the data supplied by Halliburton for 822' - 1157' Marcellus shale wells near Dansville, New York; the pressure needed to create a fracture out of the salina in the Ranous well would be as follows:

Fracture Gradient: .86 psi/ft
Injection Brine Hydrostatic: 10 #/gal Max.
Well Depth: 643 feet
Wellhead Pressure = (643 ft)(.86 psi/ft) - (643 ft)(.5195 psi/ft)
= 219 psia
= 234 psig
Bottom Hole Pressure = 583 psig ?

III. Nature of Annulus Fluid

The annulus contains a combination of fresh water and bentonite gel.

IV. Injection Fluid Analysis

Injection fluid is produced fluids from Lenape Operated Medina and Bass Island wells in Western New York. The following list and analysis is a sampling of these fluids.

Ranous Well Disposal Fluid Samples

All: New York State

LRC No.	County	Township	Date	Time	Comments
16	Wyoming	Bennington	11/12/85	9:30 am	Medina Fluid
20	Wyoming	Covington	11/12/85	11:15 am	Medina Fluid
184	Livingston	York	11/12/85	1:55 pm	Medina Fluid
238	Livingston	Caledonia	11/12/85	2:15 pm	Medina Fluid
21	Genesee	Pavilion	11/12/85	2:30 pm	Medina Fluid
285	Chautauqua	Ellery	11/12/85	8:00 am	Medina Fluid (Tank Sample)
229	Chautauqua	Ellery	11/12/85	9:00 am	Medina Fluid
279	Chautauqua	Ellery	11/12/85	8:30 am	Medina Fluid
253	Chautauqua	Ellery	11/12/85	9:45 am	Bass Islands Fluid (Ta Sample)
183	Chautauqua	Ellery	11/12/85	8:00 am	Bass Isla Fluid

ATTACHMENT I

Formation Testing Program

I. The formation fluid pressure was obtained by using a Bottom Hole Pressure Gauge supplied by Halliburton Services.
   Measured Bottom Hole Pressure: 254 psig

II. Formation fracture pressure was obtained from historical fracturing data given in Attachment A

   The Ranous Well LRC# 73 is under vacuum conditions which make the calculations for obtaining fracture pressures difficult.

III. The physical characteristics of the injection zone are described in Attachment G.

   The attached water analysis from the pit on LRC# 224 was recovered when drilling through the Salina on that well, it should represent formation water.

IV. The injection zone of the Ranous Disposal Well LRC# 73, is operating under vacuum conditons which makes calculations for permeability and porosity difficult.

On May 18, 1983, an injection test was performed on the Ranous well. A brief outline of the test is as follows:

1. 4½" casing was placed at 640' on a Butler Larkin C-134openhole packer to isolate the injection zone.

2. 2 3/8" tubing was placed in the well to isolate the bottom hole pressure gauge from turbulent flow.

3. A bottom hole pressure gauge was placed in a perforated tubing joint at approximately 650' to record bottom hole pressure.

4. A surface pressure recorder was used to record the annular pressure between the 4½" casing and the 7 7/8' Openhole.

5. A surface pressure recorder was used to record the annular pressure between the 2 3/8" tubing and 4½" casing.

6. Brine was injected between the 2 3/8" tubing and the 4½" casing at varying rates.

The attached outline gives a snyopsis of the pressures, rates, and comments during the injection test.

Copies of the annular pressure charts and also the interpretation of the bottom hole pressure gauge is included.

HALLIBURTON SERVICES

REPORT NO. W-263

RECEIVED 1-9-84

DATE Jan. 6, 1984

O: Geoff Hannon
Lenape Resources, Corp.
9489 Alexander Road
Alexander, NY 14005

OMPANY LENAPE RESOURCES

EASE _____ WELL NO. _____ FORMATION _____

IELD _____ COUNTY _____ STATE _____

AMPLE SOURCE LRC #224 DEPTH _____

UBMITTED BY LENAPE DATE 1-3-84 DISTRICT _____

ARKED _____

Specific Gravity	1.165 @ 68 °F		Nesslens NH_3 (N)	-	ppm
pH	2.6		Sulfate (SO_4)	-	ppm
Chloride (C)	190,000	ppm	Iron (Fe)	Not checked	ppm
Total Hardness ($CaCO_3$)	125,000	ppm	Sulfide (S)	None	
Calcium (Ca)	38,800	ppm	Bicarbonate (HCO_3)	pH too low	ppm
Magnesium (Mg)	6,804	ppm			

COMMENT: This is the water analysis of the water pumped down Injection Well LRC #73.

(ppm not corrected for gravity)

Respectively submitted,
HALLIBURTON SERVICES

JOHN C. HOLKO
ANALYST

By _____
DIVISION CHEMIST

NOTICE: This report is limited to the described sample tested. Any person using or relying on this report agrees that Halliburton shall not be liable for any loss or damage, whether due to act or omission, resulting from such report or its use.

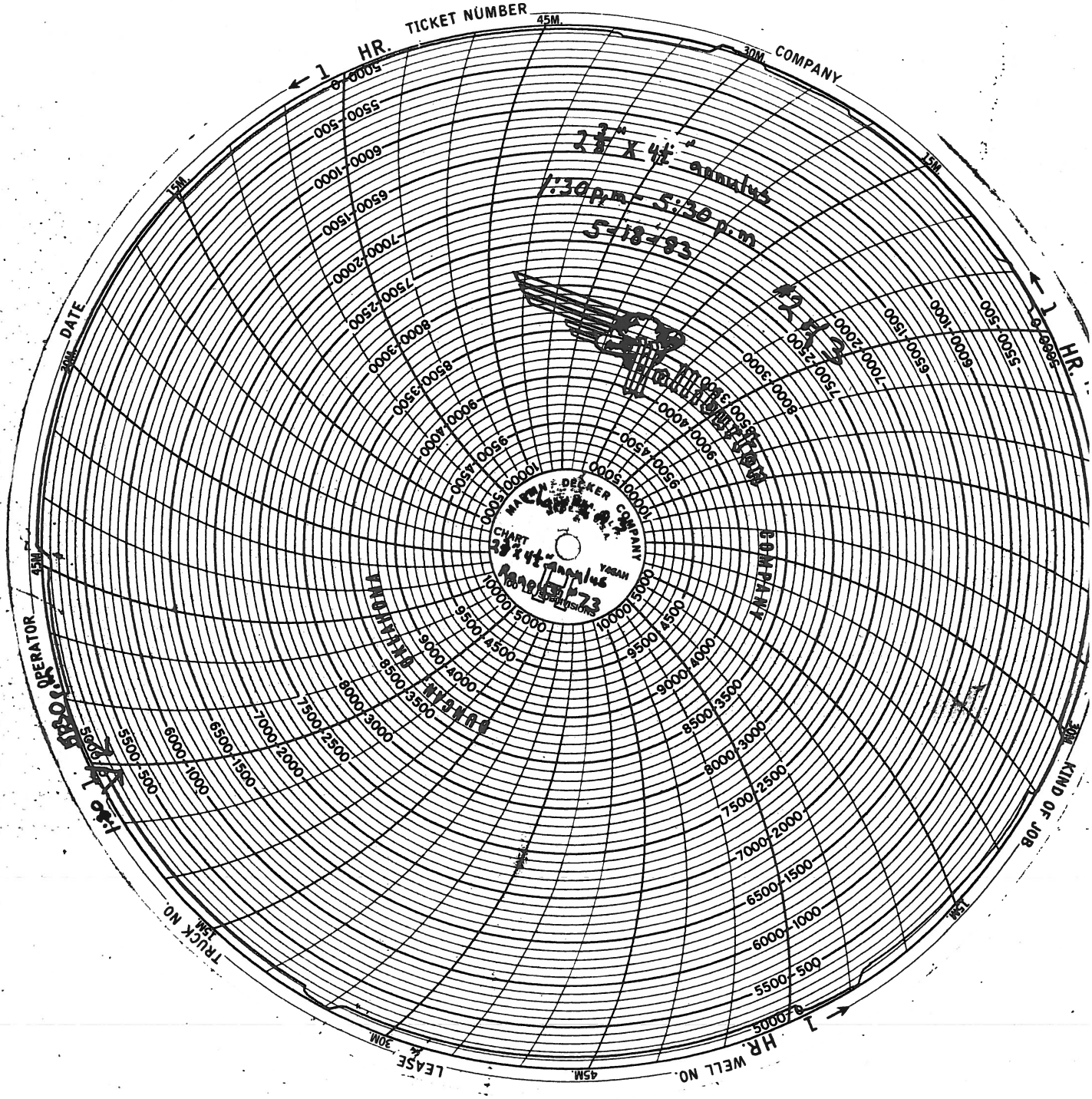
A DIVISION OF HALLIBURTON COMPANY

INJECTION T
Company- The Lenape Res
Lease - L. C. Ran

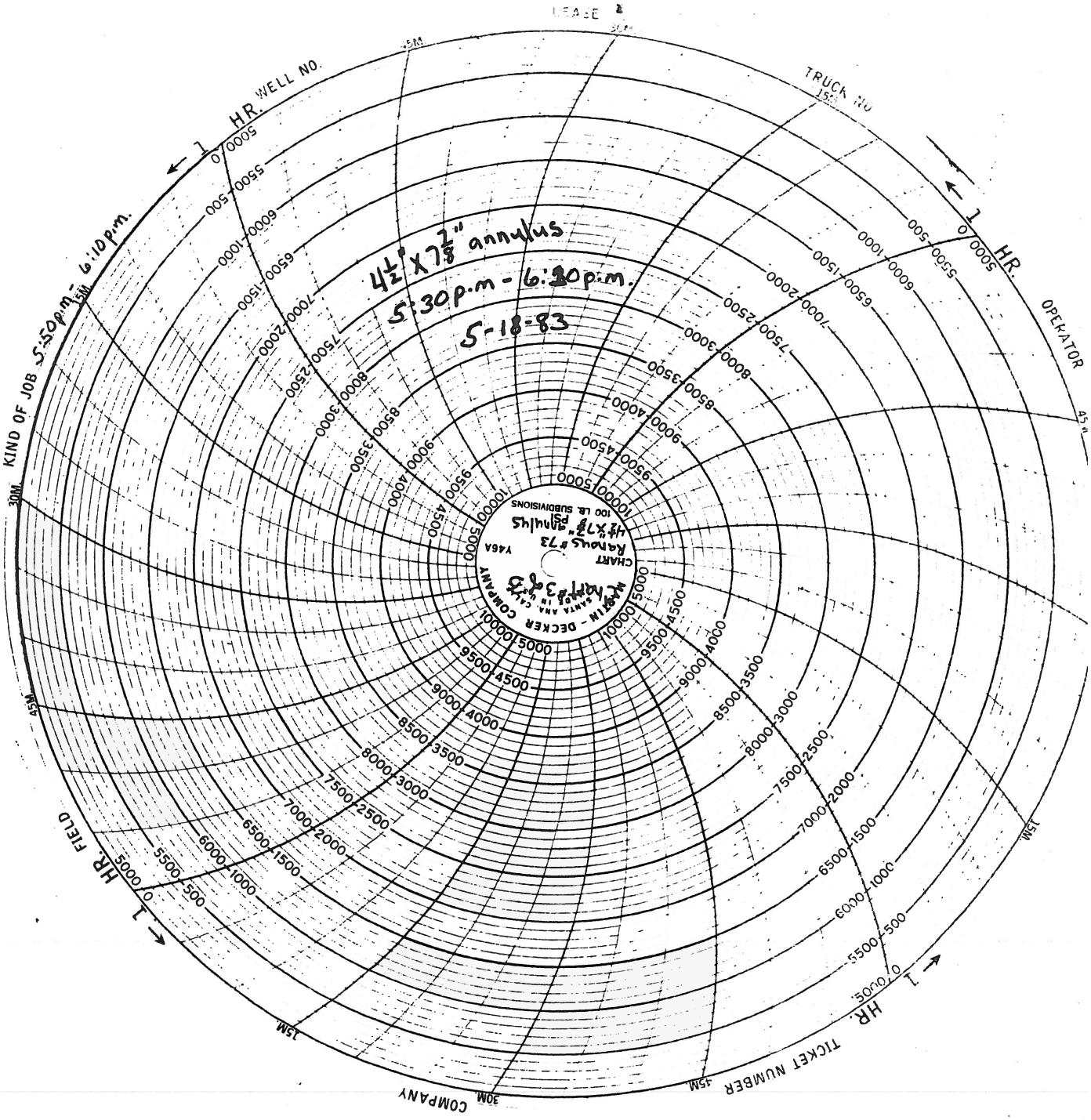
Time	Feed Rate B.P.M.	2 3/8" x 4 1/2" Annulus Pressure	4 1/2" x 7 7/ Annulus Pressure
9:30 am - 10:00 am	2	0	0
10:00 am - 10:30 am	4	0	0
10:30 am - 11:00 am	8	50	0
11:00 am - 11:30 am	10	80	0
11:30 am - 12:00 am	10	100	0
12:00 am - 12:30 pm	10	60	0
12:30 pm - 1:00 pm	10	90	0
1:00 pm - 1:30 pm	10	90	0
1:30 pm - 2:00 pm	10	110	0
2:00 pm - 2:30 pm	10	140	0
2:30 pm - 3:00 pm	10	100	0
3:00 pm - 3:30 pm	10	100	0
3:30 pm - 4:00 pm	10	100	0
4:00 pm - 4:30 pm	10	80	0
4:30 pm - 4:45 pm	10	90	0
4:45 pm - 5:50 pm	0	0	0
5:50 pm - 6:10 pm	10	100	0
6:10 pm - 6:30 pm	0	0	0

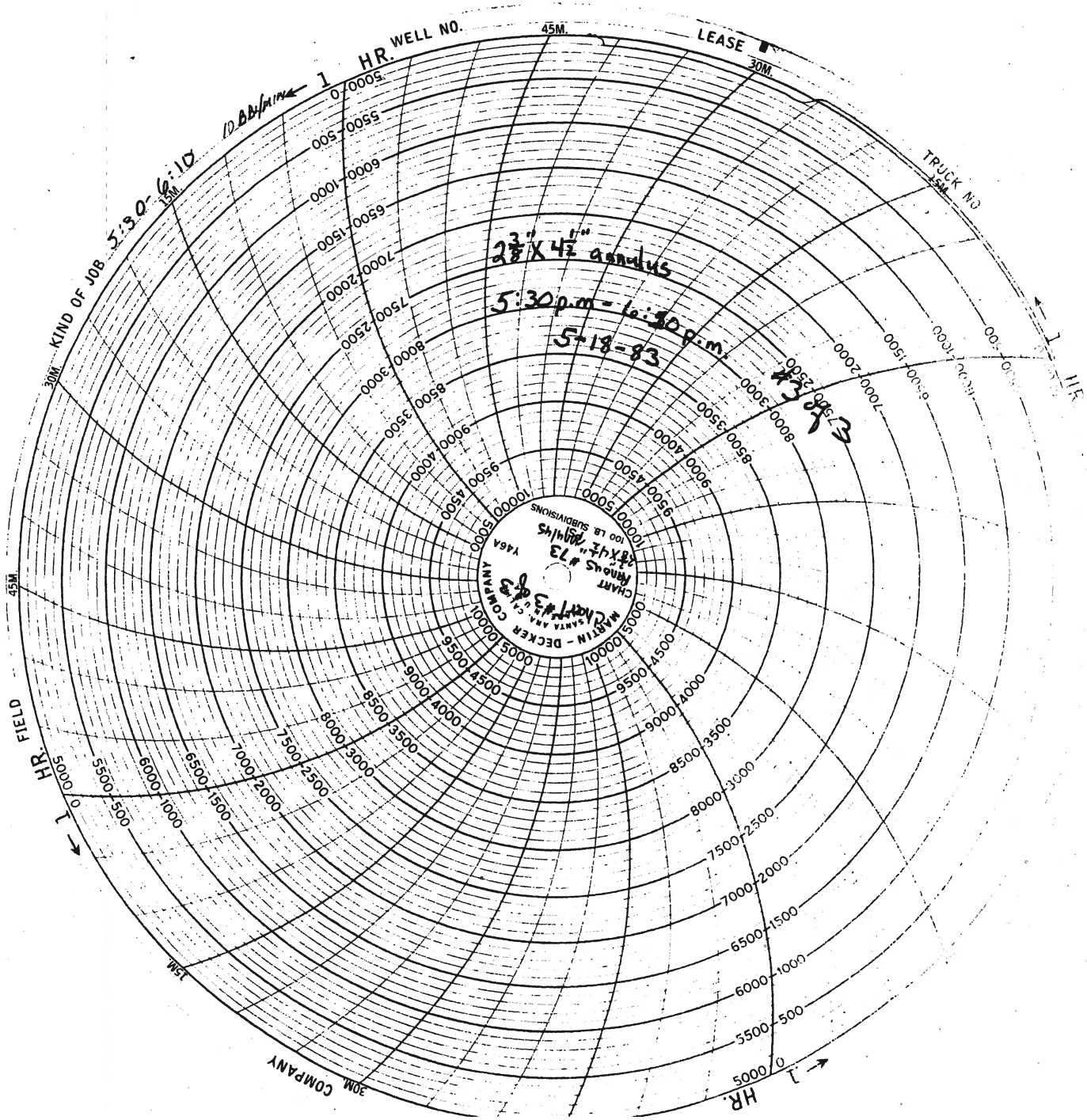
COMPANY
TICKET NUMBER
HR.
HR. FIELD
KIND OF JOB
HR. WELL NO.
LEASE
TRUCK NO.
OPERATOR
BURGAN - OKLAHOMA
COMPANY
MARTIN - DECKER COMPANY
SANTA ANA, CALIF.
CHART
5-18-83
Ranous #3
2" x 4½" annulus
9:30 a.m. - 1:30 p.m.
30M.
15M.
45M.

OPERATOR
TRUCK NO.
DATE
LEASE
WELL NO.
KIND OF JOB
COMPANY
FIELD
COMPANY
NUMBER
1 HR.
45M.
30M.
15M.
5000-0
5500-500
6000-1000
6500-1500
7000-2000
7500-2500
8000-3000
8500-3500
9000-4000
9500-4500
10000-5000
DECKER COMPANY
CHART
OKLAHOMA

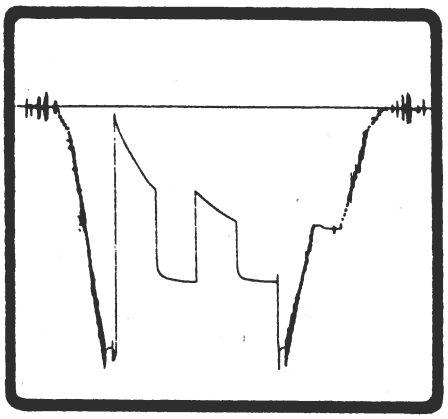

TICKET NUMBER
COMPANY
DATE
OPERATOR
TRUCK NO.
LEASE
WELL NO.
KIND OF JOB
1 HR.
45M.
30M.
15M.
CHART
MATTHEW DECKER COMPANY
2¾" x 4½" annulus
1:30 p.m. - 5:30 p.m.
5-18-93
Annulus
Pressure
Pump Rate
Pump Pressure
Cement Pressure
Cement Rate

DATE
TICKET NUMBER
OPERATOR
TRUCK NO.
LEASE
HR WELL NO.
FIELD
KIND OF JOB
1 HR.
15M.
30M.
45M.
CHART
MARTIN - DECKER COMPANY
HOUSTON, TEXAS
100 LB. PRESSURE
COMPANY
4½ x 7⅞" Annulus
1:30pm - 5:30pm
5-18-83


LEASE
WELL NO.
TRUCK NO.
OPERATOR
TICKET NUMBER
COMPANY
FIELD
KIND OF JOB
HR.
4½"X7⅞" annulus
5:30p.m - 6:10p.m.
5-18-83
CHART
Rapidus #73
4½"X7⅞" annulus
100 LB. SUBDIVISIONS
DECKER
SANTA ANA, CALIF.
Y46A


HR.
FIELD
COMPANY
KIND OF JOB
WELL NO.
LEASE
TRUCK NO
HR.
5:30-6:10
10 BBL/min
2 3/8" X 4 1/2" annulus
5:30 p.m - 6:30 p.m.
5-18-83
#3
CHART
MANDUS #73
2 3/8" X 4 1/2" ANNULUS
MARTIN - DECKER COMPANY
SANTA ANA, CALIF.
100 LB. SUBDIVISIONS
Y46A

FORMATION TESTING SERVICE REPORT



HALLIBURTON
SERVICES

Duncan, Oklahoma 73536

A Halliburton Company

NOMENCLATURE

B	=	Formation Volume Factor (Res Vol / Std Vol)	—
c_t	=	System Total Compressibility	(Vol / Vol) / psi
DR	=	Damage Ratio	—
h	=	Estimated Net Pay Thickness	Ft
k	=	Permeability	md
m	=	(Liquid) Slope Extrapolated Pressure Plot	psi/cycle
		(Gas) Slope Extrapolated m(P) Plot	MM psi^2/cp/cycle
$m(P^*)$	=	Real Gas Potential at P^*	MM psi^2/cp
$m(P_f)$	=	Real Gas Potential at P_f	MM psi^2/cp
AOF_1	=	Maximum Indicated Absolute Open Flow at Test Conditions	MCFD
AOF_2	=	Minimum Indicated Absolute Open Flow at Test Conditions	MCFD
P^*	=	Extrapolated Static Pressure	Psig
P_f	=	Final Flow Pressure	Psig
Q	=	Liquid Production Rate During Test	BPD
Q_1	=	Theoretical Liquid Production w/ Damage Removed	BPD
Q_g	=	Measured Gas Production Rate	MCFD
r_i	=	Approximate Radius of Investigation	Ft
r_w	=	Radius of Well Bore	Ft
S	=	Skin Factor	
t	=	Total Flow Time Previous to Closed-in	Minutes
Δt	=	Closed-in Time at Data Point	Minutes
T	=	Temperature Rankine	°R
ϕ	=	Porosity	—
μ	=	Viscosity of Gas or Liquid	cp
Log	=	Common Log	

HALLIBURTON

SERVICES

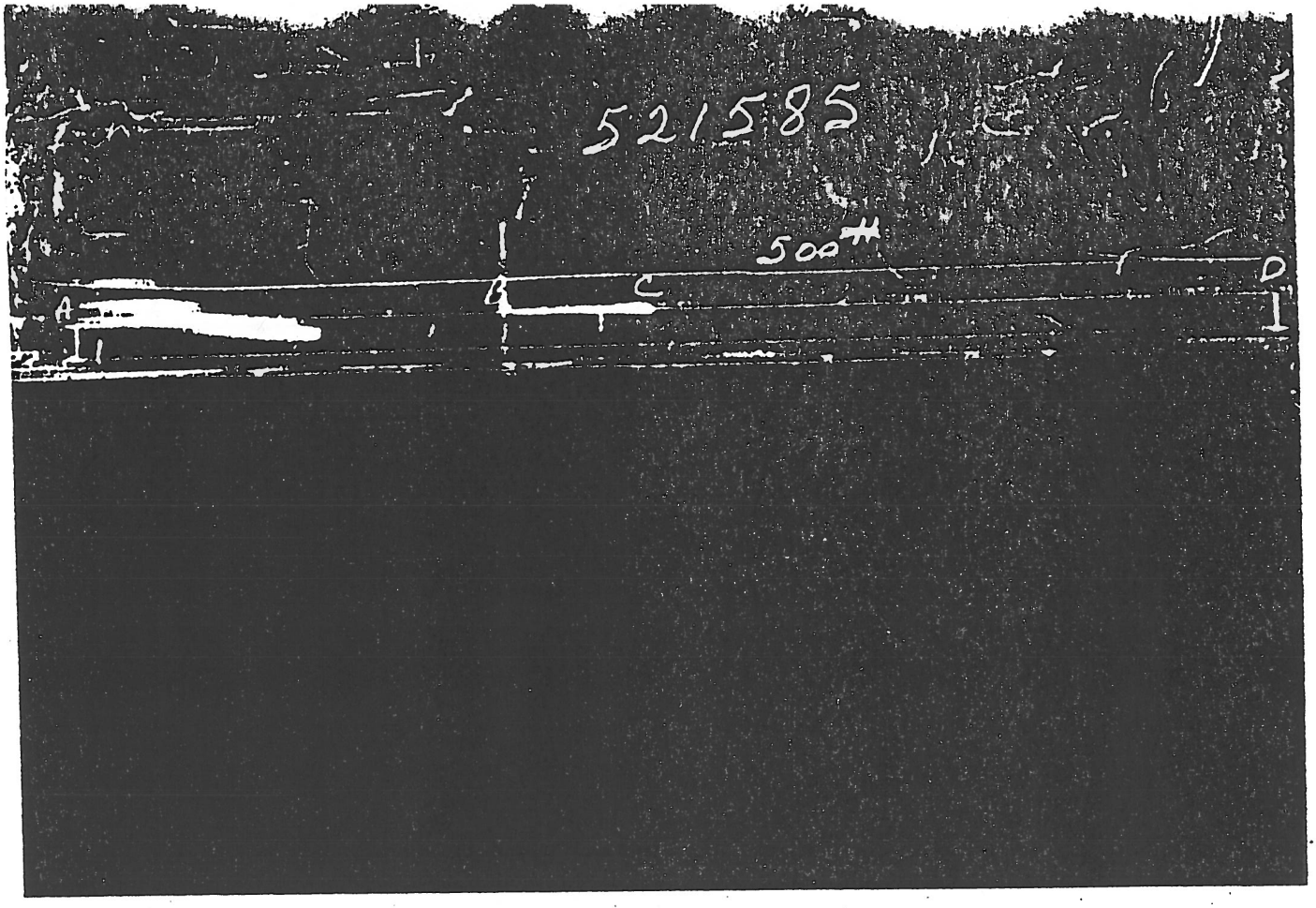
TICKET NO. 52158500

27-MAY-83

BRADFORD

FORMATION TESTING SERVICE REPORT

FIELD AREA	COUNTY	STATE
CALENDOWIA	LIVINGSTON	NEW YORK IC



GAUGE NO: 996 DEPTH: 650.0 BLANKED OFF: YES HOUR OF CLOCK: 72

ID	DESCRIPTION	PRESSURE REPORTED	PRESSURE CALCULATED	TIME REPORTED	TIME CALCULATED	TYPE
A	START PERIOD 1 @ 650'		253.0		1657	
B	END PERIOD 1 @ 650'		251.9			
B	INITIAL INJECTION PSI		251.9		550	
C	FINAL INJECTION PSI		252.4			
C	START PERIOD 2 @ 650'		252.4		2397	
D	END PERIOD 2 @ 650'		258.8			

EQUIPMENT & HOLE DATA

FORMATION TESTED: _____
NET PAY (ft): _____
GROSS TESTED FOOTAGE: _____
ALL DEPTHS MEASURED FROM: MASTER VALVE
CASING PERFS. (ft): _____
HOLE OR CASING SIZE (in): 4.500
ELEVATION (ft): 0
TOTAL DEPTH (ft): _____
PACKER DEPTH(S) (ft): _____
FINAL SURFACE CHOKE (in): _____
BOTTOM HOLE CHOKE (in): _____
MUD WEIGHT (lb/gal): _____
MUD VISCOSITY (sec): _____
ESTIMATED HOLE TEMP. (°F): 70
ACTUAL HOLE TEMP. (°F): ____ @ _____ ft

TICKET NUMBER: 52158500
DATE: 5-20-83 TEST NO: 1
TYPE DST: PRESSURE SURVEY
HALLIBURTON CAMP: BRADFORD
TESTER: HOLES
WITNESS: _____
DRILLING CONTRACTOR: _____

FLUID PROPERTIES FOR RECOVERED MUD & WATER

SOURCE	RESISTIVITY	CHLORIDES
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm
	@ °F	ppm

SAMPLER DATA

Psig AT SURFACE: _____
cu.ft. OF GAS: _____
cc OF OIL: _____
cc OF WATER: _____
cc OF MUD: _____
TOTAL LIQUID cc: _____

HYDROCARBON PROPERTIES

OIL GRAVITY (°API): _____ @ ____ °F
GAS/OIL RATIO (cu.ft. per bbl): _____
GAS GRAVITY: _____

CUSHION DATA

TYPE	AMOUNT	WEIGHT

RECOVERED:

MEASURED FROM TESTER VALVE

REMARKS:

TYPE & SIZE MEASURING DEVICE: _____ TICKET NO: 52158500

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
5-17-83					
0815					ARRIVED ON LOCATION
0839					DREW BASE LINE
0841					WOUND CLOCK
0842					ENGAGED CLOCK AND STYLUS
0843					TOOL TOGETHER
0850					STAFF UP-MASTER VALVE OPEN
0851					STARTED TOOL IN HOLE
0858					TOOL STOPPED AT 650' FOR REST
					OF TEST
5-18-83					
0930 TO					
1000					PUMPED 2 BPM
1000 TO					
1030					PUMPED 4 BPM
1030 TO					
1100					PUMPED 8 BPM
1100 TO					
1200					PUMPED 10 BPM
1200 TO					
1300					INJECTED AT 10 BPM
1300 TO					
1400					INJECTED AT 10 BPM
1400 TO					
1500					INJECTED AT 10 BPM
1500 TO					
1600					INJECTED AT 10 BPM
1600 TO					
1645					INJECTED AT 10 BPM
1645 TO					
1750					INJECTED AT 10 BPM
1750 TO					
1810					INJECTED AT 10 BPM
					INJECTION STOPPED
5-20-83					
1345					CREW ON LOCATION
1350					STARTED TOOL OUT OF HOLE

TYPE & SIZE MEASURING DEVICE: _____ TICKET NO: 52158500

TIME	CHOKE SIZE	SURFACE PRESSURE PSI	GAS RATE MCF	LIQUID RATE BPD	REMARKS
1357					TOOL IN STAFF-VALVE SHUT
1400					CLOCK AND STYLUS DISENGAGED

TICKET NO: 52158500	GAUGE NO: 996
CLOCK NO: 1549 HOUR: 72	DEPTH: 650.0

HALLIBURTON SERVICES

REF	MINUTES	PRESSURE	ΔP	$\frac{t \times \Delta t}{t + \Delta t}$	$\log \frac{t + \Delta t}{\Delta t}$
PERIOD 1 @ 650'					
A 1	0	253.0			
2	120	252.1			
3	240	252.1			
4	360	251.7			
5	480	251.7			
6	600	251.4			
7	720	250.7			
8	840	250.1			
9	960	249.8			
10	1080	249.8			
11	1200	249.8			
12	1320	249.4			
13	1440	249.4			
14	1560	249.4			
B 15	1657	251.9			
INJECTION PERIOD					
B 1	0	251.9			
[1] 2	0	252.8			
[2] 3	30	254.0			
[3] 4	60	254.0			
[4] 5	90	255.3			
6	120	255.4			
7	150	253.5			
8	180	254.2			
9	210	255.3			
10	240	255.4			
11	270	260.1			
12	300	259.0			
13	330	258.3			
14	360	256.5			
15	390	255.8			
16	420	259.5			
17	450	258.8			
18	480	260.6			
19	510	256.7			
C 20	550	252.4			
PERIOD 2 @ 650'					
C 1	0	252.4			
2	120	251.7			
3	240	251.7			
4	360	251.7			
5	480	252.4			
6	600	252.4			
7	720	252.8			
PERIOD 2 @ 650' - CONTINUED					
8	840	252.8			
9	960	253.0			
10	1080	253.3			
11	1200	253.3			
12	1320	253.5			
13	1440	254.0			
14	1560	254.9			
15	1680	255.3			
16	1800	255.4			
17	1920	256.2			
18	2040	256.9			
19	2160	257.9			
20	2280	258.5			
D 21	2397	258.8			

No press base

why recording press before test started

LEGEND:
[1] PUMP AT 2 BPM
[2] PUMP AT 4 BPM
[3] PUMP AT 8 BPM
[4] PUMP AT 10 BPM

REMARKS:

EQUATIONS FOR DST LIQUID WELL ANALYSIS

Transmissibility	$\frac{kh}{\mu} = \frac{162.6\ QB}{m}$	$\frac{\text{md-ft}}{\text{cp}}$
Indicated Flow Capacity	$kh = \frac{kh}{\mu}\ \mu$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Damage Ratio	$DR = .183\ \frac{P^* - P_f}{m}$	—
Theoretical Potential w / Damage Removed	$Q_1 = Q\ DR$	BPD
Approx. Radius of Investigation	$r_i = 4.63\ \sqrt{kt}$	ft

EQUATIONS FOR DST GAS WELL ANALYSIS

Indicated Flow Capacity	$kh = \frac{1637\ Q_g\ T}{m}$	md-ft
Average Effective Permeability	$k = \frac{kh}{h}$	md
Skin Factor	$S = 1.151 \left[\frac{m(P^*) - m(P_f)}{m} - \text{LOG}\ \frac{kt}{\phi\ \mu\ c_t r_w^2} + 3.23 \right]$	—
Damage Ratio	$DR = \frac{m(P^*) - m(P_f)}{m(P^*) - m(P_f) - 0.87\ mS}$	—
Indicated Flow Rate (Maximum)	$AOF_1 = \frac{Q_g\ m(P^*)}{m(P^*) - m(P_f)}$	MCFD
Indicated Flow Rate (Minimum)	$AOF_2 = Q_g \sqrt{\frac{m(P^*)}{m(P^*) - m(P_f)}}$	MCFD
Approx. Radius of Investigation	$r_i = 0.032 \sqrt{\frac{kt}{\phi \mu c_t}}$	ft

ATTACHMENT J

Stimulation Program

At this time, there is no stimulation program required or anticipated.

ATTACHMENT K

Injection Procedures

I. Narrative Explanation

1. Brine is transported from well sites to the 210 Bbl storage tanks at LRC# 73- Ranous Well Disposal Site.

2. An opening and closing storage tank measurement is taken by the operator to calculate amount of brine brought to storage facility.

3. The brine is pumped into the storage tanks from the tanker transport. The volume of brine delivered is recorded by operator.

4. Lenape personnel then re-measure tanks to get opening measurement for injection.

5. The brine is then hydrostatically discharged into the disposal well by opening the Gate Valve on the bottom of the storage tank then opening the Newco Full Port Valve on the 4" transfer line.

6. Annular and Tubing injection pressures are recorded with the pressure recorders as shown on Drawing A.

7. After injection is completed, the closing tank measurement is taken to give injected volume. The injection rate is calculated by dividing injected volume by injection time (refer to enclosed measuring memorandum).

   This method of injection works because the Ranous Disposal Well is operating under vacuum conditions.

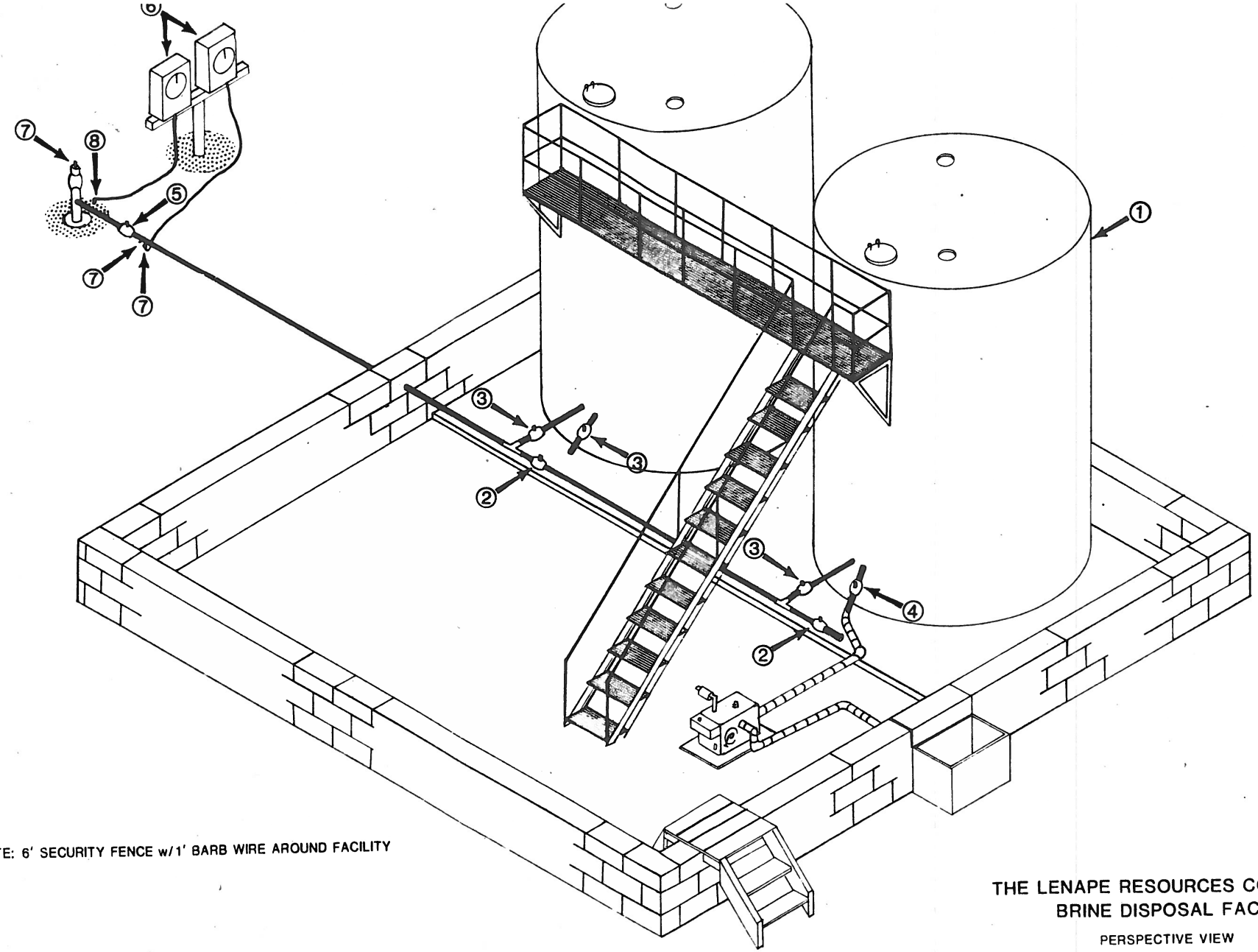
8. After injection is completed, all valves are closed and the security fence is locked.

ATTACHMENT K

Exhibit #1

Material List

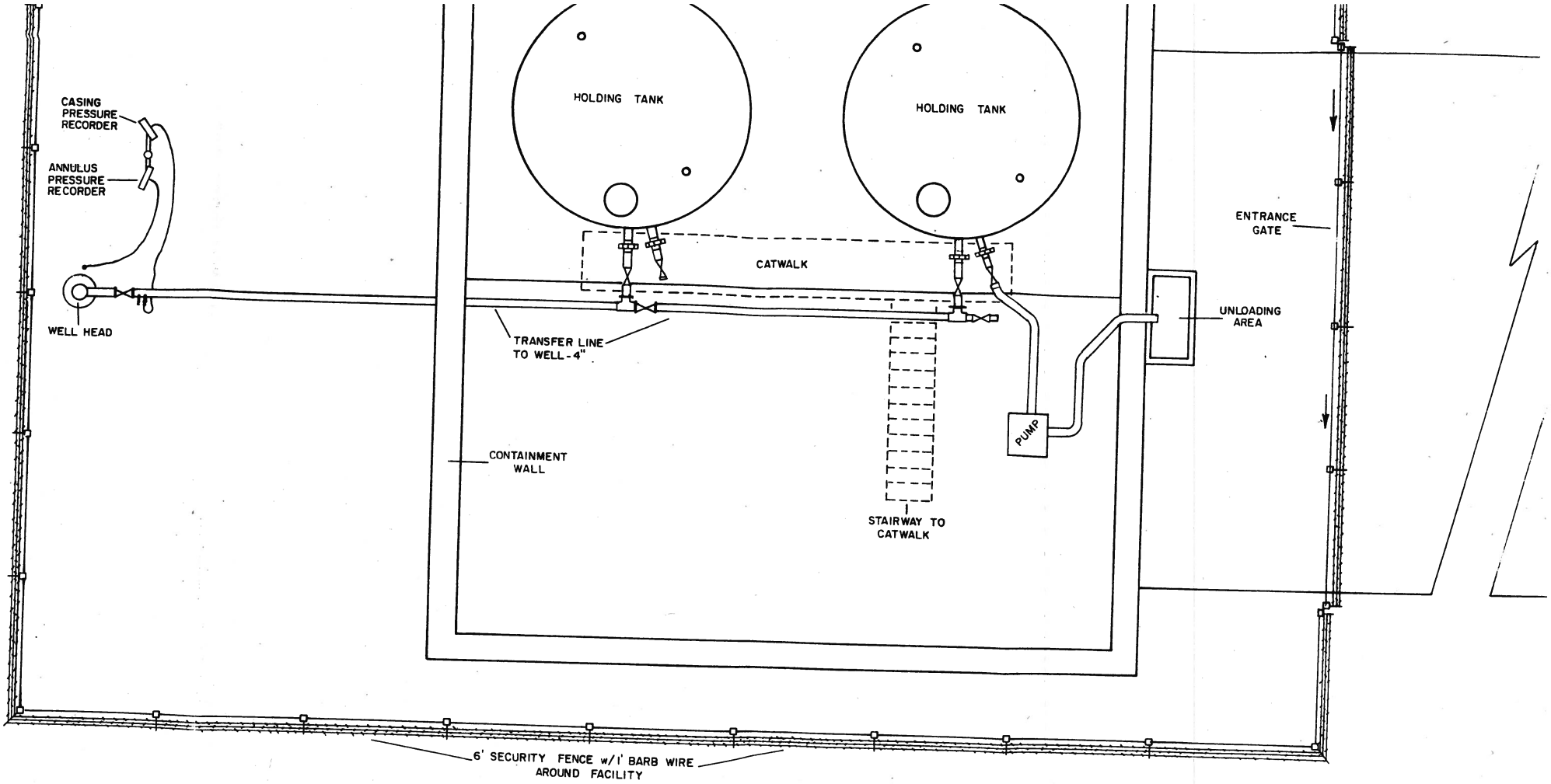
1. Bremco 210 Bbl Storage Tanks
2. 4" 125# Iron Wedge Gate Valve, Flanged Ends
3. 3" 125# Iron Wedge Gate Valve, Flanged Ends
4. 3" Series H400 Hale Bronze Ball Valve
5. 4" ANSI Class 600 Newco Fullport Valve
6. Pressure Recorders made by Mercury Instruments, Inc.
7. 2" X 1½" 2000 psi WP, 4000 psi Test Series A Demco Ball Valves 3000#
8. Mersh ½" Needle Valves



NOTE: 6' SECURITY FENCE w/1' BARB WIRE AROUND FACILITY

THE LENAPE RESOURCES CORPORATION
BRINE DISPOSAL FACILITY

PERSPECTIVE VIEW



THE LENAPE RESOURCES CORPORATION
BRINE DISPOSAL FACILITY

OVERHEAD VIEW

ATTACHMENT L

Construction Procedures

I. Drilling Methods

The Ranous Disposal well was drilled in four (4) steps:

1. Drive 13 3/8" Conductor Casing to a depth of 33' from ground level.

2. Drill a 12¼" hole to a depth of 134' from ground level.

3. Drill a 7 7/8" hole to a depth of 655' from ground level.

4. Drill out cement at bottom of 6 5/8" casing after cementing casing in place.

II. Casing Methods

1. The 13 3/8" 54.5 #/ft conductor casing is set in the bedrock.

2. 8 5/8" 24 #/ft, J-55 casing is set at 90' (G.L.) and cemented back to surface.

3. 6 5/8" 20#/ft, H-40 casing is set at 640' (G.L.) and cemented back to surface.

4. 4½" 9.5 #/ft, J-55 Smls casing is set at 630' (G.L.) on a Butler Larkin C-101 Packer and the annulus is filled with gelled fresh water.

III. Cementing Program

1. 8 5/8" Surface Cement Job:
   Type: 120 sacks of common class A cement with 3% C_aCl_2, ½# Flocele and 5# Gilsonite per sack.

   Volume: $\frac{(90')(.4465\ CuFt/ft)}{1.18\ ft^3/sk}$ = 34 sacks of cement needed.

2. 6 5/8" Casing Cement Job:
   Type: 125 sacks of Halliburton Thixotropic Cement, contains 10# Calseal, 4% bentonite gel, 2% C_aCl_2 per 1 sack of Class A common cement.

   Volume: $\frac{(640")(.0989\ CuFt/LnFt)}{1.61\ ft^3/sk}$ = 39 sacks of cement needed.

3. 6 5/8" remedial squeeze cement job to improve bond:
   Perforations: 194' - 200' (G.L.)
   Type: 100 sks Class A common cement with 5# Gilsonite, and 5# of Calseal per sack of cement

   Volume: $\frac{(200')(.0989\ CuFt/LnFt)}{1.25\ ft^3/sk}$ = 16 sacks of cement needed.

IV. Placement of 4½" 9.5 #/ft, J-55 Smls Casing as Injection Tubing for Corrosion Protection

1. Casing is set using a C-101 Hook Wall Packer and releasing tubing weight to hold packer in place.

2. Gel water is spotted in the annulus between 4½" and 6 5/8" casing.
   Type: 18 barrels of Howco Bentonite Gel Mixture.
   Volume: (630')(.0519 Bbls/ft) = 10 Barrels

V. Logging Program

1. Information on USDW's was obtained from adjacent logs and also public records.

2. Bond logging was performed to check bond to below USDW's. (See Attachment for Mechanical Integrity)

EASTERN STATES ENERGIES

WELL		API #	TOWN	COUNTY	STATE	TYPE/FORMATION
C. Phillips Unit	#1	31-029-20108	Evans	Erie	NY	Gas/Medina
"	#2	" " -20109	"	"	"	" "
"	#3	" " -20232	"	"	"	" "
"	#5	" " -20228	"	"	"	" "
"	#6	" " -20233	"	"	"	" "
Vacco-Renaldo	#1	" " -20230	"	"	"	" "
"	#2	" " -20196	"	"	"	" "
Palmieri-Salva	#1	" " -20200	"	"	"	" "
"	#2	" " -20231	"	"	"	" "
Walsh	#1	" " -20199	"	"	"	" "
Hagen	#1	" " -20134	"	"	"	" "
Gugino	#1	" " -19748	Brant	"	"	" "
"	#2	" " -19274	"	"	"	" "
"	#3	" " -19987	"	"	"	" "
"	#4	" " -20026	"	"	"	" "
Chiavetta	#1	" " -19892	"	"	"	" "
"	#2	" " -19875	"	"	"	" "
"	#3	" " -20002	"	"	"	" "
"	#4	" " -20001	"	"	"	" "
Bowman Farms	#1	" " -20118	"	"	"	" "
Ciminesi	#1	" " -20150	"	"	"	" "
Muffoletto	#1	" " -20090	"	"	"	" "

WELL	API #	TOWN	COUNTY	STATE	TYPE/FORMATION
Janik #1	31-029-19332	Brant	Erie	NY	Gas/Medina
" #2	" " -19768	"	"	"	" "
" #3	" " -19976	"	"	"	" "
Renaldo #1	" " -19991	"	"	"	" "
Valentine #2	" " -19939	"	"	"	" "
Piall #1	" " -20015	"	"	"	" "
" #2	" " -20016	"	"	"	" "
Guzzetta #1	" " -20101	"	"	"	" "
Arrigo-Notaro #1	" " -20738	"	"	"	" "
Hornberger #3	" " -20239	Eden	"	"	" "
Magavern #1	" " -20768	Concord	"	"	" "
Emerling #1	" " -20824	"	"	"	" "
G. Phillips #1	" " -19391	Lancaster	"	"	" "
" #2	" " -19913	"	"	"	" "
Lorentz #1	" " -19817	"	"	"	" "
Josela #1	" " -19392	"	"	"	" "
" #2	" " -20079	"	"	"	" "
Paschke #1	" " -19968	"	"	"	" "
" #2	" " -19820	"	"	"	" "
H.M.R.P.N.C.C. #1	" " -19920	"	"	"	" "

WELL		API #	TOWN	COUNTY	STATE	TYPE/FORMATION
Smith	#1	31-029-19010	Elma	Erie	NY	Gas/Medina
Ulrich	#1	" " -19804	"	"	"	" "
Theal-Luders	#1	" " -19781	"	"	"	" "
Boasberg	#1	" " -19958	"	"	"	" "
Luders	#1	" " -20003	"	"	"	" "
Ford-Michener	#1	" " -19971	"	"	"	" "
Gach	#1	" " -20051	"	"	"	" "
"	#2	" " -20093	"	"	"	" "
"	#3	" " -20125	"	"	"	" "
Benz	#1	" " -19803	Orchard Park	"	"	" "
"	#2	" " -19896	"	"	"	" "
Black-Benz	#1	" " -19907	"	"	"	" "
Hamburg All Saints Luth. Church	#1	" " -63745	Hamburg	"	"	" "
Gallagher	#1	" " -20730	"	"	"	" "
~~C. Burke~~	~~#1~~	~~" " -20757~~	~~North Collins~~	~~"~~	~~"~~	~~" Akron~~
"	#2	" " -20749	"	"	"	" Medina
"	#3	" " -20771	"	"	"	" "
Koch	#1	" " -20195	Aurora	"	"	" "
Sievenpiper	#1	" " -20229	"	"	"	" "
Martin	#1	" " -20104	"	"	"	" "
Siwiec	#2	" " -20812	"	"	"	" "

WELL	API #	TOWN	COUNTY	STATE	TYPE/FORMATION
Ponderosa Frontier#1	31-013-19382	Cherry Creek	Chautauqua	NY	Gas/Medina
McDermott Unit #1	" " -18818	"	"	"	" "
B. Johnson #1	" " -18825	"	"	"	" "
Abbey-Tutton #1	" " -18844	"	"	"	" "
" #2	" " -18845	"	"	"	" "
Howard-Buckley #1 #1	" " -18739	"	"	"	" "

Avony holdings in Western New York

Well Name	API	Town	County	For.
BERTRAND I	31-121-15461	Perry	Wyoming	Medina
BERTRAND II	31-121-15570	Perry	Wyoming	Medina
DUKELOW I	31-121-13659	Covington	Wyoming	Medina
HOLLISTER I	31-121-15460	Perry	Wyoming	Medina
KRAMELL I	31-121-13888	Perry	Wyoming	Medina
KRAMELL II	31-121-13889	Perry	Wyoming	Medina
LABIN I	31-121-13919	Warsaw	Wyoming	Medina
OCONNELL I	31-121-15615	Perry	Wyoming	Medina
PAGE I	31-121-13890	Perry	Wyoming	Medina
PIERSON I	31-121-13664	Perry	Wyoming	Medina
PIERSON II	31-121-13713	Perry	Wyoming	Medina
SHEARING I	31-121-13891	Perry	Wyoming	Medina
WHEELER I	31-121-15569	Perry	WYOMING	Medina
WILKIE I	31-121-13662	Warsaw	Wyoming	Medina
WILKIE II	31-121-13892	Warsaw	Wyoming	Medina
WILKIE III	31-121-13915	Warsaw	Wyoming	Medina

TABLE

DIMENSIONS AND

Size O.D. In.	Grade	Wt. Per Ft. With Cplg., Lb.	Inside Dia. In.	Thread & Cplg. Drift Dia. In.	Thread & Cplg. O.D. of Cplg. In.	Extreme Line Drift Dia. In.	Extreme Line O.D. of Box In.	** Col'pse Resistance PSI
11¾	*F-25	38.00	11.150	10.994	12.750	—	—	620
	H-40	42.00	11.084	10.928	12.750	—	—	1,070
	J-55	47.00	11.000	10.844	12.750	—	—	1,510
	J-55	54.00	10.880	10.724	12.750	—	—	2,070
	J-55	60.00	10.772	10.616	12.750	—	—	2,660
	K-55	47.00	11.000	10.844	12.750	—	—	1,510
	K-55	54.00	10.880	10.724	12.750	—	—	2,070
	K-55	60.00	10.772	10.616	12.750	—	—	2,660
	C-75	60.00	10.772	10.616	12.750	—	—	3,070
	N-80	60.00	10.772	10.616	12.750	—	—	3,180
	C-95	60.00	10.772	10.616	12.750	—	—	3,440
13⅜	*F-25	48.00	12.715	12.559	14.375	—	—	560
	H-40	48.00	12.715	12.559	14.375	—	—	770
	J-55	54.50	12.615	12.459	14.375	—	—	1,130
	J-55	61.00	12.515	12.359	14.375	—	—	1,540
	J-55	68.00	12.415	12.259	14.375	—	—	1,950
	K-55	54.50	12.615	12.459	14.375	—	—	1,130
	K-55	61.00	12.515	12.359	14.375	—	—	1,540
	K-55	68.00	12.415	12.259	14.375	—	—	1,950
	C-75	72.00	12.347	12.191	14.375	—	—	2,590
	*C-75	77.00	12.275	12.119	14.375	—	—	2,990
	*C-75	85.00	12.159	12.003	14.375	—	—	3,810
	*C-75	98.00	11.937	11.781	14.375	—	—	5,720
	N-80	72.00	12.347	12.191	14.375	—	—	2,670
	*N-80	77.00	12.275	12.119	14.375	—	—	3,100
	*N-80	85.00	12.159	12.003	14.375	—	—	3,870
	*N-80	98.00	11.937	11.781	14.375	—	—	5,910
	C-95	72.00	12.347	12.191	14.375	—	—	2,820
	*P-110	72.00	12.347	12.191	14.375	—	—	2,880
	*V-150	72.00	12.347	12.191	14.375	—	—	2,880
16	*F-25	55.00	15.376	15.188	17.000	—	—	290
	H-40	65.00	15.250	15.062	17.000	—	—	670
	J-55	75.00	15.124	14.936	17.000	—	—	1,020
	J-55	84.00	15.010	14.822	17.000	—	—	1,410
	K-55	75.00	15.124	14.936	17.000	—	—	1,020
	K-55	84.00	15.010	14.822	17.000	—	—	1,410
	*K-55	109.00	14.688	14.500	17.000	—	—	2,560
	*C-75	109.00	14.688	14.500	17.000	—	—	2,980
	*N-80	109.00	14.688	14.500	17.000	—	—	3,080

*Not API Standard. Shown for information only.

NO. 203

STRENGTHS OF CASING

Internal Yield Pressure PSI** Plain End or Ext. Line	Round Thread Short	Round Thread Long	Buttress Thd.	** Body Yield Stgth. 1,000 Lbs.	Joint Strength - 1000 Lbs.** Thread & Cplg. Joint Round Thread Short	Round Thread Long	Buttress Thd.	Ext. Line Joint
—	1,120	—	—	270	222	—	—	—
1,980	1,980	—	—	478	307	—	—	—
3,070	3,070	—	3,070	737	477	—	807	—
3,560	3,560	—	3,560	850	568	—	931	—
4,010	4,010	—	4,010	952	649	—	1,042	—
3,070	3,070	—	3,070	737	509	—	935	—
3,560	3,560	—	3,560	850	606	—	1,079	—
4,010	4,010	—	4,010	952	693	—	1,208	—
5,460	5,460	—	5,460	1,298	869	—	1,361	—
5,830	5,830	—	5,830	1,384	924	—	1,440	—
6,920	6,920	—	6,920	1,644	1,066	—	1,596	—
—	1,080	—	—	338	260	—	—	—
1,730	1,730	—	—	541	322	—	—	—
2,730	2,730	—	2,730	853	514	—	909	—
3,090	3,090	—	3,090	962	595	—	1,025	—
3,450	3,450	—	3,450	1,069	675	—	1,140	—
2,730	2,730	—	2,730	853	547	—	1,038	—
3,090	3,090	—	3,090	962	633	—	1,169	—
3,450	3,450	—	3,450	1,069	718	—	1,300	—
5,040	5,040	—	5,040	1,558	978	—	1,598	—
—	5,400	—	5,400	1,662	1,054	—	2,054	—
—	5,970	—	5,970	1,829	1,177	—	2,261	—
—	6,270	—	6,120	2,144	1,408	—	2,296	—
5,380	5,380	—	5,380	1,661	1,040	—	1,693	—
—	5,760	—	5,760	1,773	1,122	—	2,148	—
—	6,360	—	6,360	1,951	1,252	—	2,364	—
—	6,680	—	6,530	2,287	1,498	—	2,400	—
6,390	6,390	—	6,390	1,973	1,204	—	1,893	—
—	7,400	—	7,400	2,596	1,402	—	2,433	—
—	10,090	—	10,090	3,323	1,887	—	2,976	—
—	850	—	—	384	258	—	—	—
1,640	1,640	—	—	736	439	—	—	—
2,630	2,630	—	2,630	1,178	710	—	1,200	—
2,980	2,980	—	2,980	1,326	817	—	1,351	—
2,630	2,630	—	2,630	1,178	752	—	1,331	—
2,980	2,980	—	2,980	1,326	865	—	1,499	—
—	3,950	—	3,950	1,739	1,181	—	1,962	—
—	5,380	—	—	2,372	1,499	—	—	—
—	5,740	—	—	2,530	1,594	—	—	—

**Collapse, Internal Yield and Joint Yield Strengths are minimum values with no safety factor, reproduced by permission from API Bul. 5C2, Bulletin on Performance Properties of Casing and Tubing.

TABLE

DIMENSIONS AND

Size O.D. In.	Grade	Wt. Per Ft. With Cplg., Lb.	Inside Dia. In.	Thread & Cplg. Drift Dia. In.	Thread & Cplg. O.D. of Cplg. In.	Extreme Line Drift Dia. In.	Extreme Line O.D. of Box In.	** Col'pse Resistance PSI
7⅝	*F-25	20.00	7.125	7.000	8.500	—	—	1,100
	H-40	24.00	7.025	6.900	8.500	—	—	2,040
	J-55	26.40	6.969	6.844	8.500	6.750	8.010	2,890
	K-55	26.40	6.969	6.844	8.500	6.750	8.010	2,890
	C-75	26.40	6.969	6.844	8.500	6.750	8.010	3,280
	C-75	29.70	6.875	6.750	8.500	6.750	8.010	4,670
	C-75	33.70	6.765	6.640	8.500	6.640	8.010	6,320
	C-75	39.00	6.625	6.500	8.500	6.500	8.010	8,430
	N-80	26.40	6.969	6.844	8.500	6.750	8.010	3,400
	N-80	29.70	6.875	6.750	8.500	6.750	8.010	4,790
	N-80	33.70	6.765	6.640	8.500	6.640	8.010	6,560
	N-80	39.00	6.625	6.500	8.500	6.500	8.010	8,810
	C-95	26.40	6.969	6.844	8.500	6.750	8.010	3,710
	C-95	29.70	6.875	6.750	8.500	6.750	8.010	5,120
	C-95	33.70	6.765	6.640	8.500	6.640	8.010	7,260
	C-95	39.00	6.625	6.500	8.500	6.500	8.010	9,980
	P-110	29.70	6.875	6.750	8.500	6.750	8.010	5,340
	P-110	33.70	6.765	6.640	8.500	6.640	8.010	7,850
	P-110	39.00	6.625	6.500	8.500	6.500	8.010	11,060
	*V-150	33.70	6.765	6.640	8.500	—	—	8,860
	*V-150	39.00	6.625	6.500	8.500	—	—	13,450
	*V-150	45.30	6.435	6.310	8.500	—	—	19,680
8⅝	*F-25	24.00	8.097	7.972	9.625	—	—	950
	H-40	28.00	8.017	7.892	9.625	—	—	1,640
	H-40	32.00	7.921	7.796	9.625	—	—	2,210
	J-55	24.00	8.097	7.972	9.625	—	—	1,370
	J-55	32.00	7.921	7.796	9.625	7.700	9.120	2,530
	J-55	36.00	7.825	7.700	9.625	7.700	9.120	3,450
	K-55	24.00	8.097	7.972	9.625	—	—	1,370
	K-55	32.00	7.921	7.796	9.625	7.700	9.120	2,530
	K-55	36.00	7.825	7.700	9.625	7.700	9.120	3,450
	C-75	36.00	7.825	7.700	9.625	7.700	9.120	4,020
	C-75	40.00	7.725	7.600	9.625	7.600	9.120	5,350
	C-75	44.00	7.625	7.500	9.625	7.500	9.120	6,680
	C-75	49.00	7.511	7.386	9.625	7.386	9.120	8,200
	N-80	36.00	7.825	7.700	9.625	7.700	9.120	4,100
	N-80	40.00	7.725	7.600	9.625	7.600	9.120	5,520
	N-80	44.00	7.625	7.500	9.625	7.500	9.120	6,950
	N-80	49.00	7.511	7.386	9.625	7.386	9.120	8,570
	C-95	36.00	7.825	7.700	9.625	7.700	9.120	4,360
	C-95	40.00	7.725	7.600	9.625	7.600	9.120	6,010
	C-95	44.00	7.625	7.500	9.625	7.500	9.120	7,730
	C-95	49.00	7.511	7.386	9.625	7.386	9.120	9,690
	P-110	40.00	7.725	7.600	9.625	7.600	9.120	6,380
	P-110	44.00	7.625	7.500	9.625	7.500	9.120	8,400
	P-110	49.00	7.511	7.386	9.625	7.386	9.120	10,720
	*V-150	44.00	7.625	7.500	9.625	—	—	9,640
	*V-150	49.00	7.511	7.386	9.625	—	—	12,950

*Not API Standard. Shown for information only.

NO. 203

STRENGTHS OF CASING

Internal Yield Pressure PSI** Plain End or Ext. Line	Round Thread Short	Round Thread Long	Buttress Thd.	** Body Yield Stgth. 1,000 Lbs.	Joint Strength - 1000 Lbs.** Thread & Cplg. Joint Round Thread Short	Round Thread Long	Buttress Thd.	Ext. Line Joint
—	1,430	—	—	145	138	—	—	—
2,750	2,750	—	—	276	212	—	—	—
4,140	4,140	4,140	4,140	414	315	346	483	553
4,140	4,140	4,140	4,140	414	342	377	581	700
5,650	—	5,650	5,650	564	—	461	624	700
6,450	—	6,450	6,450	641	—	542	709	700
7,400	—	7,400	7,400	729	—	635	806	766
8,610	—	8,610	8,610	839	—	751	929	851
6,020	—	6,020	6,020	602	—	490	659	737
6,890	—	6,890	6,890	683	—	575	749	737
7,900	—	7,900	7,900	778	—	674	852	806
9,180	—	9,180	9,180	895	—	798	981	896
7,150	—	7,150	7,150	714	—	560	716	774
8,180	—	8,180	8,180	811	—	659	813	774
9,380	—	9,380	9,380	923	—	772	925	846
10,900	—	10,900	10,900	1,063	—	914	1,065	941
9,470	—	9,470	9,470	940	—	769	960	922
10,860	—	10,860	10,860	1,069	—	901	1,093	1,008
12,620	—	12,620	12,620	1,231	—	1,066	1,258	1,120
—	—	14,800	14,800	1,458	—	1,207	1,482	—
—	—	17,210	17,210	1,679	—	1,428	1,706	—
—	—	19,680	18,350	1,971	—	1,721	1,932	—
—	1,340	—	—	173	161	—	—	—
2,470	2,470	—	—	318	233	—	—	—
2,860	2,860	—	—	366	279	—	—	—
2,950	2,950	—	—	381	244	—	—	—
3,930	3,930	3,930	3,930	503	372	417	579	686
4,460	4,460	4,460	4,460	568	434	486	654	688
2,950	2,950	—	—	381	263	—	—	—
3,930	3,930	3,930	3,930	503	402	452	690	869
4,460	4,460	4,460	4,460	568	468	526	780	871
6,090	—	6,090	6,090	775	—	648	847	871
6,850	—	6,850	6,850	867	—	742	947	942
7,610	—	7,610	7,610	957	—	834	1,046	1,007
8,480	—	8,480	8,480	1,059	—	939	1,157	1,007
6,490	—	6,490	6,490	827	—	688	895	917
7,300	—	7,300	7,300	925	—	788	1,001	992
8,120	—	8,120	8,120	1,021	—	887	1,105	1,060
9,040	—	9,040	9,040	1,129	—	997	1,222	1,060
7,710	—	7,710	7,710	982	—	789	976	963
8,670	—	8,670	8,670	1,098	—	904	1,092	1,042
9,640	—	9,640	9,640	1,212	—	1,017	1,206	1,113
10,740	—	10,740	10,740	1,341	—	1,144	1,334	1,113
10,040	—	10,040	10,040	1,271	—	1,055	1,288	1,240
11,160	—	11,160	11,160	1,404	—	1,186	1,423	1,326
12,430	—	12,430	12,430	1,553	—	1,335	1,574	1,326
—	—	15,220	15,220	1,914	—	1,591	1,925	—
—	—	16,950	16,950	2,118	—	1,789	2,130	—

**Collapse, Internal Yield and Joint Yield Strengths are minimum values with no safety factor, reproduced by permission from API Bul. 5C2, Bulletin on Performance Properties of Casing and Tubing.

TABLE

DIMENSIONS AND

Size O.D. In.	Grade	Wt. Per Ft. With Cplg., Lb.	Inside Dia. In.	Thread & Cplg. Drift Dia. In.	Thread & Cplg. O.D. of Cplg. In.	Extreme Line Drift Dia. In.	Extreme Line O.D. of Box In.	** Col'pse Resistance PSI
*6	F-25	15.00	5.524	5.399	6.625	—	—	1,540
	H-40	18.00	5.424	5.299	6.625	—	—	2,780
	J-55	18.00	5.424	5.299	6.625	—	—	3,620
	N-80	18.00	5.424	5.299	6.625	—	—	4,740
	N-80	20.00	5.352	5.227	6.625	—	—	5,690
	N-80	23.00	5.240	5.115	6.625	—	—	7,180
	P-110	23.00	5.240	5.115	6.625	—	—	10,380
	P-110	26.00	5.132	5.007	6.625	—	—	12,380
6⅝	*F-25	17.00	6.135	6.010	7.390	—	—	1,370
	H-40	20.00	6.049	5.924	7.390	—	—	2,520
	J-55	20.00	6.049	5.924	7.390	—	—	2,970
	J-55	24.00	5.921	5.796	7.390	5.730	7.000	4,560
	K-55	20.00	6.049	5.924	7.390	—	—	2,970
	K-55	24.00	5.921	5.796	7.390	5.730	7.000	4,560
	C-75	24.00	5.921	5.796	7.390	5.730	7.000	5,570
	C-75	28.00	5.791	5.666	7.390	5.666	7.000	7,830
	C-75	32.00	5.675	5.550	7.390	5.550	7.000	9,830
	N-80	24.00	5.921	5.796	7.390	5.730	7.000	5,760
	N-80	28.00	5.791	5.666	7.390	5.666	7.000	8,170
	N-80	32.00	5.675	5.550	7.390	5.550	7.000	10,320
	C-95	24.00	5.921	5.796	7.390	5.730	7.000	6,290
	C-95	28.00	5.791	5.666	7.390	5.666	7.000	9,200
	C-95	32.00	5.675	5.550	7.390	5.550	7.000	11,800
	P-110	24.00	5.921	5.796	7.390	5.730	7.000	6,710
	P-110	28.00	5.791	5.666	7.390	5.666	7.000	10,140
	P-110	32.00	5.675	5.550	7.390	5.550	7.000	13,200

*Not API Standard. Shown for information only.

NO. 203

STRENGTHS OF CASING

Internal Yield Pressure PSI**				** Body Yield Stgth. 1,000 Lbs.	Joint Strength - 1000 Lbs.**			
	Round Thread				Thread & Cplg. Joint			
Plain End or Ext. Line	Short	Long	Buttress Thd.		Round Thread Short	Round Thread Long	Buttress Thd.	Ext. Line Joint
—	1,740	—	—	107	108	—	—	—
—	3,360	—	—	206	179	—	—	—
—	4,620	—	—	283	239	279	—	—
—	—	6,720	—	412	—	323	—	—
—	—	7,560	—	461	—	366	—	—
—	—	8,870	—	536	—	432	—	—
—	—	12,190	—	737	—	565	—	—
—	—	13,920	—	833	—	646	—	—
—	1,620	—	—	123	121	—	—	—
3,040	3,040	—	—	229	184	—	—	—
4,180	4,180	4,180	4,180	315	245	266	374	—
5,110	5,110	5,110	5,110	382	314	340	453	477
4,180	4,180	4,180	4,180	315	267	290	453	—
5,110	5,110	5,110	5,110	382	342	372	548	605
6,970	—	6,970	6,970	520	—	453	583	605
8,260	—	8,260	8,260	610	—	552	683	648
9,410	—	9,410	9,200	688	—	638	771	717
7,440	—	7,440	7,440	555	—	481	615	637
8,810	—	8,810	8,810	651	—	586	721	682
10,040	—	10,040	9,820	734	—	677	814	755
8,830	—	8,830	8,830	659	—	546	665	668
10,460	—	10,460	10,460	773	—	665	780	716
11,920	—	11,920	11,660	872	—	769	880	793
10,230	—	10,230	10,230	763	—	641	786	796
12,120	—	12,120	12,120	895	—	781	922	852
13,800	—	13,800	13,500	1,009	—	904	1,040	944

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TABLE

DIMENSIONS AND

Size O.D. In.	Grade	Wt. Per Ft. With Cplg., Lb.	Inside Dia. In.	Thread & Cplg. Drift Dia. In.	Thread & Cplg. O.D. of Cplg. In.	Extreme Line Drift Dia. In.	Extreme Line O.D. of Box In.	** Col'pse Resistance PSI
4½	*F-25	9.50	4.090	3.965	5.000	—	—	1,920
	H-40	9.50	4.090	3.965	5.000	—	—	2,770
	J-55	9.50	4.090	3.965	5.000	—	—	3,310
	J-55	10.50	4.052	3.927	5.000	—	—	4,010
	J-55	11.60	4.000	3.875	5.000	—	—	4,960
	K-55	9.50	4.090	3.965	5.000	—	—	3,310
	K-55	10.50	4.052	3.927	5.000	—	—	4,010
	K-55	11.60	4.000	3.875	5.000	—	—	4,960
	C-75	11.60	4.000	3.875	5.000	—	—	6,130
	C-75	13.50	3.920	3.795	5.000	—	—	8,170
	N-80	11.60	4.000	3.875	5.000	—	—	6,350
	N-80	13.50	3.920	3.795	5.000	—	—	8,540
	C-95	11.60	4.000	3.875	5.000	—	—	7,010
	C-95	13.50	3.920	3.795	5.000	—	—	9,650
	P-110	11.60	4.000	3.875	5.000	—	—	7,560
	P-110	13.50	3.920	3.795	5.000	—	—	10,670
	P-110	15.10	3.826	3.701	5.000	—	—	14,320
	*V-150	15.10	3.826	3.701	5.000	—	—	18,110
5	*F-25	11.50	4.560	4.435	5.563	—	—	1,820
	J-55	11.50	4.560	4.435	5.563	—	—	3,060
	J-55	13.00	4.494	4.369	5.563	—	—	4,140
	J-55	15.00	4.408	4.283	5.563	4.151	5.360	5,550
	K-55	11.50	4.560	4.435	5.563	—	—	3,060
	K-55	13.00	4.494	4.369	5.563	—	—	4,140
	K-55	15.00	4.408	4.283	5.563	4.151	5.360	5,550
	C-75	15.00	4.408	4.283	5.563	4.151	5.360	6,970
	C-75	18.00	4.276	4.151	5.563	4.151	5.360	10,000
	*C-75	20.30	4.184	—	—	4.059	5.094‡	11,240
	*C-75	23.20	4.044	—	—	3.919	5.094‡	12,970
	N-80	15.00	4.408	4.283	5.563	4.151	5.360	7,250
	N-80	18.00	4.276	4.151	5.563	4.151	5.360	10,490
	*N-80	20.30	4.184	—	—	4.059	5.250†	11,990
	*N-80	23.20	4.044	—	—	3.919	5.094‡	13,830
	C-95	15.00	4.408	4.283	5.563	4.151	5.360	8,090
	C-95	18.00	4.276	4.151	5.563	4.151	5.360	12,010
	*C-95	20.30	4.184	—	—	4.059	5.250†	14,250
	*C-95	23.20	4.044	—	—	3.919	5.094‡	16,430
	P-110	15.00	4.408	4.283	5.563	4.151	5.360	8,830
	P-110	18.00	4.276	4.151	5.563	4.151	5.360	13,450
	*P-110	20.30	4.184	—	—	4.059	5.094‡	16,490
	*P-110	23.20	4.044	—	—	3.919	5.094‡	19,020
	*V-150	15.00	4.408	4.283	5.563	—	—	10,260
	*V-150	18.00	4.276	4.151	5.563	—	—	16,860
	*V-150	20.80	4.156	4.031	5.563	—	—	22,860
	*V-150	24.20	4.000	3.875	5.563	—	—	27,000

*Not API Standard. Shown for information only.
**Collapse, Internal Yield and Joint Yield Strengths are minimum values with no safety factor, reproduced by permission from API Bul. 5C2, Bulletin on Performance Properties of Casing and Tubing.

NO. 203

STRENGTHS OF CASING

Internal Yield Pressure PSI** Plain End or Ext. Line	Round Thread Short	Round Thread Long	Buttress Thd.	** Body Yield Stgth. 1,000 Lbs.	Joint Strength - 1000 Lbs.** Thread & Cplg. Joint Round Thread Short	Round Thread Long	Buttress Thd.	Ext. Line Joint
—	1,990	—	—	69	71	—	—	—
3,190	3,190	—	—	111	77	—	—	—
4,380	4,380	—	—	152	101	—	—	—
4,790	4,790	—	4,790	165	132	—	203	—
5,350	5,350	5,350	5,350	184	154	162	225	—
4,380	4,380	—	—	152	112	—	—	—
4,790	4,790	—	4,790	165	146	—	249	—
5,350	5,350	5,350	5,350	184	170	180	277	—
7,290	—	7,290	7,290	250	—	212	288	—
8,460	—	8,460	8,460	288	—	257	331	—
7,780	—	7,780	7,780	267	—	223	304	—
9,020	—	9,020	9,020	307	—	270	349	—
9,240	—	9,240	9,240	317	—	234	325	—
10,710	—	10,710	10,710	364	—	284	374	—
10,690	—	10,690	10,690	367	—	279	385	—
12,410	—	12,410	12,410	422	—	338	443	—
14,420	—	14,420	13,460	485	—	406	509	—
—	—	19,660	18,360	661	—	519	683	—
—	1,930	—	—	83	84	—	—	—
4,240	4,240	—	—	182	133	—	—	—
4,870	4,870	4,870	4,870	208	169	182	252	—
5,700	5,700	5,700	5,700	241	207	223	293	328
4,240	4,240	—	—	182	147	—	—	—
4,870	4,870	4,870	4,870	208	186	201	309	—
5,700	5,700	5,700	5,700	241	228	246	359	416
7,770	—	7,770	7,770	328	—	295	375	416
9,500	—	9,500	9,290	396	—	376	452	446
10,710	—	—	—	—	369†	—	—	529‡‡
12,550	—	—	—	—	369†	—	—	529‡‡
8,290	—	8,290	8,290	350	—	311	396	437
10,140	—	10,140	9,910	422	—	396	477	469
11,420	—	—	—	—	388†	284††	363‡	556‡‡
13,380	—	—	—	—	388†	284††	363‡	556‡‡
9,840	—	9,840	9,840	416	—	326	424	459
12,040	—	12,040	11,770	501	—	416	512	493
13,560	—	—	—	—	—	—	—	584‡‡
15,890	—	—	—	—	—	—	—	584‡‡
11,400	—	11,400	11,400	481	—	388	503	547
13,940	—	13,940	13,620	580	—	495	606	587
15,710	—	—	—	—	485†	354††	454‡	696‡‡
18,400	—	—	—	—	485†	354††	454‡	696‡‡
—	—	15,540	15,540	656	—	497	685	—
—	—	19,000	18,580	791	—	634	826	—
—	—	20,280	18,580	910	—	755	847	—
—	—	20,280	18,580	1,060	—	905	847	—

†Hydril TS
††Hydril FJ-P
‡Hydril Super FJ-P
‡‡Hydril Super EU.

JOB SUMMARY

FORM 2013 R-2

HALLIBURTON LOCATION _____ BILLED ON TICKET NO. _____

WELL DATA

FIELD _____ SEC. _____ TWP. _____ RNG. _____ COUNTY _____ STATE _____

FORMATION NAME _____ TYPE _____

FORMATION THICKNESS _____ FROM _____ TO _____

INITIAL PROD: OIL _____ BPD. WATER _____ BPD. GAS _____ MCFD

PRESENT PROD: OIL _____ BPD. WATER _____ BPD. GAS _____ MCFD

COMPLETION DATE _____ MUD TYPE _____ MUD WT. _____

PACKER TYPE _____ SET AT _____

BOTTOM HOLE TEMP. _____ PRESSURE _____

MISC. DATA _____ TOTAL DEPTH _____

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING						
LINER						
TUBING			5½			
OPEN HOLE						SHOTS/FT.
PERFORATIONS						
PERFORATIONS						
PERFORATIONS						

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 11/21/91	DATE 9/21/91	DATE 9/21/91	DATE 9/21/91
TIME 2100	TIME 0300	TIME 1000	TIME 1021

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG		
HEAD [illegible]	1	[illegible]
PACKER		
OTHER		

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
[illegible]	OPER	Bradford PA
[illegible]	3477	"
[illegible]	TD 2527	"

MATERIALS

TREAT. FLUID _____ DENSITY _____ LB/GAL.-°API

DISPL. FLUID _____ DENSITY _____ LB/GAL.-°API

PROP. TYPE _____ SIZE _____ LB. _____

PROP. TYPE _____ SIZE _____ LB. _____

ACID TYPE _____ GAL. _____ % _____

ACID TYPE _____ GAL. _____ %

ACID TYPE _____ GAL. _____ %

SURFACTANT TYPE _____ GAL. _____ IN _____

NE AGENT TYPE _____ GAL. _____ IN _____

FLUID LOSS ADD. TYPE _____ GAL.-LB. _____ IN _____

GELLING AGENT TYPE HALCO GAL.-LB. 500 IN 25GAL

FRIC. RED. AGENT TYPE _____ GAL.-LB. _____ IN _____

BREAKER TYPE _____ GAL.-LB. _____ IN _____

BLOCKING AGENT TYPE _____ GAL.-LB. _____

PERFPAC BALLS TYPE _____ QTY. _____

OTHER _____

OTHER _____

DEPARTMENT cement

DESCRIPTION OF JOB cement 7½ surface

JOB DONE THRU: TUBING ☐ CASING ☒ ANNULUS ☐ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE X Nick DeLand

HALLIBURTON OPERATOR [illegible] COPIES REQUESTED _____

CEMENT DATA

STAGE	NUMBER OF SACKS	TYPE	API CLASS	BRAND	BULK SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.
1	120	1	A	common	B	3% [illegible] 2% [illegible] 1% [illegible]	1.18	15.1

SUMMARY

PRESSURES IN PSI

CIRCULATING 50 DISPLACEMENT 150

BREAKDOWN _____ MAXIMUM 150

AVERAGE _____ FRACTURE GRADIENT _____

SHUT-IN: INSTANT _____ 5-MIN. _____ 15-MIN. _____

HYDRAULIC HORSEPOWER

ORDERED _____ AVAILABLE _____ USED _____

AVERAGE RATES IN BPM

TREATING _____ DISPL. _____ OVERALL _____

CEMENT LEFT IN PIPE

FEET 30' REASON cut off 10¾

VOLUMES

PRESLUSH: BBL.-GAL. 40 TYPE Gel water

LOAD & BKDN: BBL.-GAL. _____ PAD: BBL.-GAL. _____

TREATMENT: BBL.-GAL. _____ DISPL: BBL.-GAL. 4.5

CEMENT SLURRY: BBL.-GAL. 27

TOTAL VOLUME: BBL.-GAL. 71.5

REMARKS

Took samples of circulated cement

Had circulation throughout cmt. job

CUSTOMER _____ WELL NO. 1 JOB TYPE Cmt. 7½ surface DATE 9/21/91

CUSTOMER

JOB LOG

FORM-2013 R-2

WELL NO. ____ LEASE ____ TICKET NO. ____

CUSTOMER Levapo Resources Corp. PAGE NO. 1

JOB TYPE Cement 9 1/4 Surface DATE 9/29/21

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE (PSI) TUBING	PRESSURE (PSI) CASING	DESCRIPTION OF OPERATION AND MATERIALS
	0955							SAFETY meeting
	1000		40		1		50	BREAK CIRCULATION @ gel WATER
	1012		6		1		50	WASH up mixer
	1014		27		1		100	mix cement AT 15.1 LB/gal
	1021		4.5		1		150	Displace cement @ H2O
	1021							SHUT DOWN & SHUT in VALVE
	1022							Release press.
								HAD CIRCULATION
								5 BBLS CMT. RETURNS

CUSTOMER

JOB SUMMARY

FORM 2013

HALLIBURTON LOCATION: BRADFORD, PA

BILLED ON TICKET NO. 616767

WELL DATA

FIELD: CYCLONA SEC. ____ TWP. ____ RNG. ____ COUNTY: LIMESTONE STATE: NY

FORMATION NAME ____ TYPE ____

FORMATION THICKNESS ____ FROM ____ TO ____

INITIAL PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

PRESENT PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

COMPLETION DATE ____ MUD TYPE ____ MUD WT. ____

PACKER TYPE ____ SET AT ____

BOTTOM HOLE TEMP. ____ PRESSURE ____

MISC. DATA ____ TOTAL DEPTH 615'

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING		SCC				200
LINER			1 SCH			
TUBING				CHPL		
OPEN HOLE						SHOTS/FT.
PERFORATIONS						
PERFORATIONS						
PERFORATIONS						

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG 6 5/8" SU	1	HOWCO
HEAD 6 5/8 DC & MANIF	1	HOWCO
PACKER		
OTHER		

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 10-21-83	DATE 10-21-83	DATE 10-21-83	DATE 10-21-83
TIME 0600	TIME 0800	TIME 1340	TIME 1417

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
J. YOUNG	OPER	BRADFORD, PA
J. HOLLY	HT 136 3781	"
D. KLINE	T.A. 6477	"

MATERIALS

TREAT. FLUID ____ DENSITY ____ LB/GAL. °API

DISPL. FLUID ____ DENSITY ____ LB/GAL. °API

PROP. TYPE ____ SIZE ____ LB. ____

PROP. TYPE ____ SIZE ____ LB. ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ %

ACID TYPE ____ GAL. ____ %

SURFACTANT TYPE ____ GAL. ____ IN ____

NE AGENT TYPE ____ GAL. ____ IN ____

FLUID LOSS ADD. TYPE ____ GAL.-LB. ____ IN ____

GELLING AGENT TYPE ____ GAL.-LB. ____ IN ____

FRIC. RED. AGENT TYPE ____ GAL.-LB. ____ IN ____

BREAKER TYPE ____ GAL.-LB. ____ IN ____

BLOCKING AGENT TYPE ____ GAL.-LB. ____

PERFPAC BALLS TYPE ____ QTY. ____

OTHER 5 SX HALCO GEL

OTHER ____

DEPARTMENT CMT

DESCRIPTION OF JOB CMT 6" L.S.

JOB DONE THRU: TUBING ☐ CASING ☒ ANNULUS ☐ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE X [signature]

HALLIBURTON OPERATOR [signature]

COPIES REQUESTED 1

CEMENT DATA

STAGE	NUMBER OF SACKS	TYPE	API CLASS	BRAND	BULK SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.
1	125	STANDARD	A		X	10# CALSEAL - 4% GEL - 2% CACL2	1.61	14.4

PRESSURES IN PSI

CIRCULATING ____ DISPLACEMENT ____

BREAKDOWN ____ MAXIMUM ____

AVERAGE ____ FRACTURE GRADIENT ____

SHUT-IN: INSTANT ____ 5-MIN. ____ 15-MIN. ____

HYDRAULIC HORSEPOWER

ORDERED ____ AVAILABLE ____ USED ____

AVERAGE RATES IN BPM

TREATING ____ DISPL. ____ OVERALL ____

CEMENT LEFT IN PIPE

FEET 0' REASON FLOAT SHOE

SUMMARY

PRESLUSH: BBL.-GAL. 25

LOAD & BKDN: BBL.-GAL. 21

TREATMENT: BBL.-GAL. ____

CEMENT SLURRY: BBL.-GAL. 32.2

TOTAL VOLUME: BBL.-GAL. 108

VOLUMES

TYPE GEL

PAD: BBL.-GAL. ____

DISPL: BBL.-GAL. 23.2

REMARKS

TOOK SAMPLES & DISPLACED CMT.
GOOD CIRCULATION
½ BBL CMT RETURNS

CUSTOMER: KEYSTONE KOMPOSITE CORP.

LEASE: K. FRANKS

WELL NO. 2

JOB TYPE: CMT 6 L.S.

DATE: 10-21-83

CUSTOMER

JOB LOG

FORM 2013 R-2

CUSTOMER LEWIS RESOURCES CORP. PAGE NO. 1

JOB TYPE CMT 6" LOW SHRINK DATE 10-7-88

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE (PSI) TUBING	PRESSURE (PSI) CASING	DESCRIPTION OF OPERATION AND MATERIALS
	1330							SAFETY MEETING
	1340		21		2		50	PUMP CAP. OF CASING
	1347		25		2		50	MIX 5 SKS FCL
	1351		5		2		50	WASH MIXER
	1356		35.8		2		100	MIX 135 SKS THIXOTROPIC @ 14.4#
	1408							SHUT DOWN
	1408							TRIP PIN
	1408		23.3		2		200	DISPLACE PLUG TO FLOAT SHOE
	1414						700	BUMP PLUG - SHUT DOWN
	1414							HOLD PSI
	1417							RELEASE

CUSTOMER

JOB SUMMARY

FORM 2020

HALLIBURTON LOCATION: Bradford, PA

BILLED ON TICKET NO. 740253

WELL DATA

FIELD: Allegany — SEC. ____ TWP. ____ RNG. ____ COUNTY: Livingston — STATE: NY

FORMATION NAME ____ TYPE ____

FORMATION THICKNESS ____ FROM ____ TO ____

INITIAL PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

PRESENT PROD: OIL ____ BPD. WATER ____ BPD. GAS ____ MCFD

COMPLETION DATE ____ MUD TYPE ____ MUD WT. ____

PACKER TYPE ____ SET AT ____

BOTTOM HOLE TEMP. ____ PRESSURE ____

MISC. DATA ____ TOTAL DEPTH 655'

	NEW USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING						
LINER						
TUBING						
OPEN HOLE		See Work Order				SHOTS/FT.
PERFORATIONS						
PERFORATIONS						
PERFORATIONS						

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG 6" Wooden	1	Halco
HEAD 6" P.C. + M.	1 EA	Halco
PACKER		
OTHER		

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 10-31-83	DATE 10-31-83	DATE 10-31-83	DATE 10-31-83
TIME 0600	TIME 0830	TIME 0955	TIME 1030

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
K. Stewart	OPER	Bradford PA
K. Wiedemann	3982 HT-150	"
L. Johnson	0477 T.D.	"

MATERIALS

TREAT. FLUID ____ DENSITY ____ LB/GAL. °API

DISPL. FLUID ____ DENSITY ____ LB/GAL. °API

PROP. TYPE ____ SIZE ____ LB. ____

PROP. TYPE ____ SIZE ____ LB. ____

ACID TYPE ____ GAL. ____ %

ACID TYPE ____ GAL. ____ %

ACID TYPE ____ GAL. ____ %

SURFACTANT TYPE ____ GAL. ____ IN ____

NE AGENT TYPE ____ GAL. ____ IN ____

FLUID LOSS ADD. TYPE ____ GAL.-LB. ____ IN ____

GELLING AGENT TYPE ____ GAL.-LB. ____ IN ____

FRIC. RED. AGENT TYPE ____ GAL.-LB. ____ IN ____

BREAKER TYPE ____ GAL.-LB. ____ IN ____

BLOCKING AGENT TYPE ____ GAL.-LB. ____

PERFPAC BALLS TYPE ____ QTY. ____

OTHER ____

OTHER ____

DEPARTMENT: Cement

DESCRIPTION OF JOB: 6" Squeeze Job

JOB DONE THRU: TUBING ☐ CASING ☑ ANNULUS ☐ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE: X [signature]

HALLIBURTON OPERATOR: R. K. Stewart

COPIES REQUESTED: 1

CEMENT DATA

STAGE	NUMBER OF SACKS	TYPE	API CLASS	BRAND	BULK/SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.
1	100	Common	A		B	5# Gilsonite & 5# Flo Seal P/SK	1.25	15.6

PRESSURES IN PSI

CIRCULATING ____ DISPLACEMENT ____

BREAKDOWN ____ MAXIMUM ____

AVERAGE ____ FRACTURE GRADIENT ____

SHUT-IN: INSTANT ____ 5-MIN. ____ 15-MIN. ____

HYDRAULIC HORSEPOWER

ORDERED ____ AVAILABLE ____ USED ____

AVERAGE RATES IN BPM

TREATING ____ DISPL. ____ OVERALL ____

CEMENT LEFT IN PIPE

FEET 100 REASON Requested

SUMMARY

PRESLUSH: BBL.-GAL. 10 TYPE Halco Gel

LOAD & BKDN: BBL.-GAL. 5 PAD: BBL.-GAL. ____

TREATMENT: BBL.-GAL. ____ DISPL.: BBL.-GAL. 3.7

CEMENT SLURRY: BBL.-GAL. 22

TOTAL VOLUME: BBL.-GAL. 40.7

REMARKS

Wiped Cement

Took Samples

1 BBL Returns

CUSTOMER: Allegany Resources

LEASE: Hannah

WELL NO.: 1-4

JOB TYPE: 6" Squeeze

DATE: 10-31-83

CUSTOMER

JOB LOG

FORM 2013 R-2

CUSTOMER: Lennite Resources

JOB TYPE: 6" Squeeze Job

PAGE NO. 1

DATE: 10-31-85

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE (PSI) TUBING	PRESSURE (PSI) CASING	DESCRIPTION
								Safty Meeting on L C
1	0958		12		2		200	Break Circulation mix Gel
1	1005		22		2		400	Mix mix ses C Cmt
1	1017		—		-		900	Shut down + Trip
1	1018		3.7		1		250	Disance Plug in
1	1024		—		-		250	Shut down Close in
1	1025		—		-		-0-	R Erase Psi
								W C
								Took Sam
								8 Bbl Returns

CUSTOMER

JOB SUMMARY

FORM 2003

HALLIBURTON LOCATION Bradford, Pa

BILLED ON TICKET NO. 24035-8

WELL DATA

FIELD York SEC. ____ TWP. ____ RNG. ____ COUNTY Livingston STATE N.Y.

FORMATION NAME ____ TYPE ____

FORMATION THICKNESS ____ FROM ____ TO ____

INITIAL PROD: OIL ____ BPD, WATER ____ BPD, GAS ____ MCFD

PRESENT PROD: OIL ____ BPD, WATER ____ BPD, GAS ____ MCFD

COMPLETION DATE ____ MUD TYPE ____ MUD WT. ____

PACKER TYPE ____ SET AT ____

BOTTOM HOLE TEMP. ____ PRESSURE ____

MISC. DATA ____ TOTAL DEPTH ____

	NEW/USED	WEIGHT	SIZE	FROM	TO	MAXIMUM PSI ALLOWABLE
CASING		SEE				
LINER			MARK			
TUBING				order		
OPEN HOLE						SHOTS/FT.
PERFORATIONS						
PERFORATIONS						
PERFORATIONS						

TOOLS AND ACCESSORIES

TYPE AND SIZE	QTY.	MAKE
FLOAT COLLAR		
FLOAT SHOE		
GUIDE SHOE		
CENTRALIZERS		
BOTTOM PLUG		
TOP PLUG		
HEAD 1" nipple	1	Howco
PACKER		
OTHER		

JOB DATA

CALLED OUT	ON LOCATION	JOB STARTED	JOB COMPLETED
DATE 11-11-83	DATE 11-11-83	DATE 11-11-83	DATE 11-11-83
TIME 1030	TIME 1120	TIME 1225	TIME 1245

PERSONNEL AND SERVICE UNITS

NAME	UNIT NO. & TYPE	LOCATION
B. Jackson		
T. Hardy	3967 H+WD	Bradford
T. Cawley		

MATERIALS

TREAT. FLUID ____ DENSITY ____ LB/GAL.-°API

DISPL. FLUID ____ DENSITY ____ LB/GAL.-°API

PROP. TYPE ____ SIZE ____ LB. ____

PROP. TYPE ____ SIZE ____ LB. ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ % ____

ACID TYPE ____ GAL. ____ % ____

SURFACTANT TYPE ____ GAL. ____ IN ____

NE AGENT TYPE ____ GAL. ____ IN ____

FLUID LOSS ADD. TYPE ____ GAL.-LB. ____ IN ____

GELLING AGENT TYPE Howco GAL.-LB. 500 IN 18

FRIC. RED. AGENT TYPE ____ GAL.-LB. ____ IN ____

BREAKER TYPE ____ GAL.-LB. ____ IN ____

BLOCKING AGENT TYPE ____ GAL.-LB. ____

PERFPAC BALLS TYPE ____ QTY. ____

OTHER ____

OTHER ____

DEPARTMENT Cmt

DESCRIPTION OF JOB Spot Gel water Between 4½ & 6⅝ csg.

JOB DONE THRU: TUBING ☐ CASING ☐ ANNULUS ☒ TBG./ANN. ☐

CUSTOMER REPRESENTATIVE X [signature]

HALLIBURTON OPERATOR Bernard Jackson COPIES REQUESTED ____

CEMENT DATA

STAGE	NUMBER OF SACKS	TYPE	API CLASS	BRAND	BULK SACKED	ADDITIVES	YIELD CU.FT./SK.	MIXED LBS./GAL.

SUMMARY

PRESSURES IN PSI

CIRCULATING ____ DISPLACEMENT ____

BREAKDOWN ____ MAXIMUM ____

AVERAGE ____ FRACTURE GRADIENT ____

SHUT-IN: INSTANT ____ 5-MIN. ____ 15-MIN. ____

HYDRAULIC HORSEPOWER

ORDERED ____ AVAILABLE ____ USED ____

AVERAGE RATES IN BPM

TREATING ____ DISPL. ____ OVERALL ____

CEMENT LEFT IN PIPE

FEET ____ REASON ____

VOLUMES

PRESLUSH: BBL.-GAL. ____ TYPE ____

LOAD & BKDN: BBL.-GAL. 11 PAD: BBL.-GAL. ____

TREATMENT: BBL.-GAL. ____ DISPL.: BBL.-GAL. 7

CEMENT SLURRY: BBL.-GAL. ____

TOTAL VOLUME: BBL.-GAL. 18

REMARKS

CUSTOMER

DISTRICT Bradford WELL NO. 1/5 LEASE ____ JOB TYPE Spot Gel DATE 11-11-83

JOB LOG

FORM 2013 R-2

CUSTOMER Lenape Resources

JOB TYPE Spot Gel water Between 2 LACS6 11 1 8

CHART NO.	TIME	RATE (BPM)	VOLUME (BBL) (GAL)	PUMPS T	PUMPS C	PRESSURE (PSI) TUBING	PRESSURE (PSI) CASING	
								Safety meeting
	1200							Mix 18 BBl Gel water in Displacement Tanks
	1205		11		1		25	Pump 11 BBl Gel water
								Shut Down & Pack
			7		1		25	Finish Fill up Hole

CUSTOMER

Schlumberger

CASING COLLAR LOG AND PERFORATING RECORD

FILE COPY

COUNTY
FIELD or LOCATION
WELL
COMPANY

COMPANY LENAPE RESOURCES CORPORATION

WELL RANOUS #1 LRC #73

FIELD CALEDONIA

COUNTY LIVINGSTON STATE NEW YORK

Location: N/A

Sec. Twp. CALEDONIA

Other Services:

Permanent Datum: G.L. ; Elev.: N/A
Log Measured From K.B. , 5 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. -
D.F. -
G.L. N/A

Date 10/31/83 | Run No. ONE

PLUG BACK TOTAL DEPTH | DRILLER- | LOGGER- 631

DEPTHS BELOW RELATE TO: OPEN HOLE LOG MEASUREMENTS: ☐
: RADIOACTIVITY LOG MEASUREMENTS: ☒
: SCHLUMBERGER LINE MEASUREMENTS: ☒

CASING COLLARS		PERFORATING DATA				
		No.Shots	From	To	Gun Type	Gun Size
178						
199½		6	194	196½	HYPERJET II	
211					SCG	3-3/8
243					CARRIER	

BORE HOLE RECORD			CASING RECORD				
Hole Size	From	To	Size	Type	Weight	From	To
7-7/8	SURF	~660	5½		14 LB/FT	SURF	637

HOLE FLUID DATA	
Type Fluid: WATER	Opr. Rig Time: 1 HR
Density: 8 LB/GAL	Truck No. 4404
Fluid Level: ~FULL	Location: BRADFORD
	Recorded By: R. CLAYPOOL
	Witnessed By: MR. M. LONG

The well name, location and borehole reference data were furnished by the customer.

FOLD HERE

SWS-673-H

Schlumberger

SCHLUMBERGER WELL SERVICES
5000 GULF FREEWAY, P.O. BOX 2175
HOUSTON, TEXAS 77001, (713) 926-2511

February 3, 1986

FEB 1986
RECEIVED

PLEASE REPLY TO
95 RUTHERFORD RUN
BRADFORD, PENNSYLVANIA 16701

Lenape Resources
Jeff Loney
26 Harvester Avenue
Batavia, NY 14020

Dear Jeff:

The following is an interpretation of the Cement Bond of Ranous #1, LRC #73, along with an interpretation of the lithology and it's ability to act as an upper confining zone for injection into the "B" salt.

CEMENT BOND

The quality of the cement bond as interpreted from the to Cement Bond Logs run on 10-27-83, and 11-8-83, show that the amount of cement calculated using the industry accepted Bond Index is as follows:

DEPTH INTERVAL	AVERAGE BOND %
0-118 ft.	100%
118-134 ft.	82%
134-152 ft.	95%
152-202 ft.	52%
202-218 ft.	<10%
218-240 ft.	33%
240-280 ft.	48%
280-490 ft.	45%
490-620 ft.	38%

The above Cement Bond percentages show that the bond below 152 ft. is below 55% which implies questionable cement integrity. Lenape's records show this wells being drilled with a 7 7/8 drill bit and the casing size set to T.D. is 6 5/8. This implies that the cement sheath has a thickness of 5/8 of an inch. With a cement sheath less than 3/4 of an inch in thickness, the amplitude of the Bond log does not have enough cement to adequately attenuate the sonic signal.

All interpretations are opinions based on inferences from electrical or other measurements and we cannot, and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule.

LITHOLOGY INTERPRETATION

Since the Gamma Ray is the only Lithology log run on the Ranous #1 well, the Litho Density run on an offset well (Stein-Johnson #1-LRC #232), will be used to correlate the Gamma Rays and thus give a lithology interpretation based on the LDT run on LRC 232.

From a depth of 490 ft. to 610 ft., is the Salina "C" shale which has interbedded Anhydrous Dolomite Stringers at depths of approximately 502-510, 550-556, and 592-602.

The Anhydrous Dolomite interbedded in the "C" shale have a density ranging from 2.78 to 2.86 gm/cc which constitute a maximum porosity of 4 percent with the average porosity being closer to 2 percent. This would constitute a very tight formation with minute permeability. Since shales are known to act as barriers for upward migrations of fluids, the "C" shale along with the interbedded Anhydrous Dolomite Stringers should act as a good upper confining zone for injection into the underlying "B" salt section.

Sincerely,

Ed Dooner (rkd)

Ed Dooner
Sales Engineer
Schlumberger Well Services

ED/rkd

ATTACHMENT M

Construction Details

The enclosed drawings depict the construction of the LRC# 73 - Ranous Disposal well.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, DC 20460

EPA

COMPLETION REPORT FOR BRINE DISPOSAL, HYDROCARBON STORAGE, OR ENHANCED RECOVERY WELL

Form Approved
OMB No. 2040-0042
Approval expires 9-30-86

NAME AND ADDRESS OF EXISTING PERMITTEE
The Lenape Resources Corporation
26 Harvester Avenue
Batavia, NY 14020

NAME AND ADDRESS OF SURFACE OWNER
Leonard I. Ranous, Jr.
2918 McGovern Rd.
Caledonia, NY 14423

LOCATE WELL AND OUTLINE UNIT ON SECTION PLAT — 640 ACRES

N
W E
S

STATE	COUNTY	PERMIT NUMBER
NY	Livingston	

SURFACE LOCATION DESCRIPTION (see attached survey map)
¼ OF ¼ OF ¼ SECTION TOWNSHIP RANGE

LOCATE WELL IN TWO DIRECTIONS FROM NEAREST LINES OF QUARTER SECTION AND DRILLING UNIT
Surface Location ____ ft. from (N/S) ____ Line of quarter section (see attached survey map)
and ____ ft. from (E/W) ____ Line of quarter section

WELL ACTIVITY
- [X] Brine Disposal
- [ ] Enhanced Recovery
- [ ] Hydrocarbon Storage

TYPE OF PERMIT
- [X] Individual
- [ ] Area

Number of Wells 1

Estimated Fracture Pressure of Injection Zone: N/A

Anticipated Daily Injection Volume (Bbls)		Injection Interval	
Average	Maximum	Feet	to Feet
400	2000	640'(G.L.)	660' (G.L.)

Anticipated Daily Injection Pressure (PSI)		Depth to Bottom of Lowermost Freshwater Formation (Feet)
Average	Maximum	
0	250	

Type of Injection Fluid *(Check the appropriate block(s))*
- [X] Salt Water
- [X] Brackish Water
- [ ] Fresh Water
- [ ] Liquid Hydrocarbon
- [ ] Other

Lease Name: L.C. Ranous No. 1
Well Number: LRC No. 73
Name of Injection Zone: Salina
Permeability of Injection Zone: N/A
Porosity of Injection Zone: N/A

Date Drilling Began: 1-22-82
Date Well Completed: 12-19-83
Date Drilling Completed: 2-14-82

CASING AND TUBING

OD Size	Wt/Ft — Grade — New or Used	Depth (KBM)
13 3/8	54.5-J-55 New	38' ±
8 5/8	24 -J-55 New	95'±
6 5/8	20-H40 New	643' ±
4½ Tubing	9.5-J-55 New	636 ±

CEMENT / HOLE

Sacks	Class	Hole Depth (KBM)	Bit Diameter
–	–	–	–
120	A(Common)	139	12 3/4
125	A (Thixotropic)	660	7 7/8
9½"Casing set on Open Hole Packer			

INJECTION ZONE STIMULATION

Interval Treated	Materials and Amount Used
No	Treatment

WIRE LINE LOGS, LIST EACH TYPE

Log Types	Logged Intervals (KBM)
Cement Bond	10'; 281'; 631'
Casing Collar	178', 199½', 211', 243'
Perforating	194'-196½'

Complete Attachments A — E listed on the reverse.

CERTIFICATION

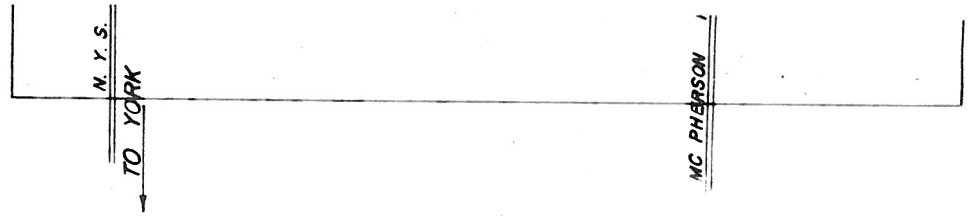
I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32).

NAME AND OFFICIAL TITLE *(Please type or print)*
John C. Holko
Petroleum Engineer

John C. Holko

DATE SIGNED: 12/12/85

EPA Form 7520-10 (2-84)



CALEDONIA QUADRANGLE, N. Y.
7.5 MINUTE SERIES
SECTION 'D'
7,840 S 42-57-30
9,700 W 77-50-00
ELEV. 748 TOPO

SURVEY MAP OF GAS WELL LOCATION FOR
LENAPE RESOURCES CORP.
ONE ELIZABETHTOWN PLAZA
ELIZABETH, N. J. 07207
TOWN OF CALEDONIA
COUNTY OF LIVINGSTON, STATE OF NEW YORK
LEONARD RANOUS - OWNER
BY JAMES F. GILLEN - LAND SURVEYOR
WARSAW, N. Y. JUNE 16, 1981
SCALE 1 INCH = 400 FEET

17 X 22

4½" 8 RND x 6" I.D. x 16" C101 HOOKWALL PACKER

4½" 9.5 # J-55 SMLS TUBING SET ON PACKER AT 630'

6⅝" 20 # H-40 CASING SET AT 640' & CEMENTED TO SURFACE

TOP OF LOST CIRCULATION ZONE AT 660'

T.D. AT 667'

SCALE: 1" = 20'

THE LENAPE RESOURCES CORPORATION

26 HARVESTER AVENUE BATAVIA, N.Y. 14020

CROSS SECTIONAL DIAGRAM

L.C. RANOUS No. 1
BRINE DISPOSAL WELL

TOWN OF CALEDONIA
LIVINGSTON COUNTY
NEW YORK

ATTACHMENT M
DIAGRAM No. 1

ATTACHMENT O

Plans for Well Failures

1. 4½" Tubing Failure

This type of failure is monitored with the pressure recorder on the Annulus between the 4½" Tubing and the 6 5/8" casing. If the pressure recorder indicates any pressure variance in the annular space, the tubing will be removed and replaced with new tubing and packer.

This is monitored manually during injection and injection can be terminated by closing the 4" Newco Valve in case of pressure variance.

2. Surface Storage Facility Failure

The maximum brine stored on the location is 210 barrels. The capacity of the cement retaining dike is approximately 350 barrels.

If a tank leaks, the fluid will be contained by the cement dike for disposal.

The tank will then be removed and replace with a new one.

3. Transfer Line Failure

Since the facilities operation is manual, any line failure will be noticed immediately, and the injection can be terminated by closing the tank valves. All lines will then be replaced with new lines.