

MISSOURI LEAD & ZINC COMPANY

CORE ANALYSIS REPORT

GRAY LEASE WELL NO. 8

NEOSHO COUNTY, KANSAS

SPOT LOG

DRILL HOLE: MLZ #8 GRAY
 PROP. OWNER: D. D. GRAY
 DRILL CONTRACTOR: L-K DRILLING CO.
 DRILL OPERATOR: H. Laverty
 DATE STARTED:
 CASING LEFT IN HOLE: 50' of 7",
 252 of 4 1/2"

LOG: Approx. 825' W of E Sec. line
 1162' N of S prop. line, Sec.
 34, T30S, R21E; 330' N of Gray 4.
 ELEV: 841' surveyed
 DATE COMPLETED: Nov. 28, 1978
 LOGGED BY: JWE
 TOTAL DEPTH: 245'

CORE 1 - 166 - 186'

- 166 - 169 - Shale, medium gray, fissile, poker chip core, few thin coal seams to 1 mm thick
- 169 - 179 - Sandstone, brown, clean, few scatt thin (paperthin) micaceous shale seams, oil saturated and bleeding
- 179 - 180 1/2 - Sandstone, silty, grayish brown, fine grained micaceous and few carbonaceous seams bleeding oil but not bubbling like rest of core, core appears dryer than rest of core
- 180 1/2 - 185 - Sandstone, brown to brownish gray, oil saturated and bubbly at 180 1/2 to 183, 183 to 185 oil saturated but not bubbly
- 185 - 185.8 - Shale, medium gray, dry

COMMENTS: Hole started gassing at 164', first oil on pit at 171'

CORE 2 - 186 - 206'

- 186 - 188 1/4 - Shale, medium gray, thin sandy seams at 187 1/2 through 188 1/4
- 188 1/4 - 191 1/2 - Sandstone, brownish gray, fairly abundant micaceous and shaly seams, 20%, oil saturated
- 191 1/2 - 193 1/2 - Shale, sandy, abundant thin to 1 mm sand seams, bleeding oil in sand seams, 10 sandy seams to inch, some H₂O at 189'
- 193 1/2 - 206 - Sandstone, brown to dark gray, abundant thin micaceous seams at 196 to 196 1/2, oil and water saturated, scatt thin micaceous seams throughout but overall a fairly clean sand, most of sand is dark gray with local brownish shade

CORE 3 - 206 - 225

- 206 - 225 - Sandstone, fine grain with numerous small shale partings, oil stains along most of core length, very water saturated

CORE 4 - 225 - 245

- 225 - 232 - Sandstone, fine grained, finely laminated
- 232 - 241 - Sandstone, coarser grained than above and noticeably darker--medium to dark brown
 - 233' - shale pebble
 - 235' - coal fragments
 - 238 - 240' - 2" coal, shale pebbles
 - 241' - sand over shale erosional contact
- 241 - 242 - Shale, light gray, containing pods of sand with 2" shale pebble at 242'
- 242 - 245 - Sandstone, as coarse grained as above, dark brown
 - 244' - thin coal seams and mm coal laminae distorted
 - 244' - abundant shale pebbles

COMMENTS: Sandstone from 169 - 185', 188 - 191', 193 - 241'; and 242 - 245'. Still had sandstone in bottom of core (245) but suspect less than 5' remaining. Therefore there is at least 70 feet of sandstone in a 76 foot section.



OILFIELD RESEARCH LABORATORIES

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

December 4, 1978

Missouri Lead & Zinc Company
1705 North Walnut
Pittsburg, Kansas 66762

Gentlemen:

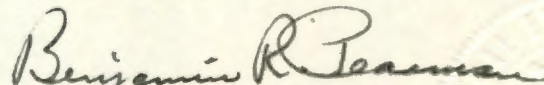
Enclosed herewith are the results of tests run on the rotary core taken from the Gray Lease, Well No. 8, Neosho County, Kansas, and submitted to our laboratory on November 26, 1978.

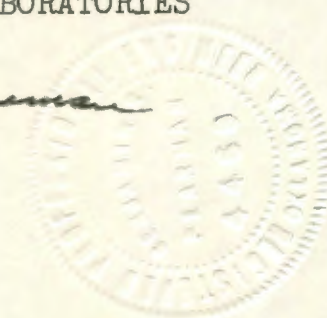
This core was sampled and the samples were sealed in bags by a representative of the client.

Your business is greatly appreciated.

Very truly yours,

OILFIELD RESEARCH LABORATORIES


Benjamin R. Pearman



SAM:km

4 c to Pittsburg, Kansas
1 c to Chanute, Kansas

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GENERAL INFORMATION & SUMMARY

Company Missouri Lead & Zinc Co. Lease Gray Well No. 8

Location SW NW SE

Section 34 Twp 30S Rge 31E County Neosho State Kansas

Name of Sand	Bartlesville
Top of Core	166.0
Bottom of Core	245.3
Top of Sand	169.2
Bottom of Sand	245.3
Total Feet of Permeable Sand	68.5
Total Feet of Floodable Sand	-

Distribution of Permeable Sand:
Permeability Range
Millidarcys

Permeability Range Millidarcys	Feet	Cum. Ft.
0 - 100	45.8	45.8
100 - 200	14.7	60.5
200 & Above	8.0	68.5

Average Permeability Millidarcys	98.3
Average Percent Porosity	20.6
Average Percent Oil Saturation	39.8
Average Percent Water Saturation	46.0
Average Oil Content, Bbls./A. Ft.	630.
Total Oil Content, Bbls./Acre	44,597.
Average Percent Oil Recovery by Laboratory Flooding Tests	-
Average Oil Recovery by Laboratory Flooding Tests, Bbls./A. Ft.	-
Total Oil Recovery by Laboratory Flooding Tests, Bbls./Acre	-
Total Calculated Oil Recovery, Bbls./Acre	-
Packer Setting, Feet	-
Viscosity, Centipoises @	-
A. P. I. Gravity, degrees @ 60 °F	-
Elevation, Feet	-

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LOG

Company Missouri Lead & Zinc Company Lease Gray Well No. 8

<u>Depth Interval, Feet</u>	<u>Description</u>
166.0 - 169.2	Gray sandy shale.
169.2 - 179.2	Dark brown sandstone.
179.2 - 180.5	Brownish gray calcareous sandstone.
180.5 - 182.8	Brown slightly laminated shaly sandstone.
182.8 - 184.9	Dark brown sandstone.
184.9 - 188.2	Gray sandy shale.
188.2 - 191.3	Brown sandstone.
191.3 - 194.1	Brownish gray very shaly sandstone.
194.1 - 195.8	Dark brown sandstone.
195.8 - 196.4	Brown sandstone with carbon streaks.
196.4 - 197.3	Dark brown sandstone.
197.3 - 203.3	Grayish brown slightly carbonaceous sandstone.
203.3 - 204.8	Light brown slightly shaly sandstone.
204.8 - 208.2	Dark brown sandstone.
208.2 - 211.8	Light brown micaceous sandstone.
211.8 - 228.7	Light brown sandstone.
228.7 - 232.8	Light brown slightly shaly sandstone.
232.8 - 235.2	Black carbonaceous sandstone.
235.2 - 237.8	Light brown carbonaceous shaly sandstone.
237.8 - 240.9	Black carbonaceous sandstone.
240.9 - 242.0	Gray sandy shale.
242.0 - 244.0	Dark brown carbonaceous sandstone.
244.0 - 245.3	Gray and black conglomeratic shaly sandstone.

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RESULTS OF SATURATION & PERMEABILITY TESTS

TABLE 1-B

Company Missouri Lead & Zinc Company Lease Gray Well No. 8

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	169.7	21.8	48	20	68	812	177.	0.8	0.8	650	141.60
2	170.6	22.2	53	27	80	913	226.	1.0	1.8	913	226.00
3	171.5	25.3	44	23	67	864	556.	1.0	2.8	864	556.00
4	172.5	24.8	64	16	80	1231	482.	1.0	3.8	1231	482.00
5	173.5	24.8	61	14	75	1174	371.	1.0	4.8	1174	371.00
6	174.6	27.3	65	12	77	1377	115.	1.0	5.8	1377	115.00
7	175.6	22.7	62	18	80	1092	577.	1.0	6.8	1092	577.00
8	176.6	25.3	66	12	78	1295	256.	1.0	7.8	1295	256.00
9	177.5	26.0	64	12	76	1291	399.	1.0	8.8	1291	399.00
10	178.5	23.4	61	20	81	1107	133.	1.2	10.0	1328	159.60
11	179.5	9.6	55	40	95	410	Imp.	1.3	11.3	533	0.00
12	180.6	20.9	48	35	83	778	3.0	0.5	11.8	389	1.50
13	181.6	19.9	43	43	86	664	39.	1.0	12.8	664	39.00
14	182.5	8.4	17	78	95	111	22.	0.8	13.6	89	17.60
15	183.7	22.4	30	32	62	521	81.	1.2	14.8	625	97.20
16	184.6	22.2	29	43	72	500	130.	0.9	15.7	450	117.00
17	188.6	22.3	33	33	66	571	66.	0.8	16.5	457	52.80
18	189.6	19.6	35	47	82	532	143.	1.0	17.5	532	143.00
19	190.8	16.9	31	59	90	406	110.	1.3	18.8	528	143.00
20	191.5	16.7	34	60	94	441	4.8	0.7	19.5	309	3.36
21	192.6	13.3	9	85	94	93	1.5	1.0	20.5	93	1.50
22	193.7	8.2	67	30	97	426	0.41	1.1	21.6	469	0.45
23	194.6	31.0	30	53	83	722	106.	0.9	22.5	650	95.40
24	195.7	22.4	35	45	80	608	100.	0.8	23.3	486	80.00
25	196.5	23.5	42	40	82	766	92.	0.9	24.2	689	82.80
26	197.4	24.0	41	40	81	763	100.	0.7	24.9	534	70.00
27	198.5	17.5	35	45	80	475	37.	1.0	25.9	475	37.00
28	199.5	23.8	35	46	81	646	83.	1.0	26.9	646	83.00
29	200.5	24.8	32	52	84	616	158.	1.0	27.9	616	158.00

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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.		
30	201.5	21.4	39	53	92	648	83.	1.0	28.9	648	83.00
31	202.5	20.5	37	53	90	588	31.	1.3	30.2	764	40.30
32	203.4	18.3	38	55	93	540	13.	0.7	30.9	378	9.10
33	204.4	19.9	38	49	87	587	10.	0.8	31.7	470	8.00
34	205.5	21.6	36	56	92	603	153.	1.2	32.9	724	183.60
35	206.5	21.9	46	42	88	782	17.	1.0	33.9	782	17.00
36	207.5	23.3	35	50	85	633	101.	1.2	35.1	760	121.20
37	208.5	22.0	47	42	89	802	1.0	0.8	35.9	642	0.80
38	209.5	13.4	7	67	74	73	Imp.	1.0	36.9	73	0.00
39	210.5	15.0	29	52	81	338	3.3	1.0	37.9	338	3.30
40	211.5	17.0	48	47	95	633	58.	0.8	38.7	506	46.40
41	212.5	20.1	28	65	93	437	60.	1.2	39.9	524	72.00
42	213.4	20.3	36	46	82	567	13.	1.0	40.9	567	13.00
43	214.5	20.7	28	58	86	450	52.	1.0	41.9	450	52.00
44	215.5	21.2	28	58	86	461	72.	1.0	42.9	461	72.00
45	216.5	18.0	23	63	86	321	72.	1.0	43.9	321	72.00
46	217.6	24.0	26	59	85	484	63.	1.0	44.9	484	63.00
47	218.5	21.8	27	58	85	457	259.	1.0	45.9	457	259.00
48	219.6	21.9	30	52	82	510	158.	1.0	46.9	510	158.00
49	220.5	20.2	30	57	87	470	123.	1.0	47.9	470	123.00
50	221.5	24.3	24	59	83	452	39.	1.0	48.9	452	39.00
51	222.5	23.1	26	64	90	466	121.	1.0	49.9	466	121.00
52	223.5	21.8	28	68	96	474	80.	1.0	50.9	474	80.00
53	224.5	22.2	22	70	92	379	24.	1.0	51.9	379	24.00
54	225.5	23.5	36	57	93	656	87.	1.0	52.9	656	87.00
55	226.5	21.3	29	65	94	479	62.	1.0	53.9	479	62.00
56	227.5	18.7	29	55	84	421	68.	1.0	54.9	421	68.00
57	228.5	21.0	35	53	88	570	40.	0.7	55.6	399	28.00
58	229.5	17.8	41	45	86	566	18.	1.3	56.9	736	23.40

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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.	Cur. Ft.			
59	230.5	19.1	27	63	90	400	12.	1.0	57.9	400	12.00	
60	231.5	15.5	28	55	83	337	19.	1.0	58.9	337	19.00	
61	232.5	22.6	35	48	83	614	3.3	0.8	59.7	491	2.64	
62	233.5	22.5	49	37	86	855	39.	1.2	60.9	1026	46.80	
63	234.5	21.4	49	43	92	814	60.	1.2	62.1	977	72.00	
64	235.5	19.5	37	49	86	560	6.0	0.8	62.9	448	4.80	
65	236.5	18.5	50	36	86	718	2.1	1.0	63.9	718	2.10	
66	237.5	22.7	23	43	66	405	3.1	0.8	64.7	324	2.48	
67	238.6	16.1	36	60	96	450	108.	1.2	65.9	540	129.60	
68	239.7	22.4	43	52	95	747	5.6	1.0	66.9	747	5.60	
69	240.5	21.5	73	18	91	1218	1.2	0.9	67.8	1096	1.08	
70	242.4	18.5	61	30	91	876	0.82	1.0	68.8	876	0.82	
71	243.5	17.3	73	23	96	980	1.0	1.0	69.8	980	1.00	
72	244.5	17.5	56	40	96	760	0.63	1.3	71.1	988	0.82	
		14933.2				3295						6711.76
		1482.3				11						

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SUMMARY OF PERMEABILITY & SATURATION TESTS

TABLE III

Company Missouri Lead & Zinc Company Lease Gray Well No. 8

Depth Interval, Feet	Feet of Core Analyzed	Average Permeability, Millidarcys	Permeability Capacity Ft. x Md.
169.2 - 179.2	10.0	328.3	3282.60
179.2 - 208.2	23.8	70.8	1684.81
208.2 - 232.8	23.6	63.6	1500.54
232.8 - 245.3	11.4	24.1	267.10
169.2 - 245.3	68.8	98.3	6735.05

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
169.2 - 179.2	10.0	24.4	59.1	17.4	1,122	11,215
179.2 - 208.2	25.1	19.6	36.7	48.7	548	13,760
208.2 - 232.8	24.6	20.2	29.6	57.3	443	10,902
232.8 - 245.3	11.4	20.2	51.7	40.6	786	8,720
169.2 - 245.3	71.8	20.6	39.8	46.0	630	44,597