CASE 7329: LOCO HILLS WATER DISPOSAL
COMPANY FOR EXCEPTION TO ORDER NO. R-3221
EDDY COUNTY, NEW MEXICO DE NOVO
JULY 14, 1982

Case No.

7329

Application

Transcripts.

Small Exhibits

ETC

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

TONEY ANAYA
GOVERNOR

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-5800

April 16, 1985

Les Clements
District Supervisor
Oil Conservation Division
P. O. Drawer DD
Artesia, New Mexico 88210

Re: Case No. 7329
Order No. R-6811-A

Dear Les:

Attached is a map and a plat of the Loco Hills Water Disposal System showing the recent pit added on the South side of the installation.

As the total pit area is confined within the southwest quarter of the section and does not exceed 15 acres, this change falls within the authority for disposal granted under Order No. R-6811-A as amended.

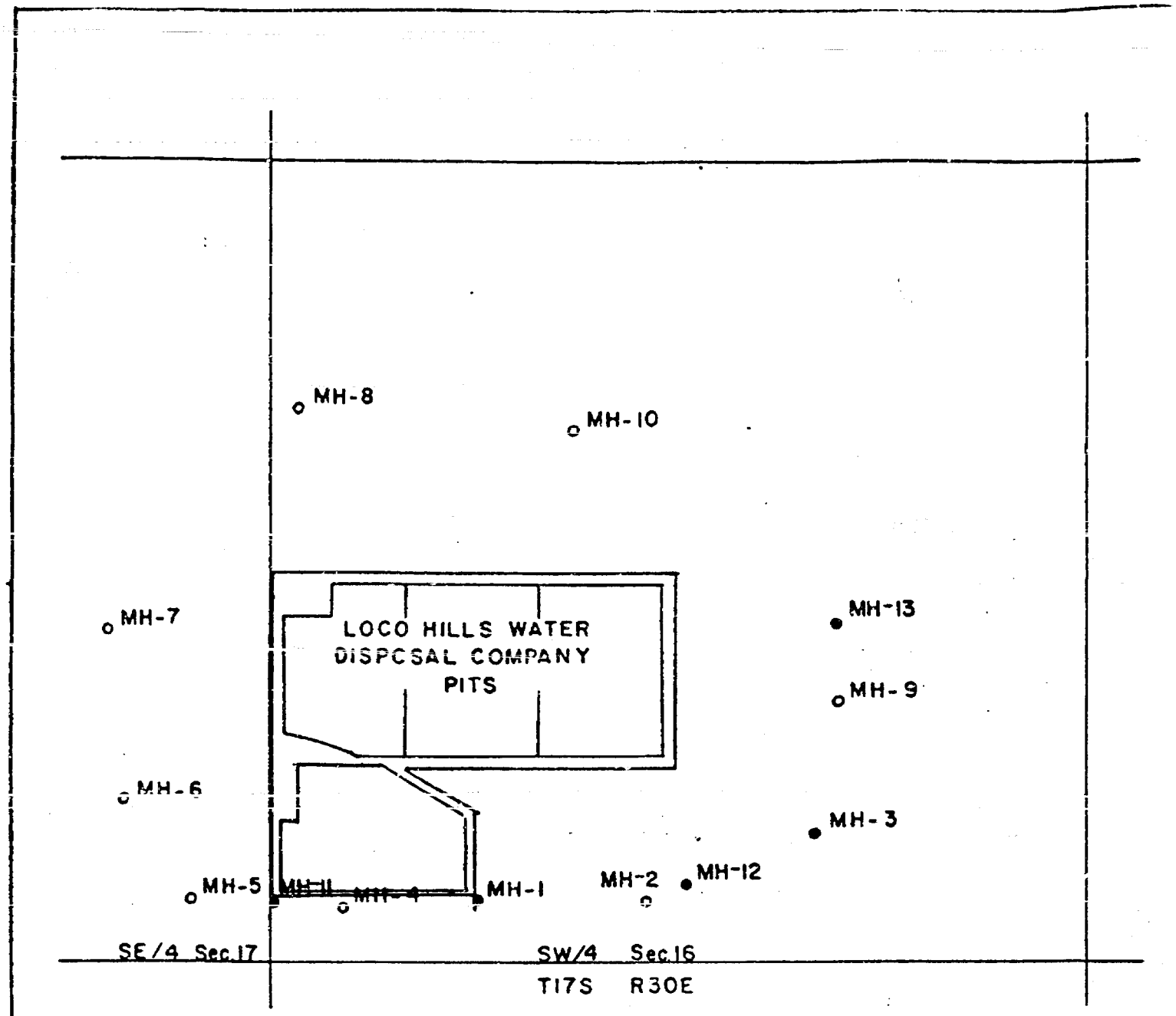
Because of the proximity of the new pit to some of the monitor wells, I would like our field people to witness the testing of these holes twice a year. If any water shows up in these wells or if the layout differs from the plat attached to this letter, please let me know immediately.

Sincerely,

R. L. STAMETS
Director

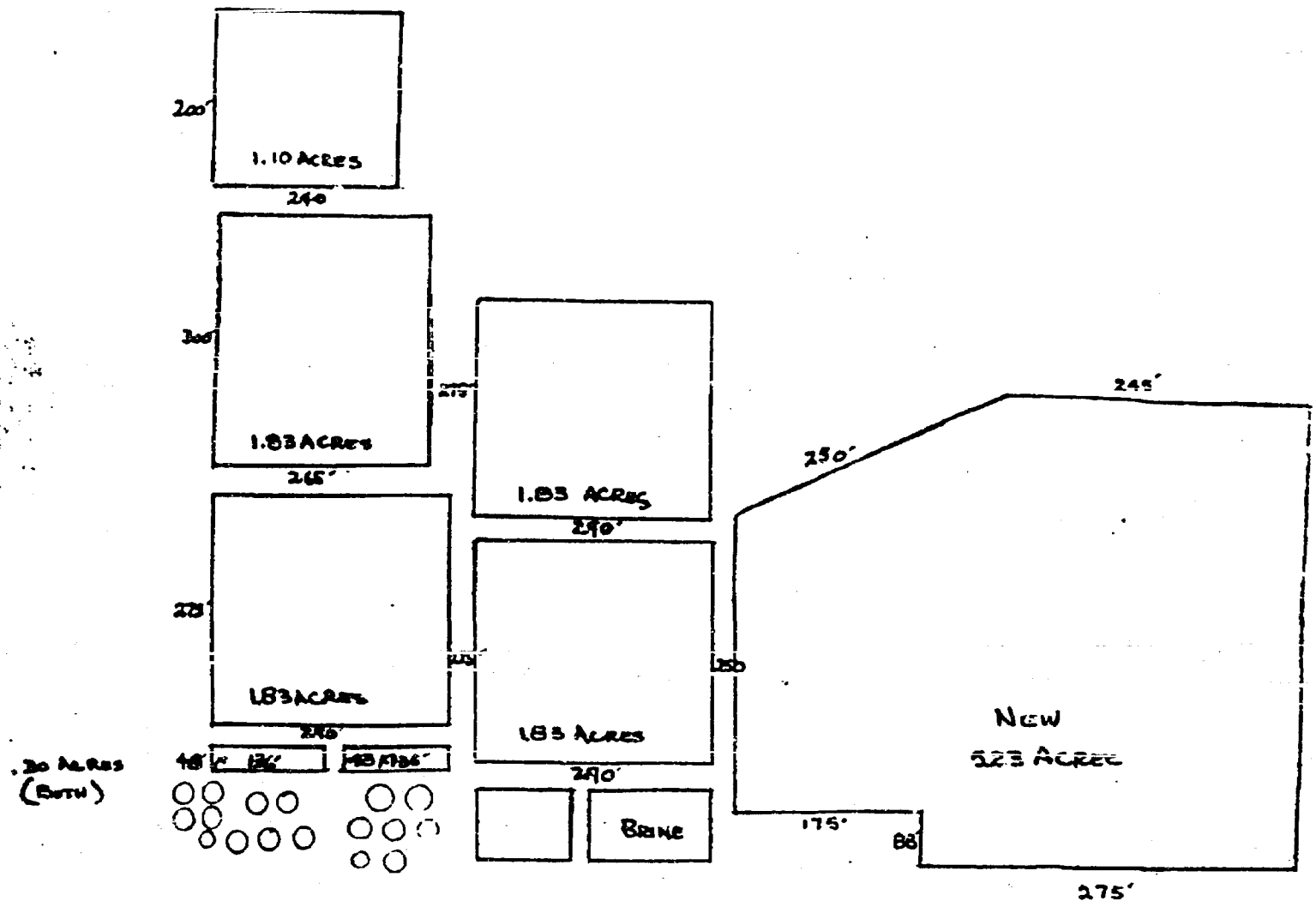
RLS/fd
enc.

cc: Jim Jennings - Roswell
Case File



EDDY COUNTY, NEW MEXICO
MONITOR HOLE LOCATIONS
LOCO HILLS WATER DISPOSAL CO
2/2/83

ED L. REED & ASSOCIATES, INC.
CONSULTING PETROLEUM ENGINEERS
MIDLAND & CORPUS CHRISTI, TEXAS



TOTAL ACRES 13.95 IN ALL PITS

LOCO HILLS WATER DISPOSAL CO.
P. O. Box 68
Loco Hills, NM 88255

March 3, 1984

Oil Conservation Division
P.O. Box 2088
Santa Fe, N.M. 87501

Re: Loco Hills Water Disposal

Gentlemen:

We have checked the monitor wells in February and there is no fluid of any kind.

Yours Truly,

Ray Westall

Ray Westall
Director

RW/bf

Case file

Order No R-6811-A
Case No 7329 De Novo

Brine Water 12 16 17S 30E
Eddy

RECEIVED
MAR 07 1984
OIL CONSERVATION DIVISION
SANTA FE

PROPOSED
SALT WATER DISPOSAL FACILITY

FOR

LOCO HILLS WATER DISPOSAL CO.
EDDY COUNTY, NEW MEXICO
AUGUST 1981

PROPOSED SALT WATER DISPOSAL FACILITY

LOCO HILLS, EDDY COUNTY, NEW MEXICO

INTRODUCTION

This firm has examined an area just north of Loco Hills, in northeastern Eddy County, New Mexico, for the feasibility of surface disposal of produced oil field brines. The investigation has shown that no fresh ground water is present in the vicinity of the proposed disposal site and thus no ground water degradation is anticipated. The area designated for surface disposal is the north half of the southwest quarter of the southwest quarter of Section 16, T.17S., R.30E.

GEOLOGY

The surface in the vicinity of Section 16 is underlain by about 10 feet of caliche and sandy caliche. This caliche cap rests on top of Triassic redbeds. The Triassic generally extends to a depth of about 250 to 300 feet where it lies on the Permian-age Rustler Formation.

The Triassic redbeds in the study area have been assigned to the Santa Rosa Formation, the lower member of the Dockum Group. The upper member (Chinle) consisting predominantly of red clay which is present in far southeastern New Mexico, is absent in northeastern Eddy County. The Santa Rosa consists principally of fine-grained sand with interbedded siltstone, silty clay and clay. Three cross-sections have been constructed (figures 1, 2, and 3) using gamma ray-neutron logs from oil wells and sample logs from test holes drilled for this study. An attempt was made to correlate the clay zones in the Santa Rosa Formation to determine if the clays were continuous across the site. We

have concluded from this exercise that the clays are essentially discontinuous and cannot be correlated with any confidence.

The Rustler Formation consists predominantly of gypsum and anhydrite in its upper part. The lower part of the Rustler Formation consists of dolomite interbedded with anhydrite. Figure 4 is a structure map contoured on the top of the Rustler Formation. This map shows that the Rustler has a regional southeastward dip. In the vicinity of Section 16 the Rustler has an irregular upper surface. A collapsed or erosional depression in the Rustler lies just southeast of Section 16. This depression plunges southwestward. The southwest quarter of Section 16 lies on the northwestern flank of this depression. The regional dip brings the Rustler Formation to the surface about 10 miles west of Section 16. The older Paleozoic formations dip regionally to the southeast into the Delaware Basin at the rate of about 80 feet per mile (Kelly, 1971).

HYDROLOGY

There is no evidence of ground water in the Santa Rosa Formation within a four mile radius of the proposed disposal site. Six test holes ranging in depth from 130 to 320 feet were drilled for this investigation to determine the presence of ground water and the lithologic characteristics of the Santa Rosa. One of these test holes (TH-6) was drilled 90 feet into the Rustler Formation without encountering ground water (figure 5).

Ground water is produced from the Triassic four to five miles west and seven to eight miles south of the proposed site. These wells are shown on figure 5. The nearest well completed in the Triassic is in Section 35, T-17-S, R-29-E. This well produces

water with reported chloride concentrations of 4,000 milligrams per liter (mg/l). The high chlorides suggest this well may be contaminated by oil field activities. Two wells five miles west of the site in Section 22, T-17-S, R-29-E, are also presumably completed in the Triassic. A water sample from one of these wells has a dissolved solid concentration of 2,722 mg/l. Wells completed in the Triassic south of the disposal site encounter water with total dissolved solids ranging between 932 and 6,882 mg/l. One well six miles northeast of the site (Section 24, T-16-S, R-30-E) produces Triassic water with total dissolved solids of 644 mg/l.

An abandoned water supply well drilled in the southeast quarter of Section 21, T-17-S, R-30-E, about a mile south of the disposal site was completed in the basal Rustler Formation. Analysis of this water indicates that the Rustler contains extremely poor quality water with chlorides exceeding 10,000 mg/l.

The local hydraulic gradient (figure 5) is to the southeast at a rate of about 25 to 30 feet per mile. Hendrickson and Jones (1952) show a regional hydraulic gradient south and southwestward toward the Pecos River.

DISPOSAL SITE FEASIBILITY AND OPERATION

The area of study lies just north of the Clayton Basin exemption. The site is in an area where fresh ground water is nonexistent. Indeed, as shown in figure 6, several brine pits have been permitted in the area because of the absence of fresh ground water. Additionally, surface disposal of salts generated by the potash industry is common in the area.

It is our opinion that brine placed in surface pits on Section 16 will migrate downward through the Santa Rosa to the Rustler Formation. The test holes drilled for this study show that the Triassic section is comprised largely of sands and thus vertical percolation is expected. Interbedded clays in the Santa Rosa will divert the brine for some distance horizontally. However, as discussed above, the clay zones appear to be discontinuous and thus, are not expected to create a widespread horizontal barrier. Once the brine has reached the Rustler Formation, it should migrate in a southerly to southeasterly direction.

We believe it is desirable to verify that the brine introduced into pits on Section 16 is indeed traveling downward to the Rustler. Even though there is no Triassic ground water in the vicinity of Section 16, there is potable water south and west of the site. After many years of horizontal movement of brine in the Triassic, the ground water to the south could be jeopardized. In order to detect undue horizontal migration of the brine, a ring of monitor holes is proposed around the disposal pit (figure 7). The original pit is anticipated to cover approximately five acres and ultimately expanded to about 15 acres. Monitor holes will be drilled 500 feet from the perimeter of the pit on a horizontal spacing of 500 feet. Test hole drilling in the area has shown that the first clay of consequence lies between 30 and 50 feet below the surface. This clay, if it is continuous, will divert the brine in a horizontal direction. It is anticipated, therefore, that the monitor holes will be drilled to a depth of 60 feet. Significant horizontal migration of the salt water will thus be detected prior to the brine leaving the property. Two of the monitoring holes (see figure 7)

will be drilled to the top of the Rustler. These two monitoring holes, which are situated downdip structurally from the pit, will detect horizontal migration above the Rustler. All of the monitoring holes will be cased with PVC pipe having at least a two inch inside diameter which will enable periodic sampling. The upper five feet of the casing will be cemented to prevent surface water from migrating down the annulus between the casing and the walls of the hole. The casing will be perforated from total depth to 10 feet below the surface with saw cuts or a minimum of four 1/4 inch holes per foot. The monitoring holes will be examined four times a year for the presence of brine.

In the event that the size of the disposal pit is enlarged, monitor holes which lie inside the expanded pit, or less than 500 feet from its perimeter will be abandoned by completely filling them with cement. Replacement monitor holes will be drilled such that the 500 foot horizontal spacing is maintained. Two Rustler depth monitor holes will be maintained. Should expansion require that the deep monitors be abandoned, they will be plugged with cement and will be redrilled such that a deep monitor is always maintained on the south and southeast sides of the pit.

The pits will be maintained with a minimum three foot freeboard.

Prior to discharging brine into the disposal pit, residual hydrocarbons will be removed by gravity separation in steel tanks. Discharged brine will enter a 50' x 50' earthen skimmer pit which will remove the last remaining hydrocarbons. Brine will be discharged into the disposal pit by siphoning from the bottom of the skimmer pit.

EVAPORATION POTENTIAL

Net evaporation figures have previously been reported to the Oil Conservation Division for data obtained from the Red Bluff Reservoir. Table 1 shows the average net evaporation in inches and the expected monthly evaporation in barrels per acre. We have previously demonstrated by using the Red Bluff evaporation figures that 3,180 barrels of fresh water can be evaporated per month per acre. This rate of inflow allows no accumulation from year to year. The actual evaporation rate at the Loco Hills site is expected to be less than 3,180 barrels per month per acre for the following reasons.

1. Loco Hills is about 60 miles north of Red Bluff Reservoir.
2. The elevation at Loco Hills is about 1,000 feet higher.
3. Evaporation from brine will be lower than fresh water.

With these factors considered we have estimated that the average disposal rate which will not allow yearly accumulation will be between 2,000 and 2,500 barrels per month per acre. This figure, of course, does not take into account infiltration which we know will occur. A 15-acre pit, therefore, should have a capability of disposing a minimum of 1,000 barrels of brine per day.

CONCLUSIONS

This investigation has shown the following:

1. The Loco Hills site is underlain by Triassic Santa Rosa Formation which does not contain ground water.
2. The underlying Rustler Formation contains ground water of extremely poor quality.

3. The Triassic formation 5 to 7 miles from the site contains a small amount of fresh ground water.

4. The material underlying the Loco Hills site is permeable and will allow migration of the brine through the bottom of the pit.

5. Clay zones within the Triassic are probably sufficiently discontinuous that the brine migrating from the pit will reach the Rustler Formation.

6. The possibility that the clays will divert the brine horizontally can not be overlooked. To detect this occurrence, a ring of monitor holes is proposed.

7. Brine that reaches the Rustler Formation will not adversely affect ground water or surface water.

Respectfully submitted,

ED L. REED & ASSOCIATES, INC.

V. Steve Reed

V. Steve Reed

Chester F. Skrabacz

Chester F. Skrabacz

VSR/cm

Table 1. Evaporation Rates, Red Bluff Reservoir

Month	Net Evaporation (inches)	Bbl/acre
January	2.18	1409
February	3.01	1946
March	5.32	3439
April	7.97	5152
May	8.87	5734
June	8.55	5527
July	8.4	5430
August	7.1	4590
September	4.67	3019
October	3.59	2320
November	2.79	1804
December	2.15	1390
Totals	64.6	41,760

REFERENCES

Hendrickson, G. E., and Jones, R. S., 1952, Geology and ground-water resources of Eddy County, New Mexico.

Kelley, Vincent C., 1971, Geology of the Pecos Country, Southeastern New Mexico.

CLIENT Loco Hills Water Disposal Co.

LOCATION Approx. Center of Section 17 T 17 S R 30 E, Eddy Co, New Mexico

DATE 12/29/80 2129' FEL 1960' FS

WELL NUMBER TH 2

ELEVATION 3668.9 topo

S.W.L.

CASING

PERFORATIONS

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: C. F. Skrabacz

38' West of oil well #2-F, General American McIntyre.

INTERVAL	DESCRIPTION	POROSITY
0- 10	100% Caliche; white calcareous sandstone, some free limestone	slight
10- 20	80% Sand; reddish, fine-medium, subround, loose, quartzitic with caliche	
	20% Clay, choc-red	very sl
20- 30	100% Sand, red-orange, round-subround, loose, fine-medium, quartzitic with	
	some clay	none
30- 40	100% Clay; reddish-chocolate, silty	none
40- 60	100% Sand; red-orange, fine-medium, loose, slightly argillaceous	slight
60- 70	100% Clay; reddish-brown, very silty	none
70- 90	100% Sand; fine-medium-coarse, reddish-orange, argillaceous	slight
90-100	100% Clay, red-brown and silt.	none
	Hole dry. Driller started to inject drilling fluid @ 100'.	
100-110	100% Clay and sand, reddish-brown (mix)	none
110-140	75% Sand, fine-medium, red-brown, loose to argillaceous	
	25% red clay and silt	sl-none
140-150	100% Clay; red-brown, sandy	none
	Total Depth: 150' Jet from 150', no water. Waited 3 minutes jet again 150', no fluids	
	Top of Triassic: 14'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION c/Section 16, T 17 S R 30 E, Eddy Co. New Mexico
DATE 12/29/80 1780 S; 2540 W
WELL NUMBER Tri 3
ELEVATION 3667.3 topo

S.W.L. No Water
CASING 3" PVC 0 - 153'
PERFORATIONS 100 - 153'
DRILLER L. Scarborough, Lamesa, Texas
GEOLOGIST: C. F. Skrabacz

212' SE of oilwell Texas American #3 Et7 State

INTERVAL	DESCRIPTION	POROSITY
0- 10	100% Caliche; white, calcareous, sandstone, some limestone	slight
10- 20	30% Caliche; 70% Siltstone and clay; reddish brown, sandy	slight
20- 40	75% Sand; reddish, fine-medium-coarse, loose, subround, quartzitic	
	20% Caliche; 5% Clay	slight
40- 50	95% Sand; reddish, fine-medium with clay; 5% caliche	fair-good
50- 80	90% Sand; reddish, fine-medium, subround, loose, quartzitic; 10% silty clay	fair-sl
80-120	95% Sand; As Above; 5% clay streak	fair-good
20-153	75% Sand; 25% Clay, reddish, sandy	fair-good
	Total Depth: 153' Jet @ 153' no water; waited 10 minutes, jetted again, no water in hole.	
	Top of Triassic: 11'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L. None

LOCATION c/section 21, T 17 S R 30 E, Eddy County, 2386 FN 2325 FW New Mexico CASING

DATE 12/30/80 PERFORATIONS

WELL NUMBER TH 4 DRILLER L. Scarborough, Lamesa, Texas

ELEVATION 3647.2 Surv. GEOLOGIST: C. Skrabacz

Location 90' SE of Oilwell Petroleum Corp. of Texas #4, Berry 'A' SE/4 NW/4 Sec 21 T17S R30E

INTERVAL	DESCRIPTION	POROSITY
0- 10	100% Caliche, white, calcareous, sandstone, some red loose sand	
10- 30	30% Caliche; 40% red loose sand; 30% gravels up to 3/8"	
30- 40	40% Sand, red loose, medium-coarse; 60% red argillaceous sand	
40- 50	100% Clay, red with sand	
50- 80	75% Sand, fine-medium-coarse, red, loose; 25% red clay	
80-100	50% Sand; 50% clay	
100-150	75% Sand; 25% Clay	
50-170	As Above	
70-180	Gravel up to 1"	
	Samples drilled with water and not distinguishable	
30-200	60% red sandy clay; 40% Sand	
	Jetted - no water from 200'	
	Top of Triassic: 11'	
	No PVC	
	Drillers log:	
0- 11	Caliche	
11- 35	Sand-sandy clay	
35-145	Clay & sand	
45-175	Sand & Gravel	
75-180	Clay	
180-200	Sand & Gravel	

CLIENT Loco Hills Water Disposal Co. S.W.L.

LOCATION Sec 19, T17S, R30E, Eddy County, N.M. CASING
1350' FE 2500'FS

DATE 12/30/80 PERFORATIONS

WELL NUMBER TH 5 DRILLER L. Scarborough, Lamesa, Texas

ELEVATION 3625 topo GEOLOGIST: C. Skrabacz

0' SW of oil well General American No. 25-A Burch SE/4 Sec 19, T17S R30E

INTERVAL	DESCRIPTION	POROSITY
0- 10	75% red siliceous sandstone; some white calcareous sandstone	
	25% red loose sand	none
10- 20	20% caliche; 80% clay, firm, red-brown	none
30	100% Sand; reddish, medium-coarse, loose to cemented with clay	slight
40	70% As Above; 30% Sandy firm clay	none-sl
50	20% Caliche; 60% Sand; medium-coarse, loose to slightly argillaceous	
	20% Clay, red	slight
50- 60	100% Clay, red, firm, some sand	none
60- 90	100% Sand, loose, red, fine-medium-coarse, subround	good
90-100	70% Sand; 30% Gravel	"
00-130	40% Sand, fine-medium-coarse, loose, 60% Clay	
	Total Depth: 130' Abd hole. Hole too large, no circulation or control	
	Drillers log	
0- 11	Caliche	
11- 65	Clay with sand streaks	
65-130	Sand with some clay	
	Top of Triassic: 11'	

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-SAN ANGELO, TEXAS

CLIENT Loco Hills Water Disposal Co.

LOCATION NW SW/4 Sec 21, T17S R30E, Eddy County, New Mexico
1338 FSL, 112 FWL

DATE 12/31/80

WELL NUMBER TH 6

ELEVATION 3624.4 Surv.

S.W.L.

CASING

PERFORATIONS

DRILLER

Location is 337' south & little west of Holly #H-2 Brigham SWD Sec 21 , 17S R30E, 1650'S-330'W

INTERVAL	Drilling with water DESCRIPTION	POROSITY
0- 10	70% red fine-medium, loose sand; 30% Caliche, white, calcareous sand	fair
10- 30	100% Sand, red in heavy clay	none
30- 40	70% Sand, red, fine grain in clay; 30% loose sand	none
40- 50	100% Sand in heavy clay (red)	none
50- 80	100% Clay; reddish, firm with sand	none
80-100	100% Sand; reddish in heavy clay	none
100-110	100% Clay, red firm sandy	none
110-120	70% Gravel; loose, round, up to 3/8"; 20% Sand; 10% Clay	fair
120-130	30% Sand & gravel; 70% Sand in heavy clay	slight
130-140	100% Clay; red firm sandy	none
140-150	100% Sand in heavy clay (soft)	none
150-180	70% Sand in heavy clay; 30% Clay, firm	none
180-200	80% Sand in clay and 20% clay, light colored	slight
200-220	As Above	
220-230	60% Sand in heavy clay; 40% Anhydrite, tan-white, fine crystalline	none
230-260	40% White, dense, fine crystalline anhydrite; 50% white soft gypsum	
	10% red clay	slight
260-270	30% Anhydrite; 30% gypsum, 40% orange siltstone	
270-280	70% Anhydrite; 30% gypsum	
280-300	40% Anhydrite; white, fine crystalline: 50% gypsum. white, chalky, purplish	
	10% Sand (conglomerate)	
300-320	70% Anhydrite; 20% Gypsum, 10% red clay	
	@ 300' Jetted hole clean, waited 10 minutes; no fluid, waited 20 minutes;	
	no fluid, waited 30 minutes; no fluid.	
	Drill dry to 320'	
	No fluid, dry cutting to surface only	
	Set 3" PVC 0 - 320' Slotted 220' - 320'	
	Drillers Log:	
0- 11	Caliche-Sand	
11- 52	Red Clay	
52- 65	Sand	
65- 71	Clay	
71- 77	Sand & Clay	
77- 85	Red Clay	
85- 93	Sand & Clay	
93-110	Red Clay	
110-124	Sand & Gravel	
124-140	Red Clay	
140-165	Sand & Gravel with clay streak	
165-180	Red Clay	
180-215	Sand & Red Clay	
215-228	Sand-Clay	
228-320	Gypsum, Anhydrite	

WATER QUALITY

SOUTHWESTERN LABORATORIES

FORT WORTH · DALLAS · HOUSTON · MIDLAND · PEAUMONT · TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 1-6-81 File No. C-1950-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 1-2-81

Received from

Identification Marks Eddy County, New Mexico, Jennings & Christy Elec. Sub, Walters Camp, NW SE/4 Section 26, T-18-S, R-30-E, 12-30-80. Sampled by Chester Skrabacz.

	mg/L
Chloride	138
Sulfate	808
Total Dissolved Solids @ 180° C.	1236

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES

Jack N Burton

Lab. No. 31991

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SOUTHWESTERN LABORATORIES

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock windmill No. 1, NWNW, Section 22, T-17-S, R-29-E, 8-26-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	1719
Chloride	45
Total Dissolved Solids (Evap. @ 180° C.)	2722

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES

Jack H Barker

Lab. No. 31704

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 1-6-81 File No. C-1950-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 1-2-81

Received from

Identification Marks Eddy County, New Mexico, Jennings & Christy Windmill, 1985 FW, 660 FN, Section 24, T-16-S, R-30-E, 12-30-80, Sampled by Chester Skrabacz.

	mg/L
Chloride	101
Sulfate	242
Total Dissolved Solids @ 180° C.	664

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES

Jack H Barker

Lab. No. 31992

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock Windmill No. 4
Section 24, T-18-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	442
Chloride	28
Total Dissolved Solids (Evap. @ 180° C.)	932

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES
Jack H Barton

Lab. No. 31786

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock Windmill No. 3
SESW Section 10, T-18-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	2088
Chloride	2035
Total Dissolved Solids (Evap. @ 180° C.)	6882

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES
Jack H Barton

Lab. No. 31785

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STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

July 30, 1982

Mr. Doug Perrin
Jennings & Christy
Attorneys at Law
Post Office Box 1180
Roswell, New Mexico 88201

Re: CASE NO. 7329
ORDER NO. R-6811-A

Applicant:

Loco Hills Water Disposal Company

Dear Sir:

Enclosed herewith are two copies of the above-referenced Commission order recently entered in the subject case.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCC x
Artesia OCC x
Aztec OCC

Other Tom Kellahin, James Jennings

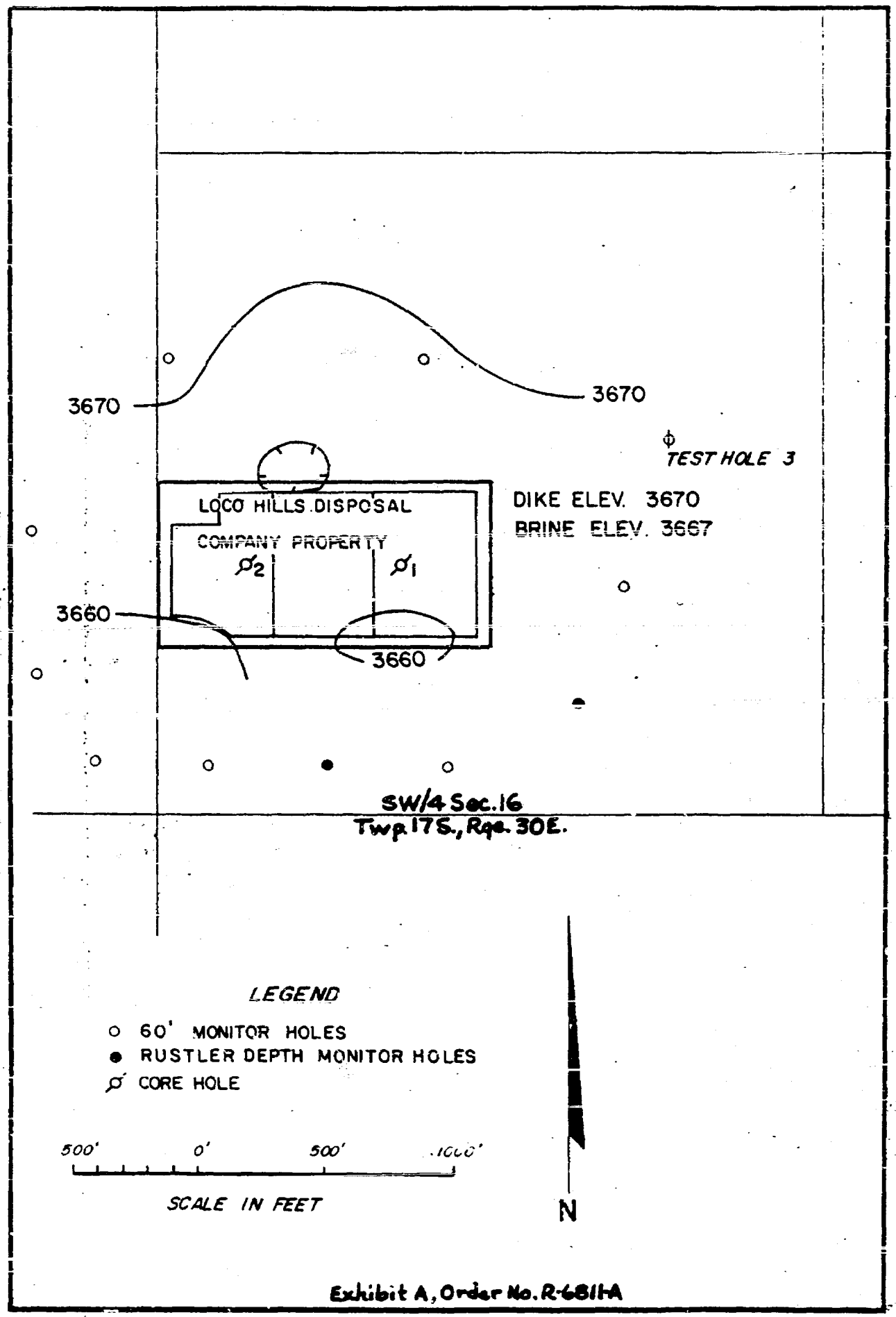


Exhibit A, Order No. R-6811-A

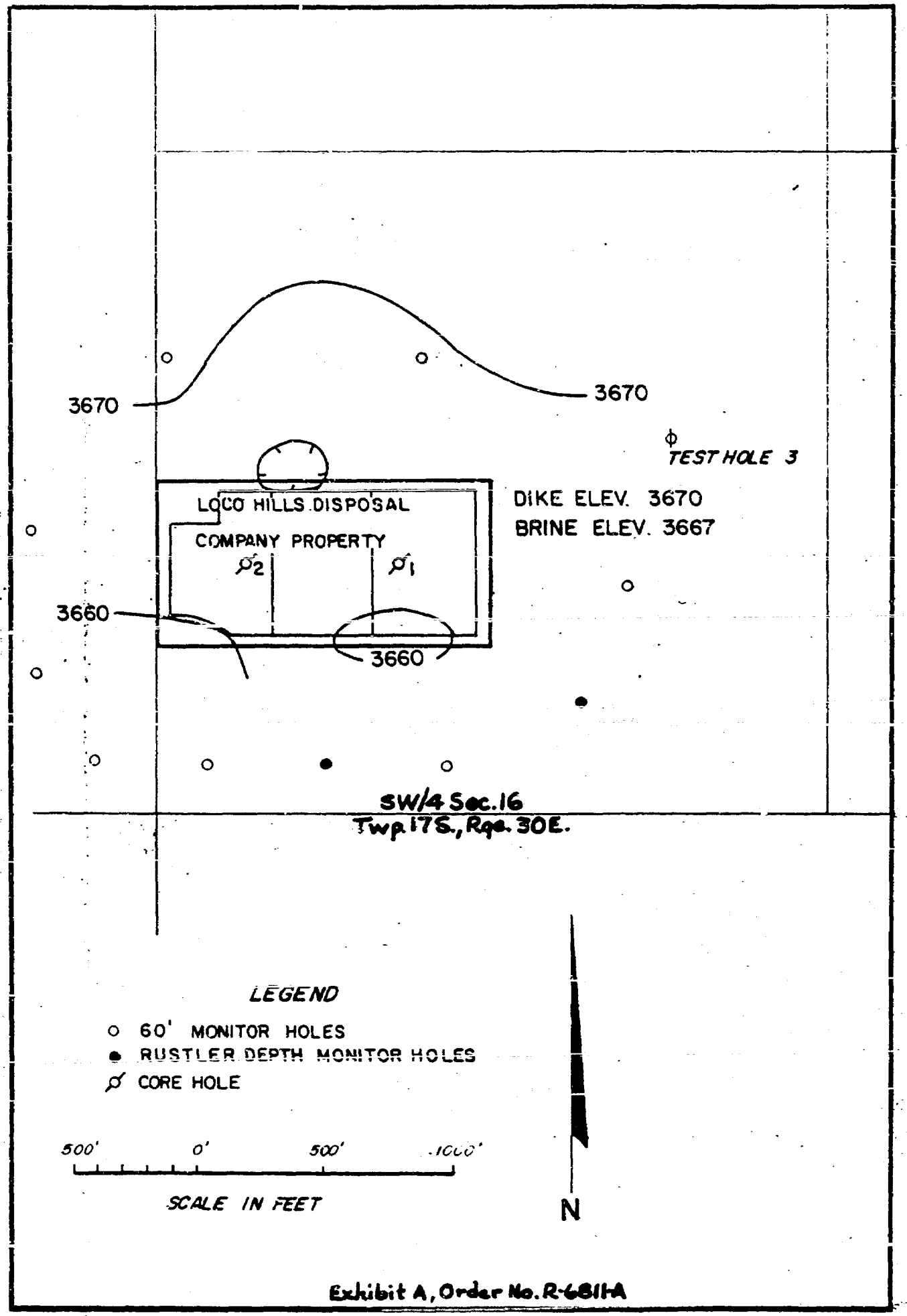


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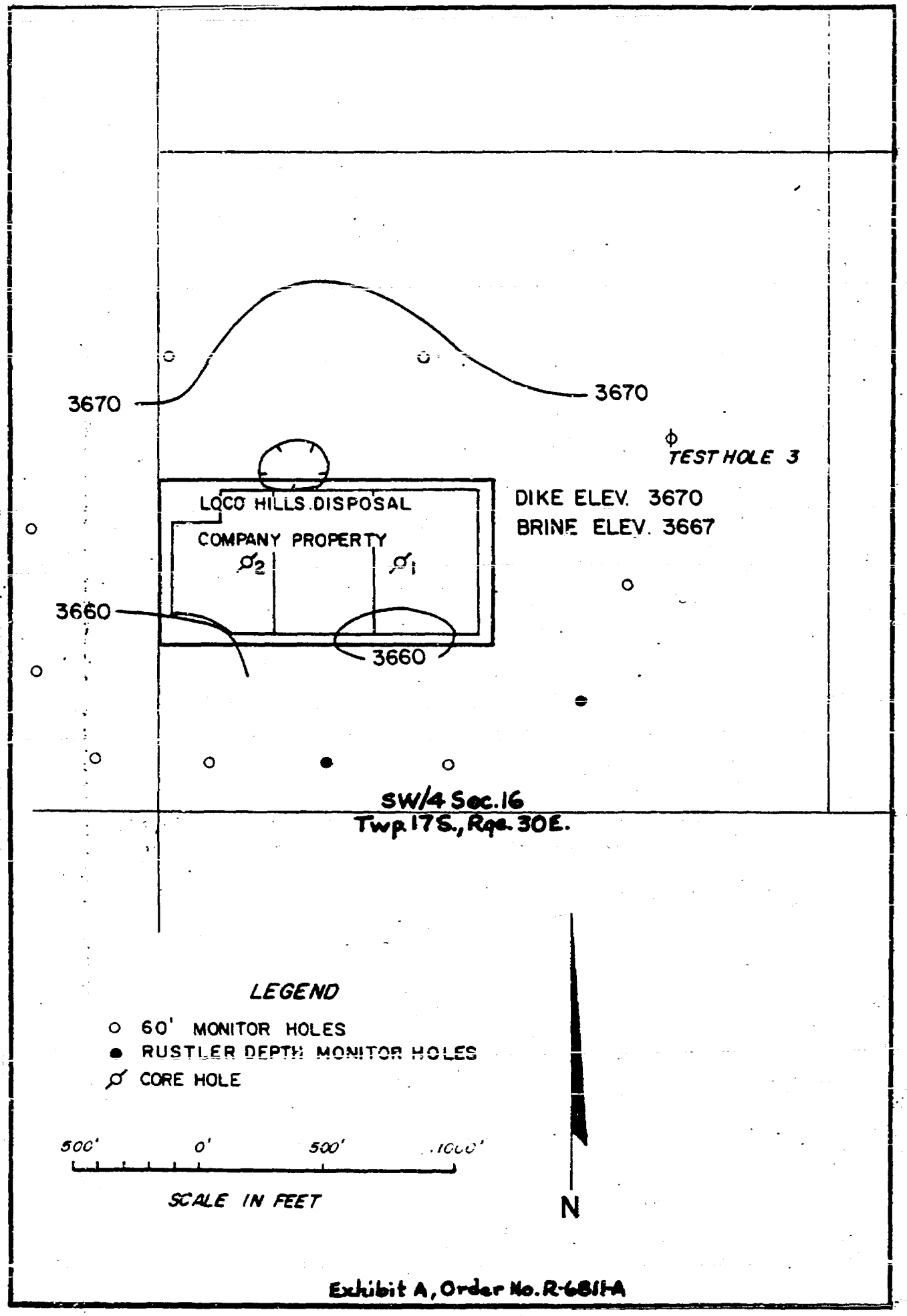


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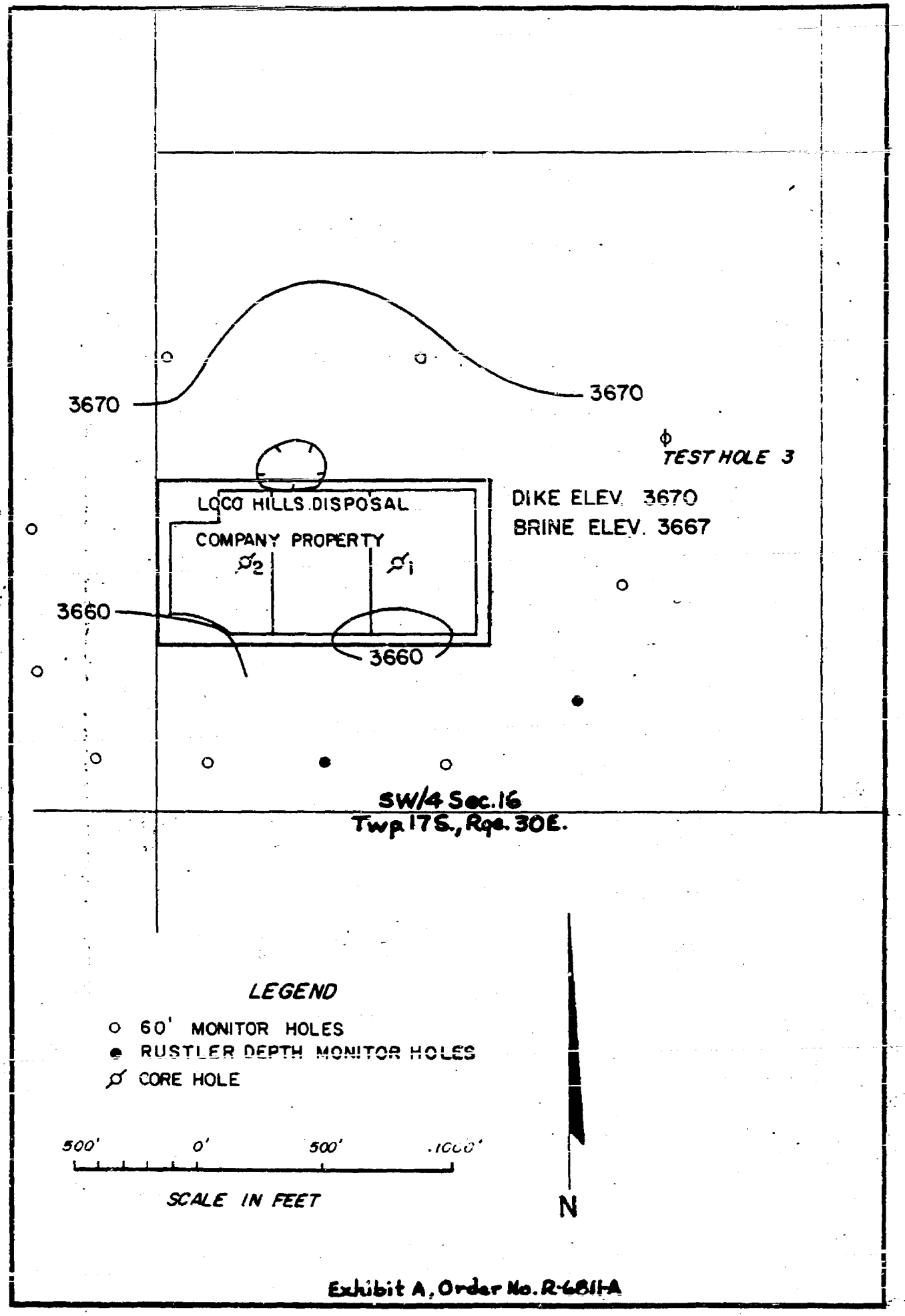


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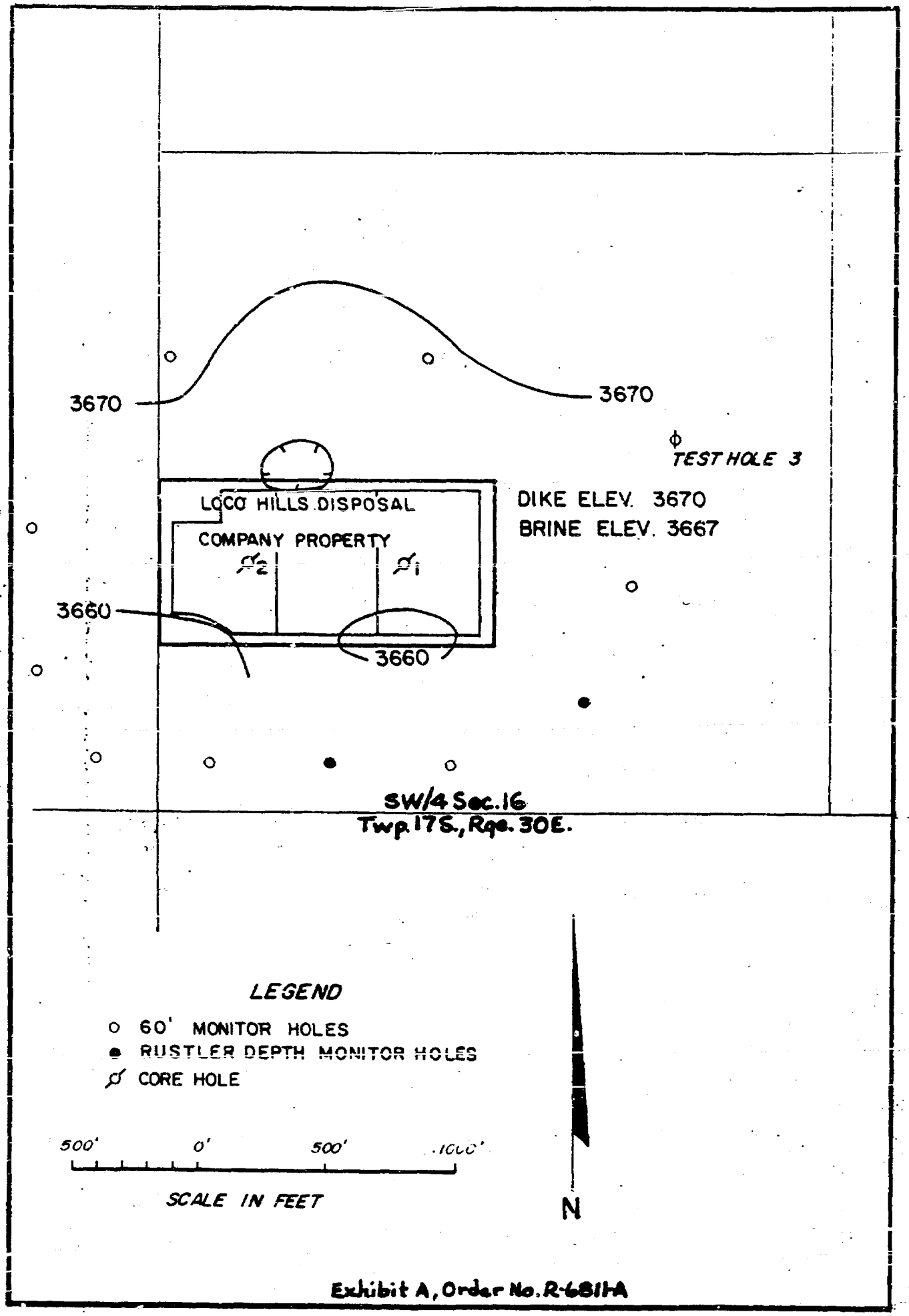


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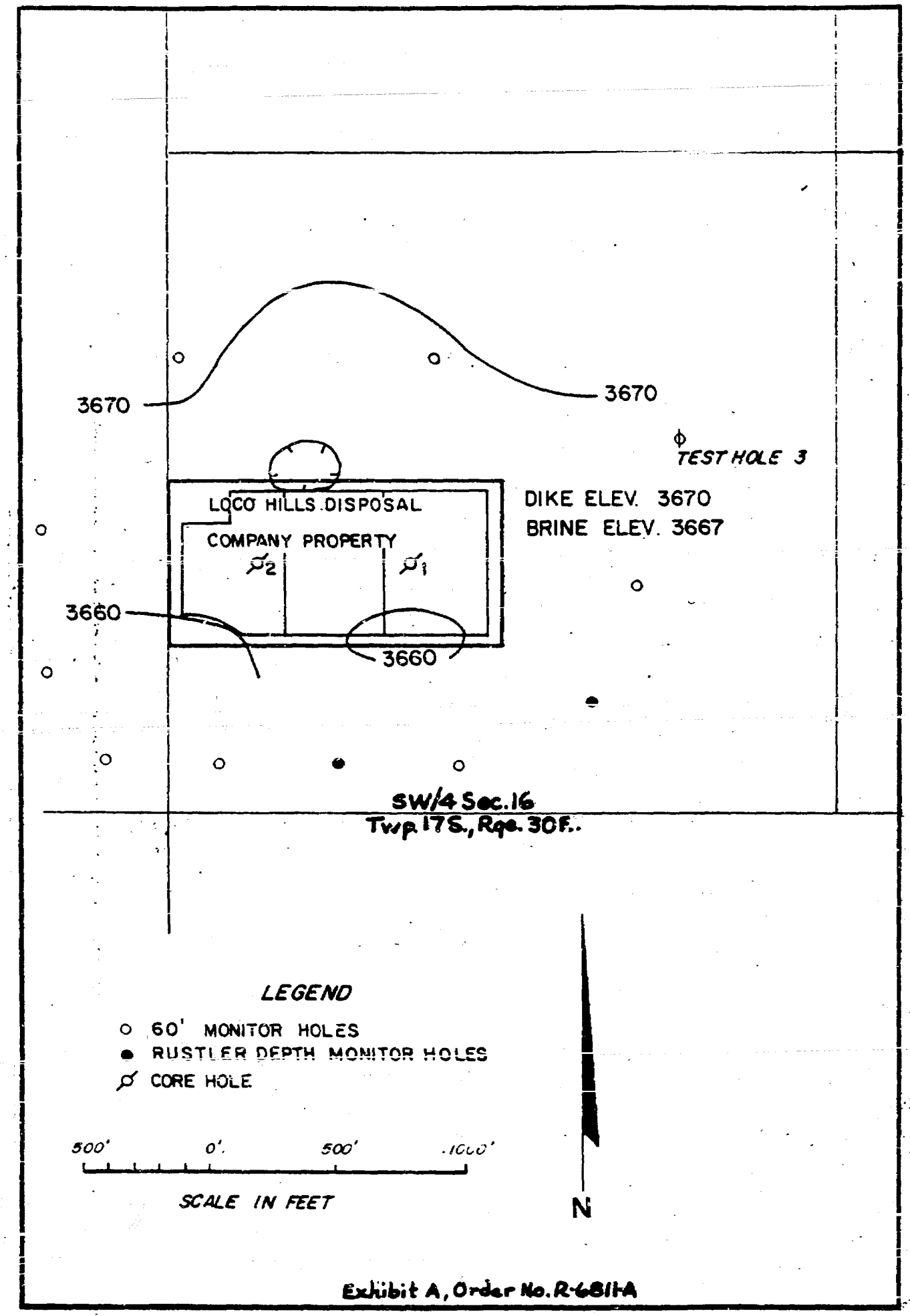


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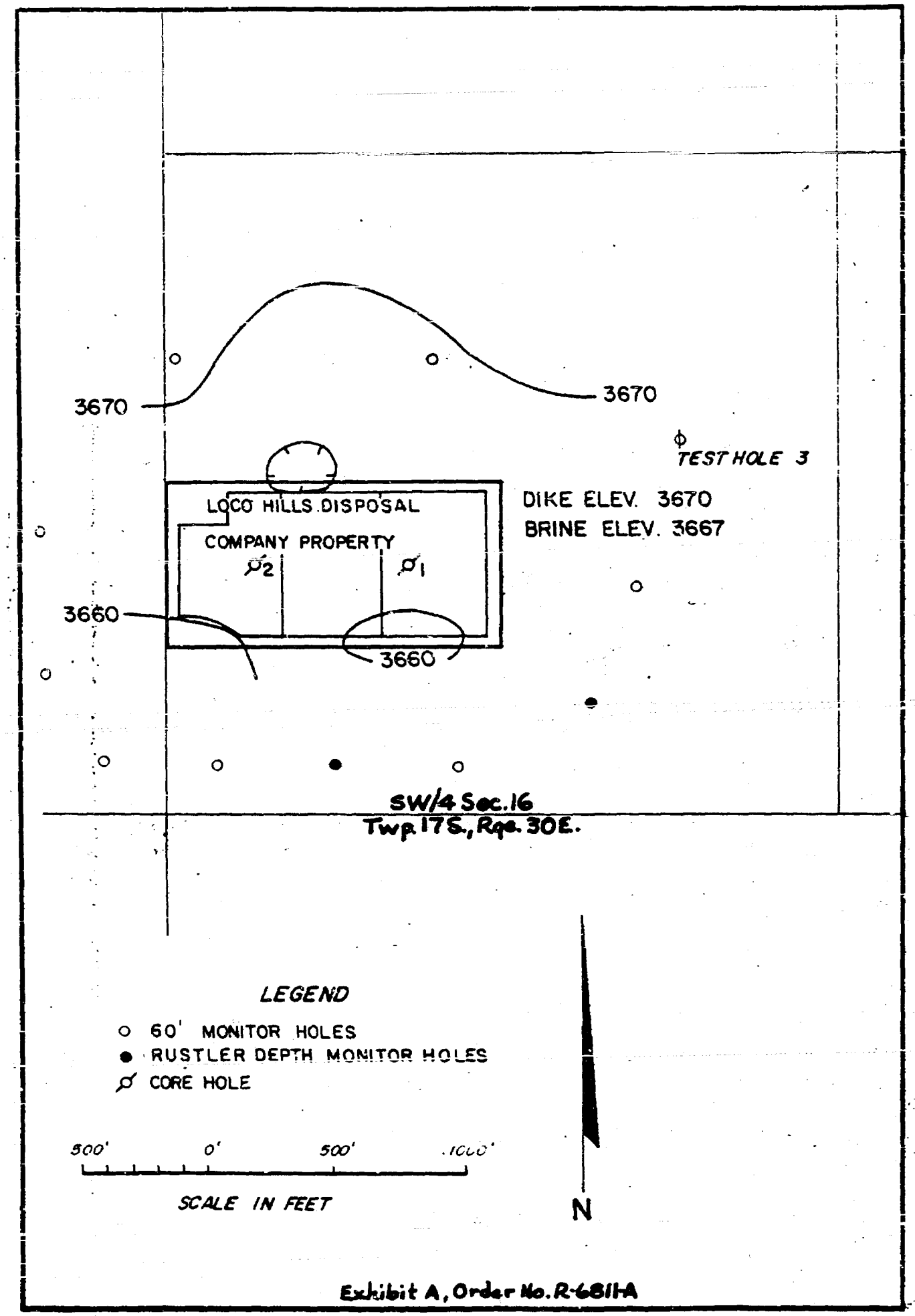


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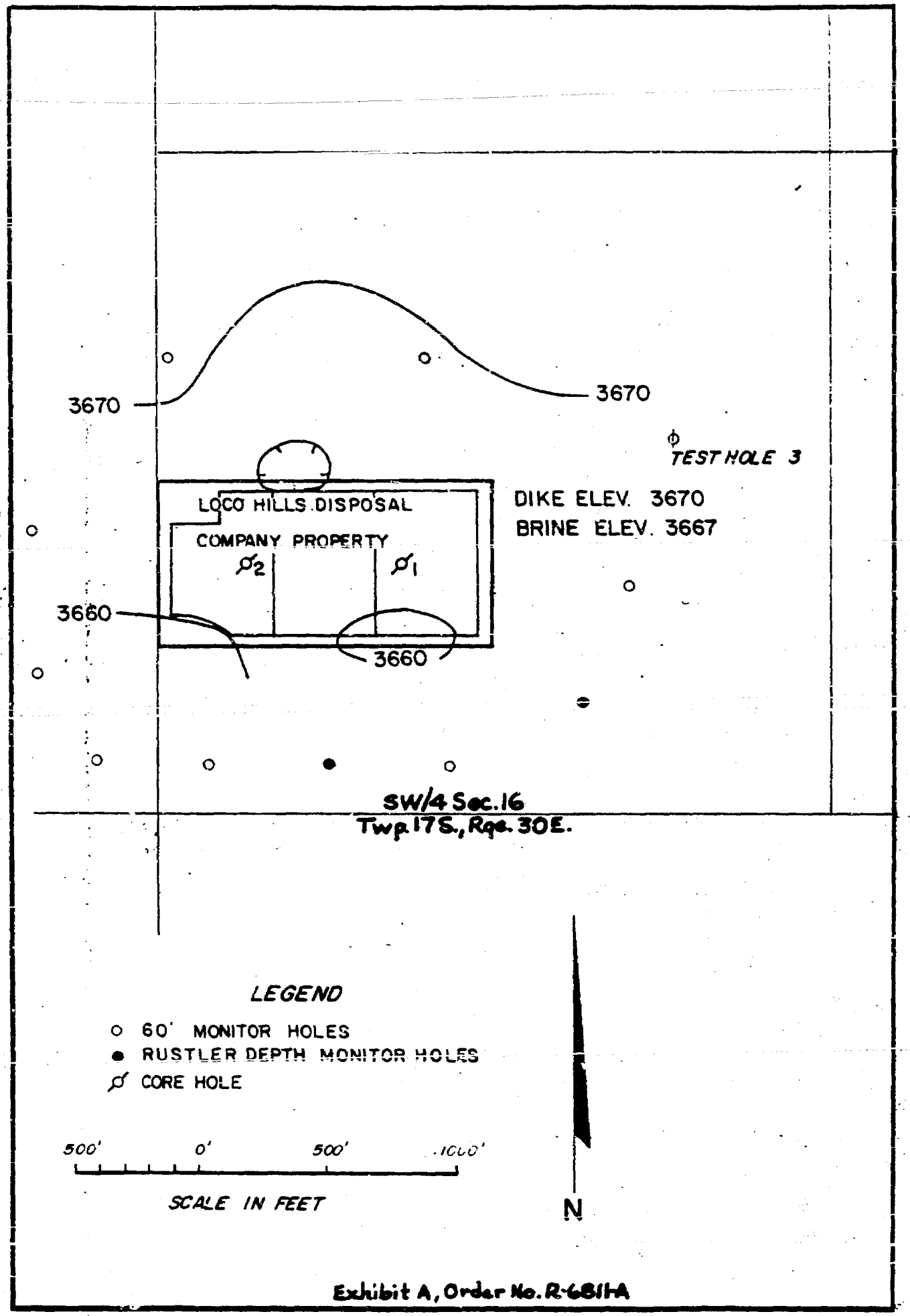


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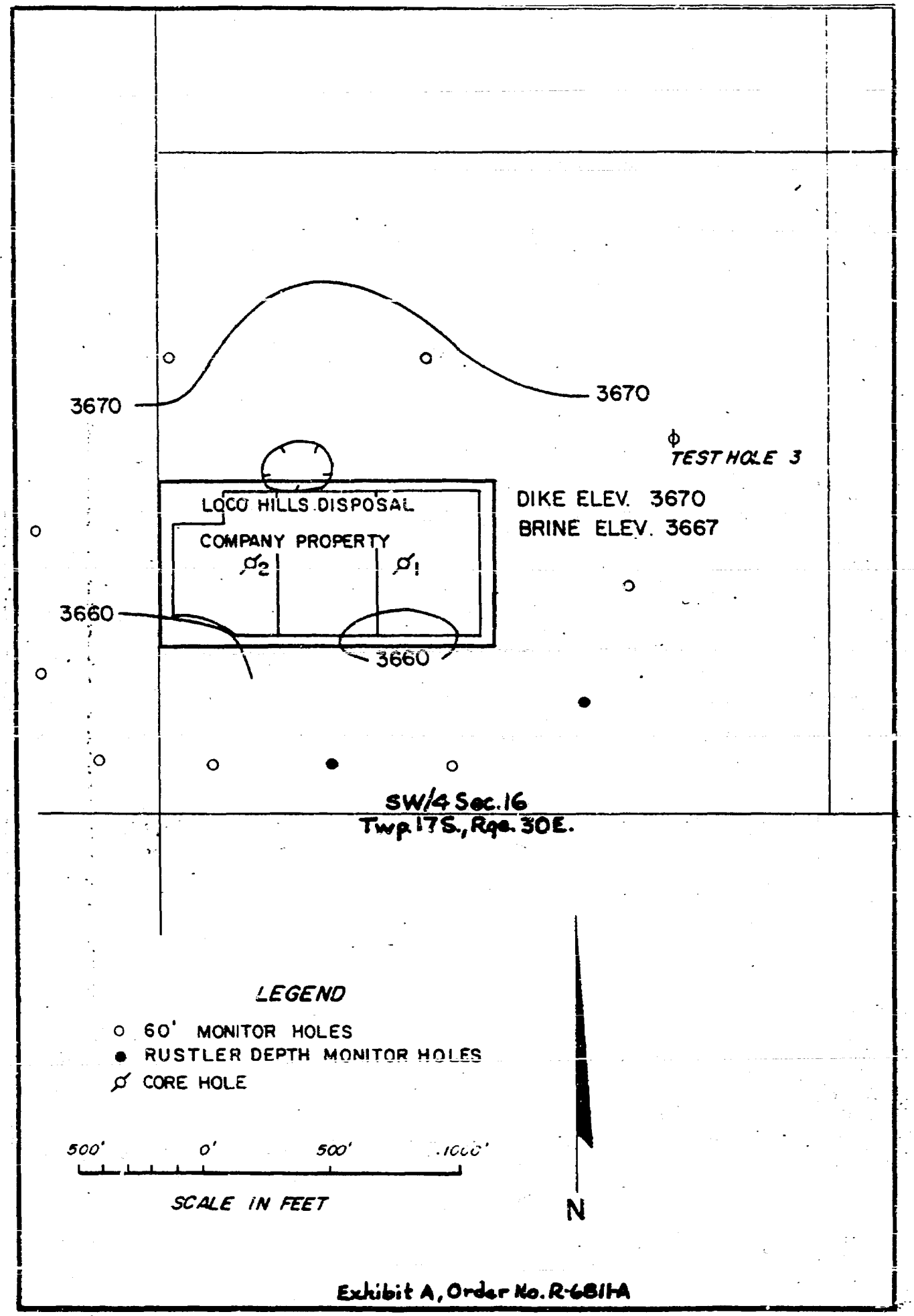


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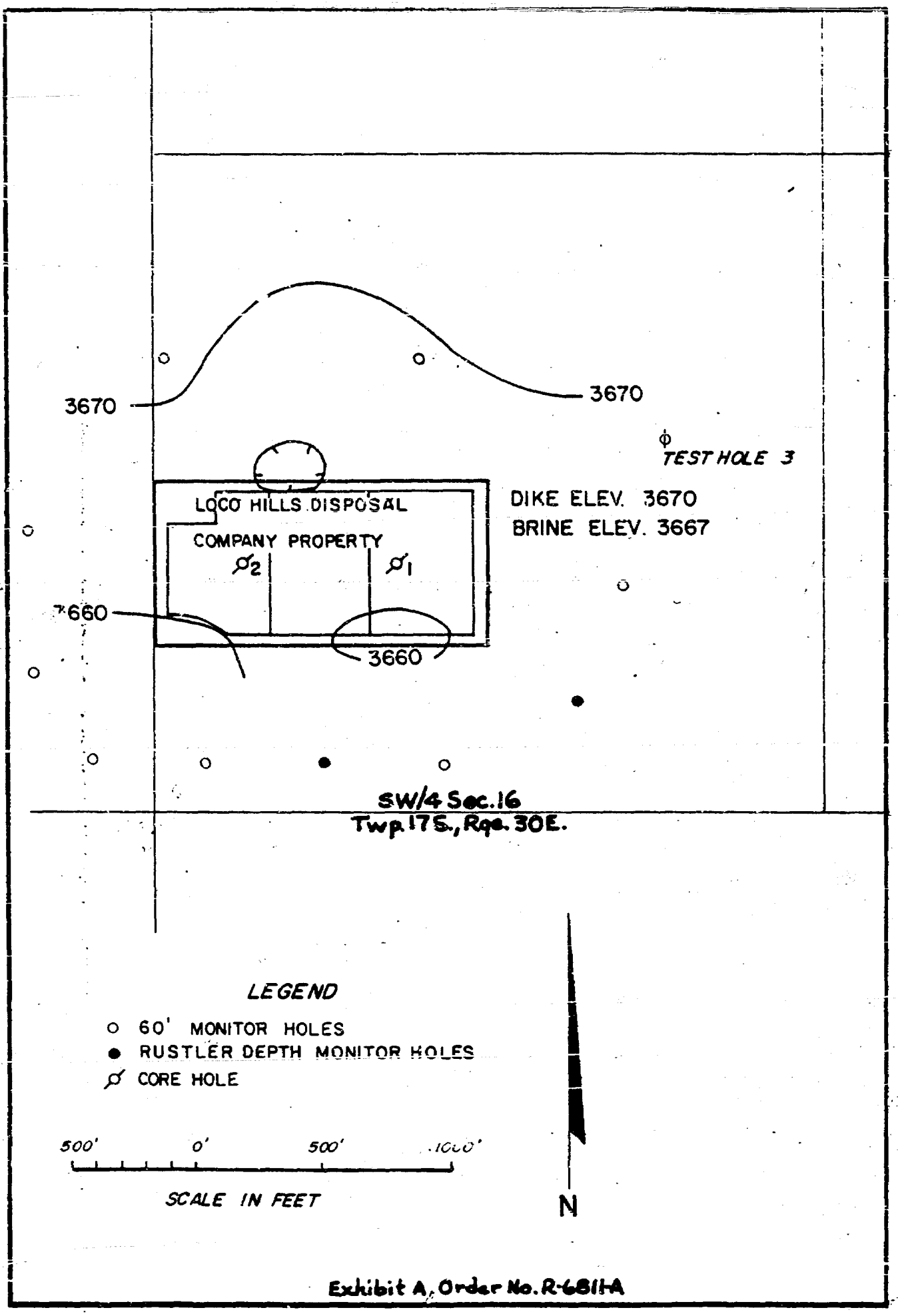


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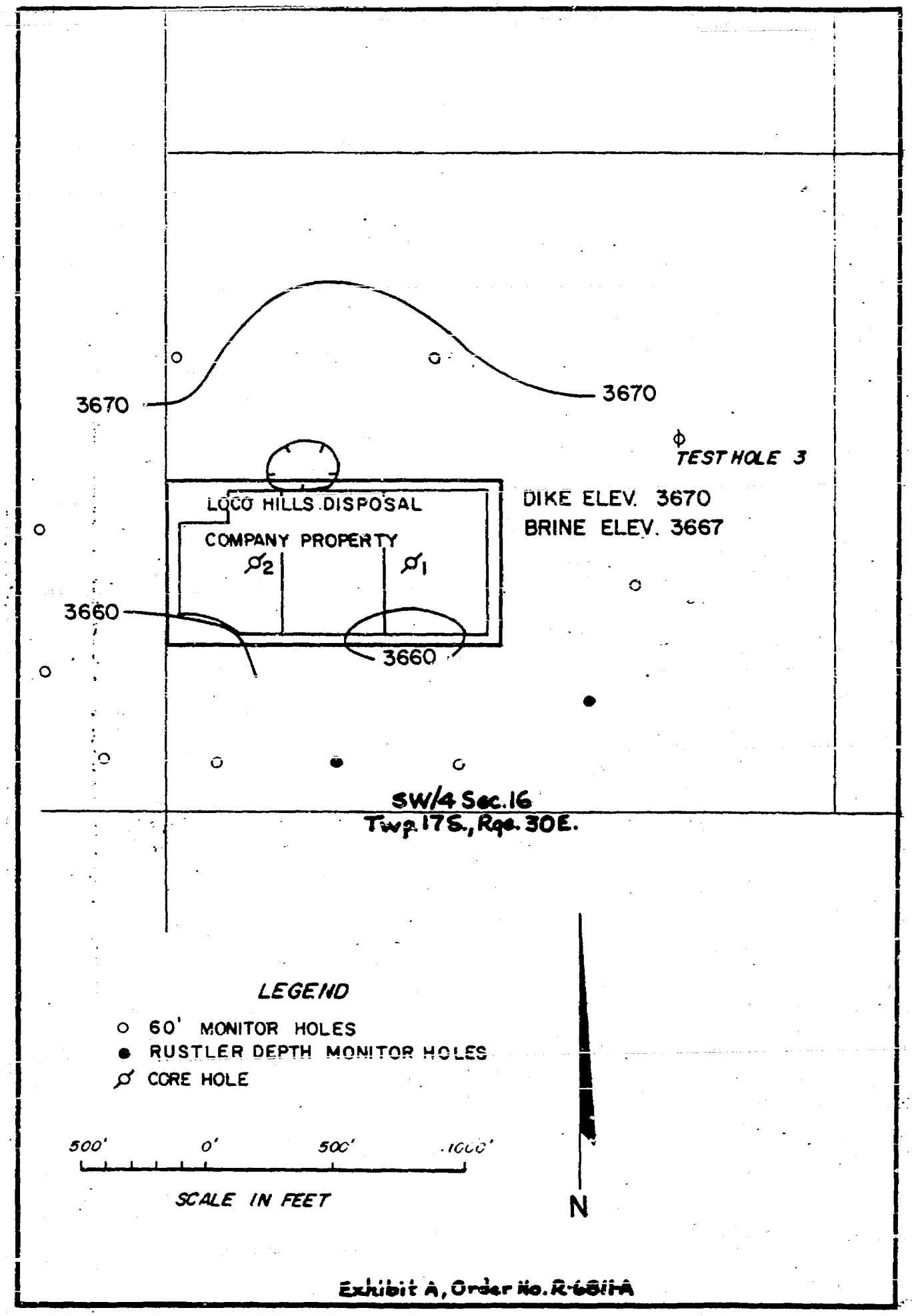


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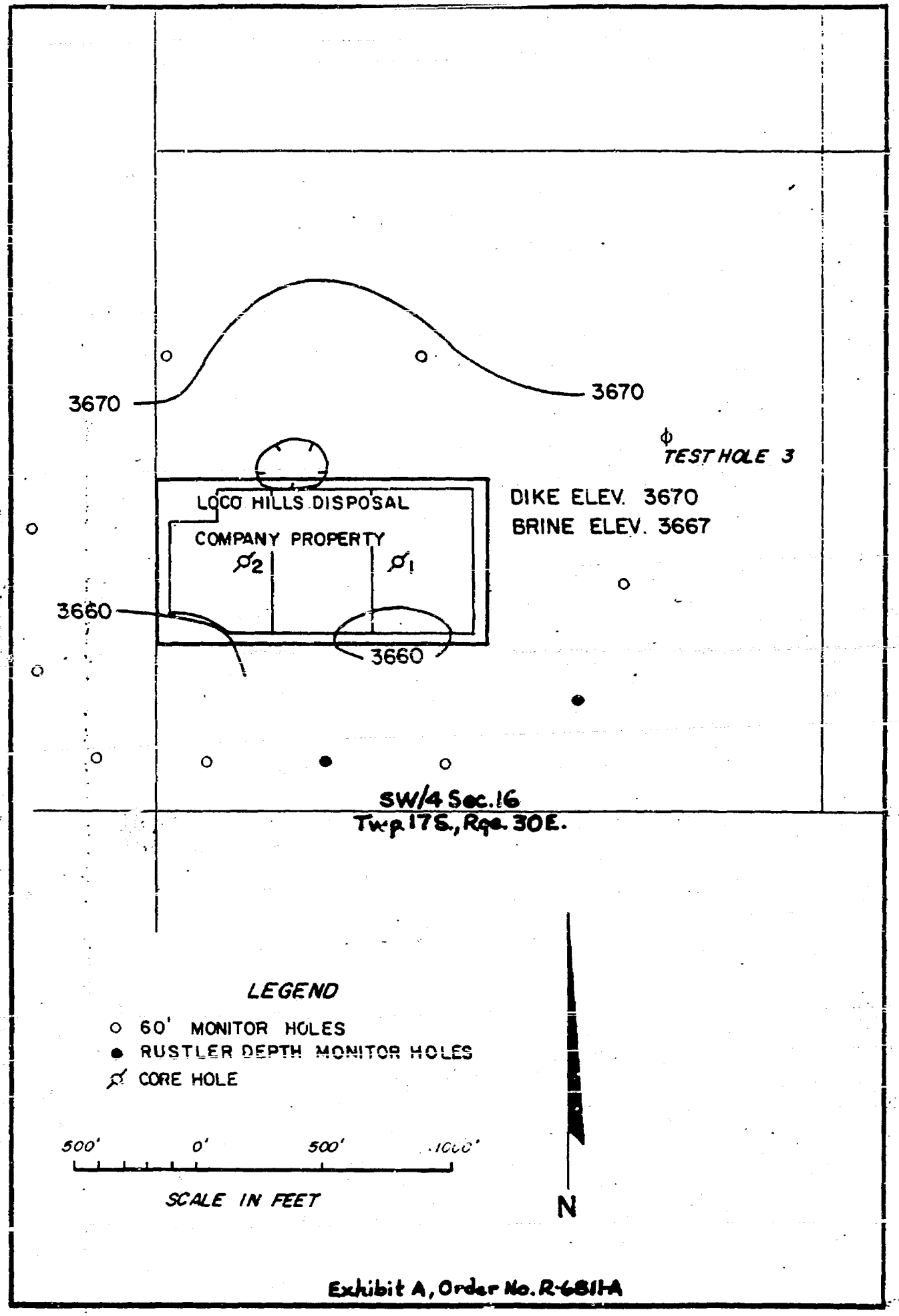


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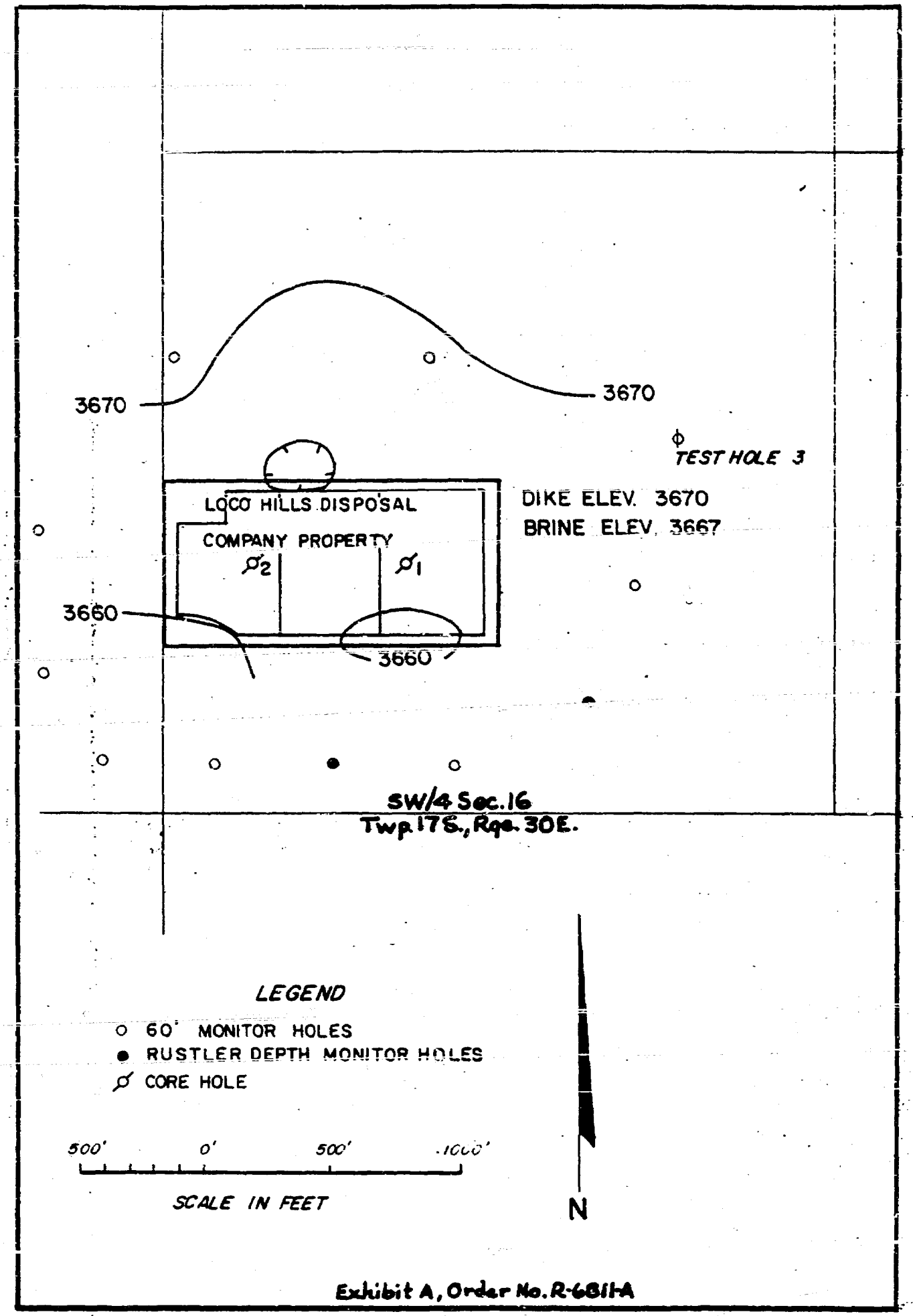


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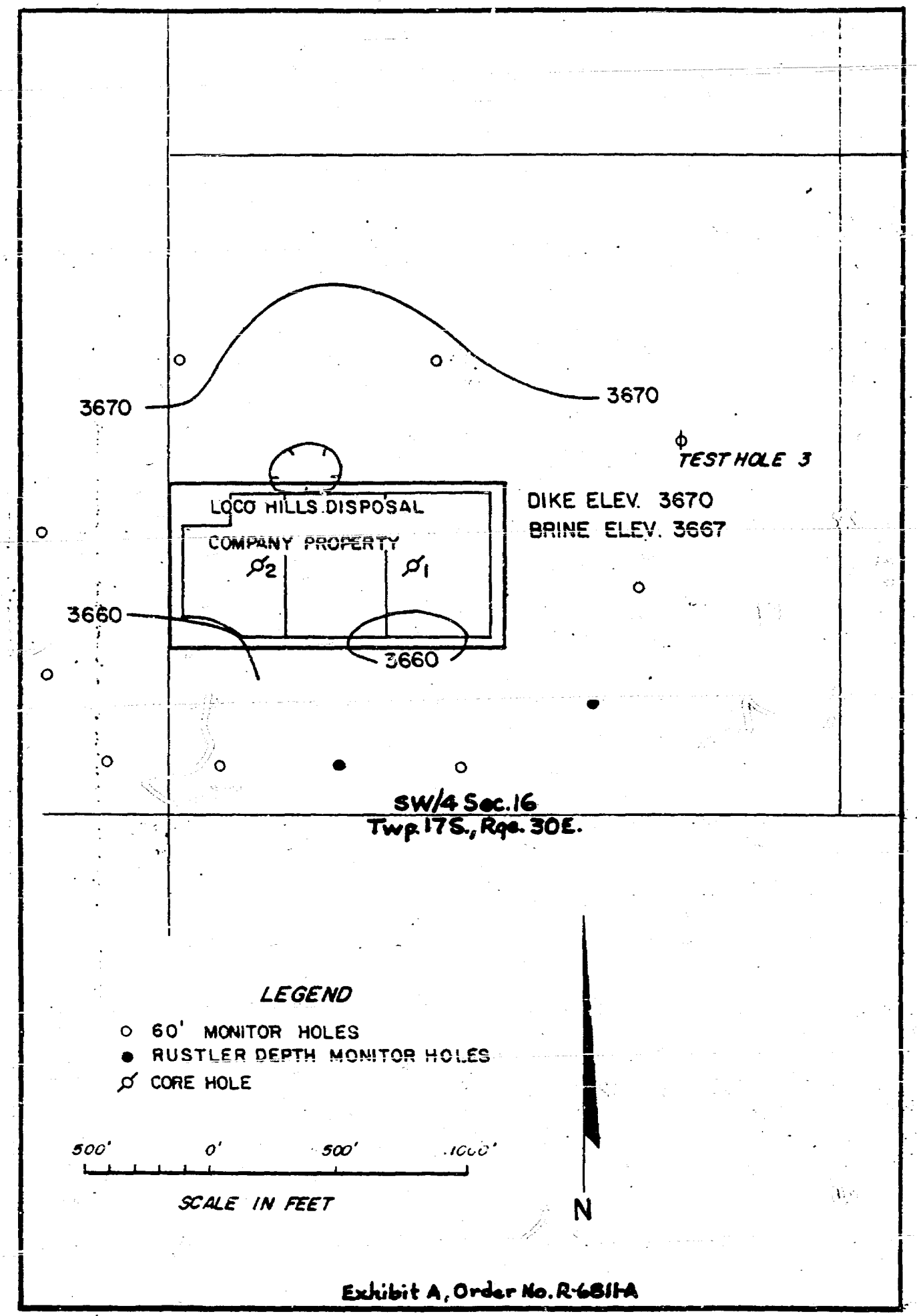


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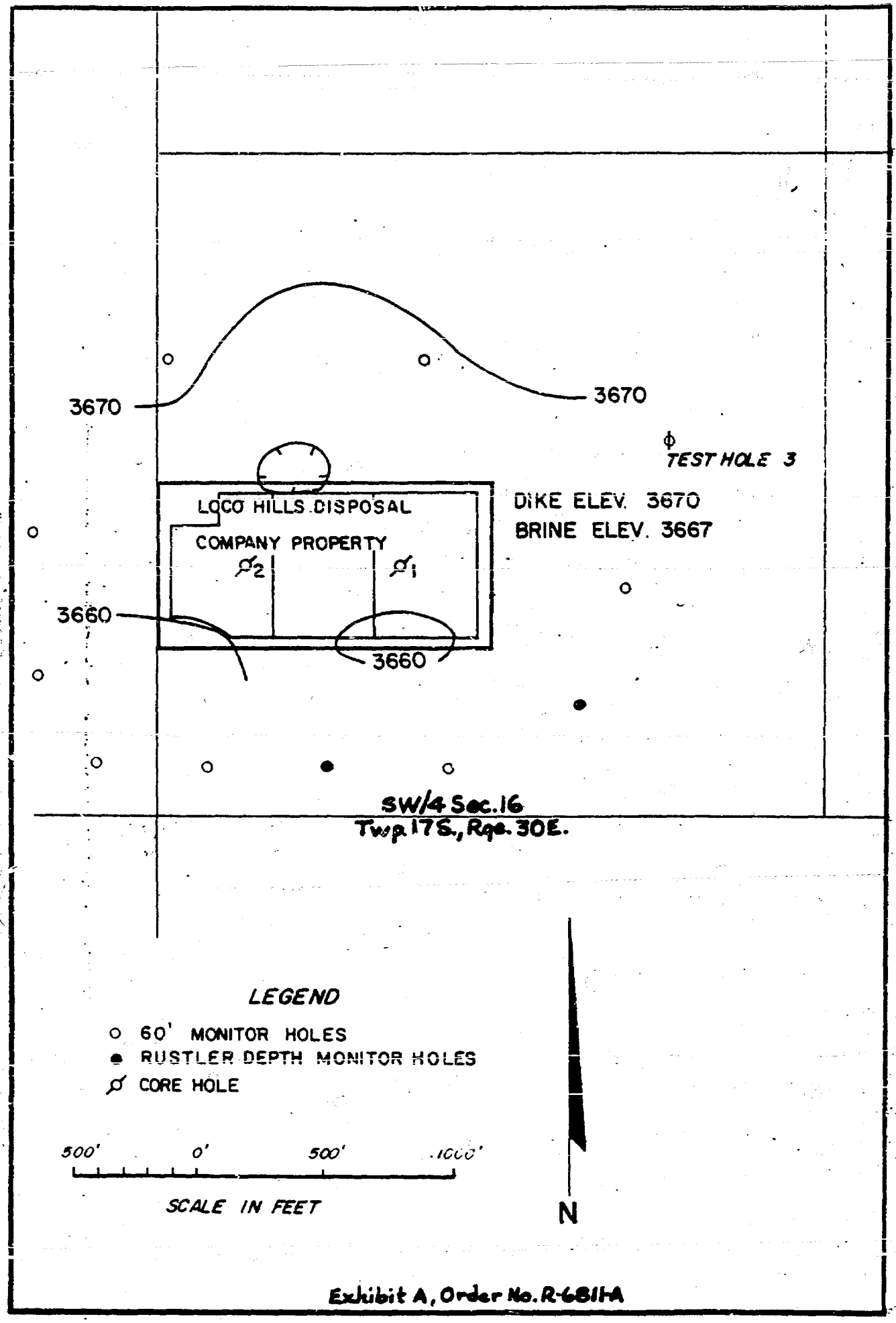


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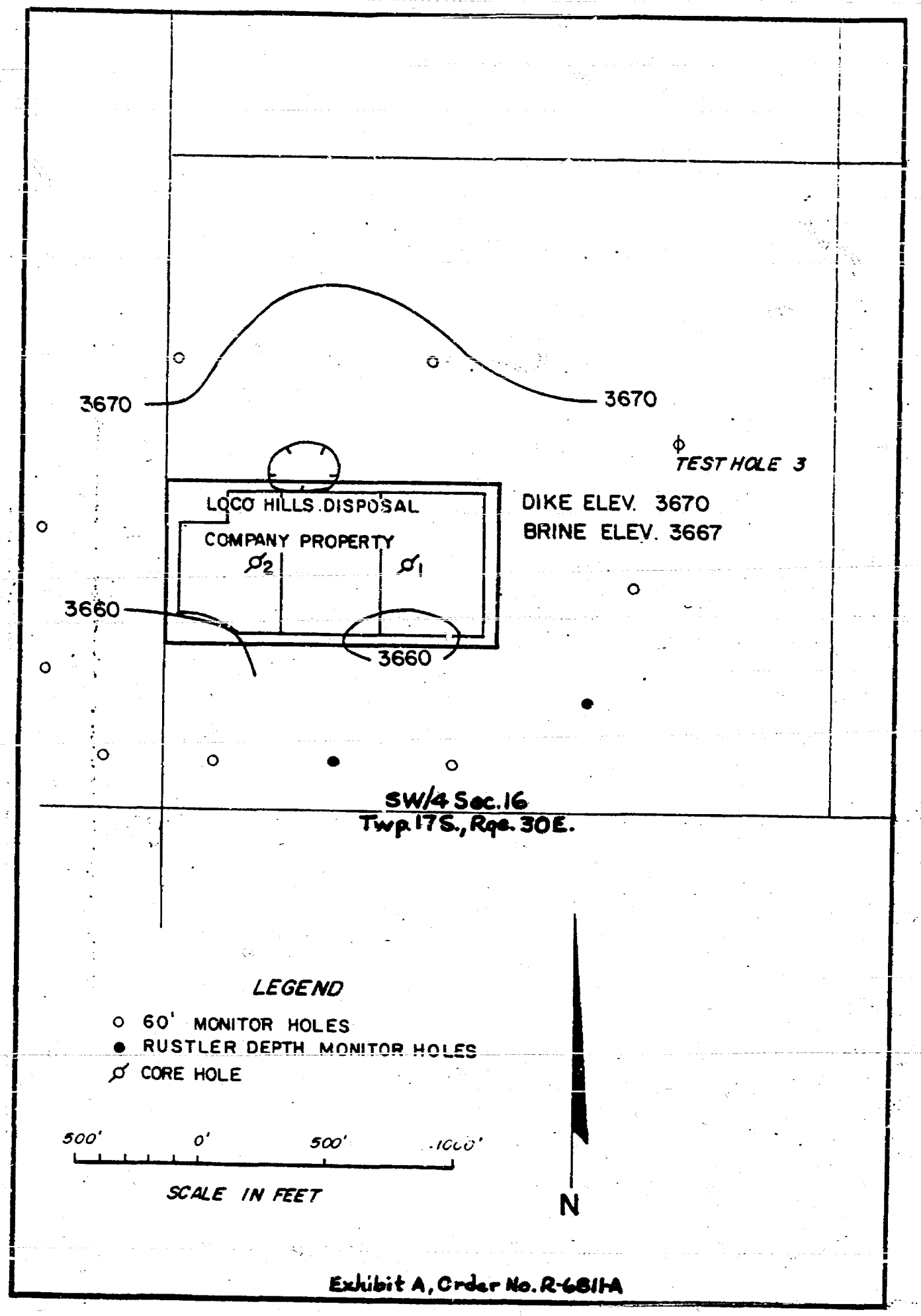


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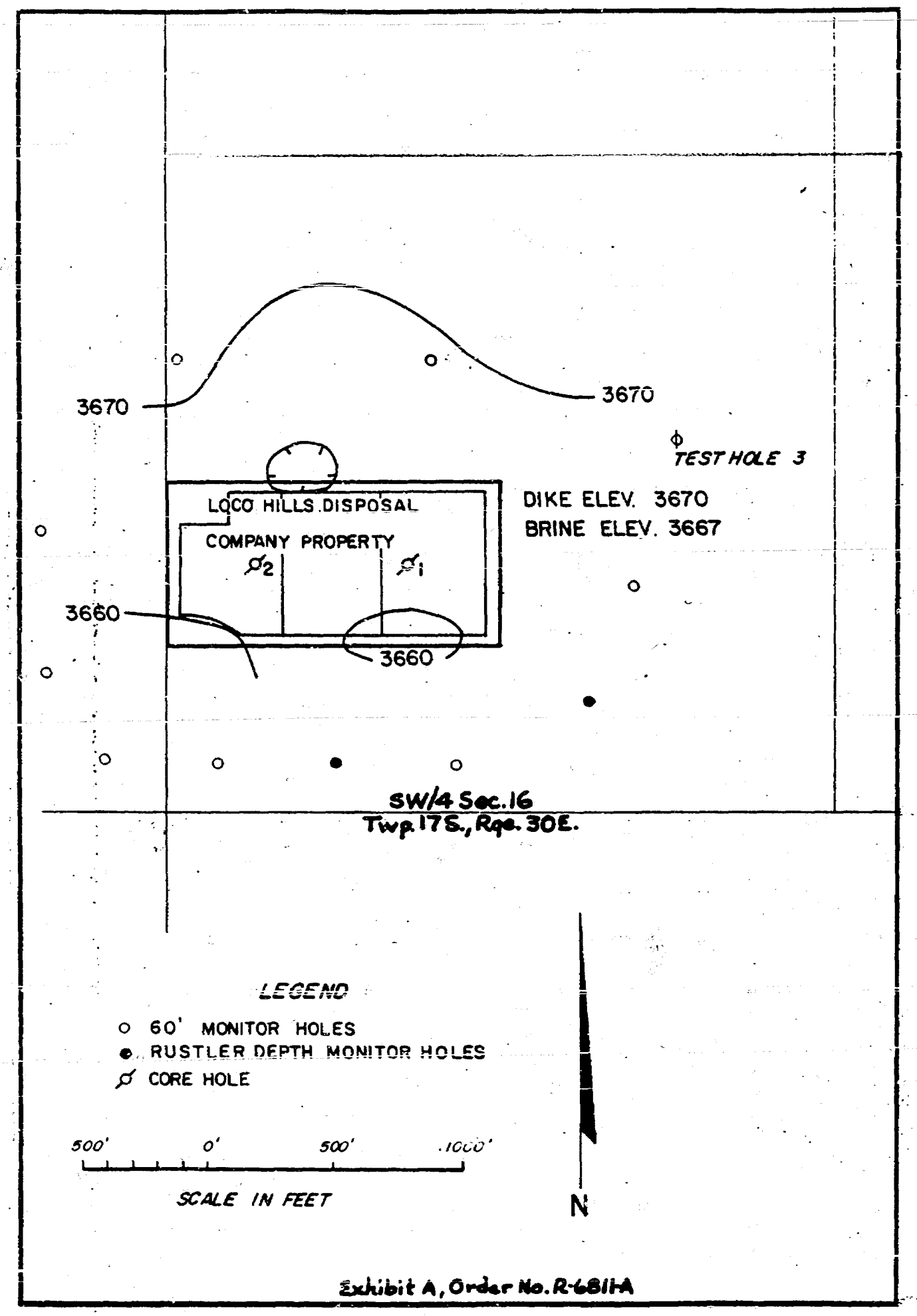


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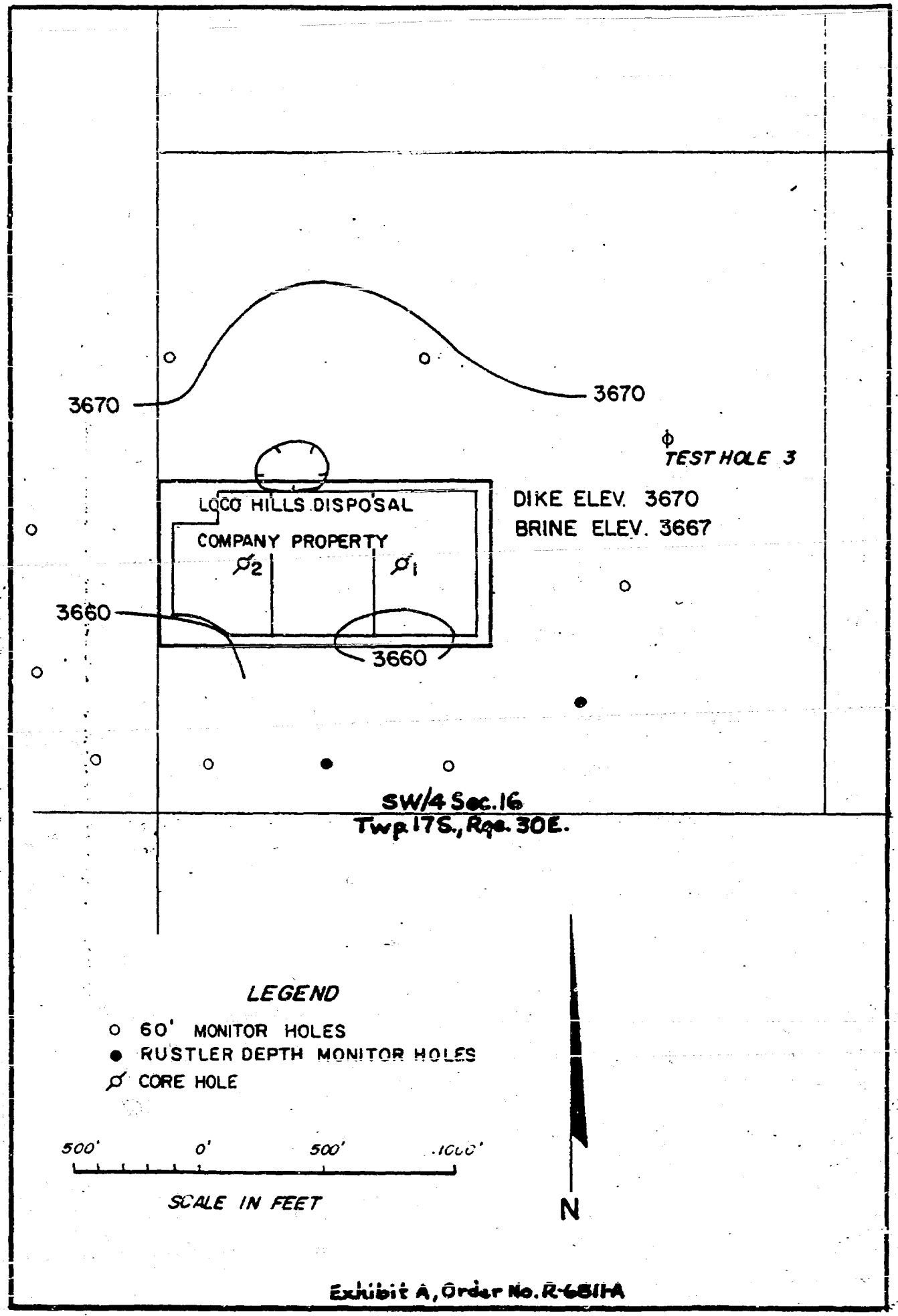


Exhibit A, Order No. R-6811-A

Docket No. 23-82

DOCKET: COMMISSION HEARING - WEDNESDAY - JULY 14, 1982

OIL CONSERVATION COMMISSION - 9 A.M.
MORGAN HALL, STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO

CASE 7496: (DE NOVO)

Application of Viking Petroleum, Inc. for an unorthodox location, Chaves County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of an Abo gas well located 62 feet from the South line and 1984 feet from the East line of Section 29, Township 5 South, Range 24 East, the SE/4 of said Section 29 to be dedicated to the well.

Upon application of Viking Petroleum, Inc., this case will be heard De Novo pursuant to the provisions of Rule 1220.

CASE 7329: (DE NOVO)

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Order No. R-3221 to permit the commercial disposal of produced brine into several unlined surface pits located in the N/2 SW/4 SW/4 of Section 16, Township 17 South, Range 30 East.

Upon application of Loco Hills Water Disposal Company, this case will be heard De Novo pursuant to the provisions of Rule 1220.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE NO. 7329 DE NOVO
Order No. R-6811-A

APPLICATION OF LOCO HILLS WATER DISPOSAL COMPANY FOR AN EXCEPTION TO ORDER NO. R-3221, AS AMENDED, EDDY COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on July 14, 1982, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this _____ day of July, 1982, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law; the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Loco Hills Water Disposal Company seeks an Order permitting the installation of a commercial salt water disposal facility whereby salt water would be disposed of into unlined surface pits ~~to be~~ to be located in the ~~SW/4~~ SW/4 of Section 16, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico.

(3) That the matter came on for hearing at 9 a.m. on September 23, 1981, at Santa Fe, New Mexico, before Examiner ~~Daniels~~ ~~Nutter~~ RLS and, pursuant to this hearing, Order No. R-6811 was issued on October 30, 1981, which denied ~~[illegible]~~ Loco Hills Water Disposal Company's application.

~~Case No. 6965 De Novo~~
~~Order No. R-6497-A~~

(4) That on November 25, 1981, application for Hearing De Novo was made by Loco Hills Water Disposal Company and the matter was set for hearing before the Commission.

(5) That the matter came on for hearing de novo on July 14, 1982.

(6) That Order (3) of Division Order No. R-3221, as amended, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which would constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(7) That the aforesaid Order No. R-3221 was issued in order to afford reasonable protection against contamination of fresh water supplies designated by the State Engineer through disposal of water produced in conjunction with the production of oil or gas, or both, in unlined surface pits.

(8) That the State Engineer has designated, pursuant to Section 65-3-11 (15), N.M.S.A., 1953 Compilation, all underground water in the State of New Mexico containing 10,000 parts per million or less of dissolved solids as fresh water supplies to be afforded reasonable protection against contamination; except that said designation does not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination.

(3)

(9) That the applicant seeks an exception to the provisions of the aforesaid Order (3) of Division Order No. 3221, as amended, to permit the commercial disposal of produced salt water into the aforesaid pits at the site described above.

(10) That the applicant proposes to install and operate an effective system, ~~[redacted]~~ composed of holding and separating tanks, and a skimming pit, for the removal of oily and solid wastes from the waters to be disposed of into said system.

(11) That there is no fresh ~~potable~~ water in the immediate vicinity of said disposal system, but there are ~~[redacted]~~ wells producing fresh ~~potable~~ water some nine miles south of ~~[redacted]~~ the proposed disposal pits ~~[redacted]~~.

(12) That the native ~~[redacted]~~ soils underlying said pits will permit the vertical percolation of some of the ~~[redacted]~~ waters disposed of in said system.

(13) That the vertical percolation of waters, from said system, should not endanger any fresh ~~potable~~ waters ~~in the area~~.

(14) That to ensure that waters percolating from said pits move only ~~[redacted]~~ vertically, monitor wells should be drilled in a pattern as shown on Exhibit "A" ~~that would~~ designed to detect horizontal movement of water

(4). Freeboard 3'

from said disposal area.

(15) That in the event ~~[illegible]~~ salt water is detected in any monitor well, ~~[illegible]~~ Case No. 7329 should be re-opened within 90 days to permit ~~applicant~~ to appear & show ~~the source of said water.~~ cause why the authority to use said pits for water disposal should not be rescinded.

~~[illegible] THEREFORE ORDERED:~~

(16) That the maximum volume of produced water to be disposed of through said system should not exceed 2500 barrels per acre per month.

(17) That a freeboard of a minimum of three feet should be maintained at all times.

(18) That the granting of the ~~application~~ (impair) will not cause waste or ~~violate~~ correlative rights.

~~[illegible]~~ to install ~~and~~ operate a 15-acre commercial salt water ~~[illegible]~~ disposal facility to be located in the SW/4 of Section 16, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico, said (disposal) system to be limited to the maximum of 2500 barrels per acre per month.

(2) That the operator shall install ~~sufficient~~ tanks, ~~and~~ a skimming pit, ~~to~~ sufficient to ensure that oil or other deleterious substances will not enter the disposal pits in harmful quantities.

(3) That a freeboard of a minimum of three feet will be maintained on all pits at all times.

(4) That monitor wells, as shown on Exhibit "A", attached to and made a part of this order, shall be drilled and equipped with perforated or slotted tubing casing from a depth of four feet to total depth.

(5) That said monitor wells will be tested ~~checked~~ for ~~or~~ check for migration of the disposed salt water thereto and the result of such tests will be promptly delivered to the Artesia District Office of the Oil Conservation Division.

(6) That if disposed salt water is detected in any monitor wells, Case 7329 will be reopened, within 90 days, to permit the applicant to appear and show cause why the ~~source of said water~~ authority granted by this order should not be rescinded.

(7) Jurisdiction

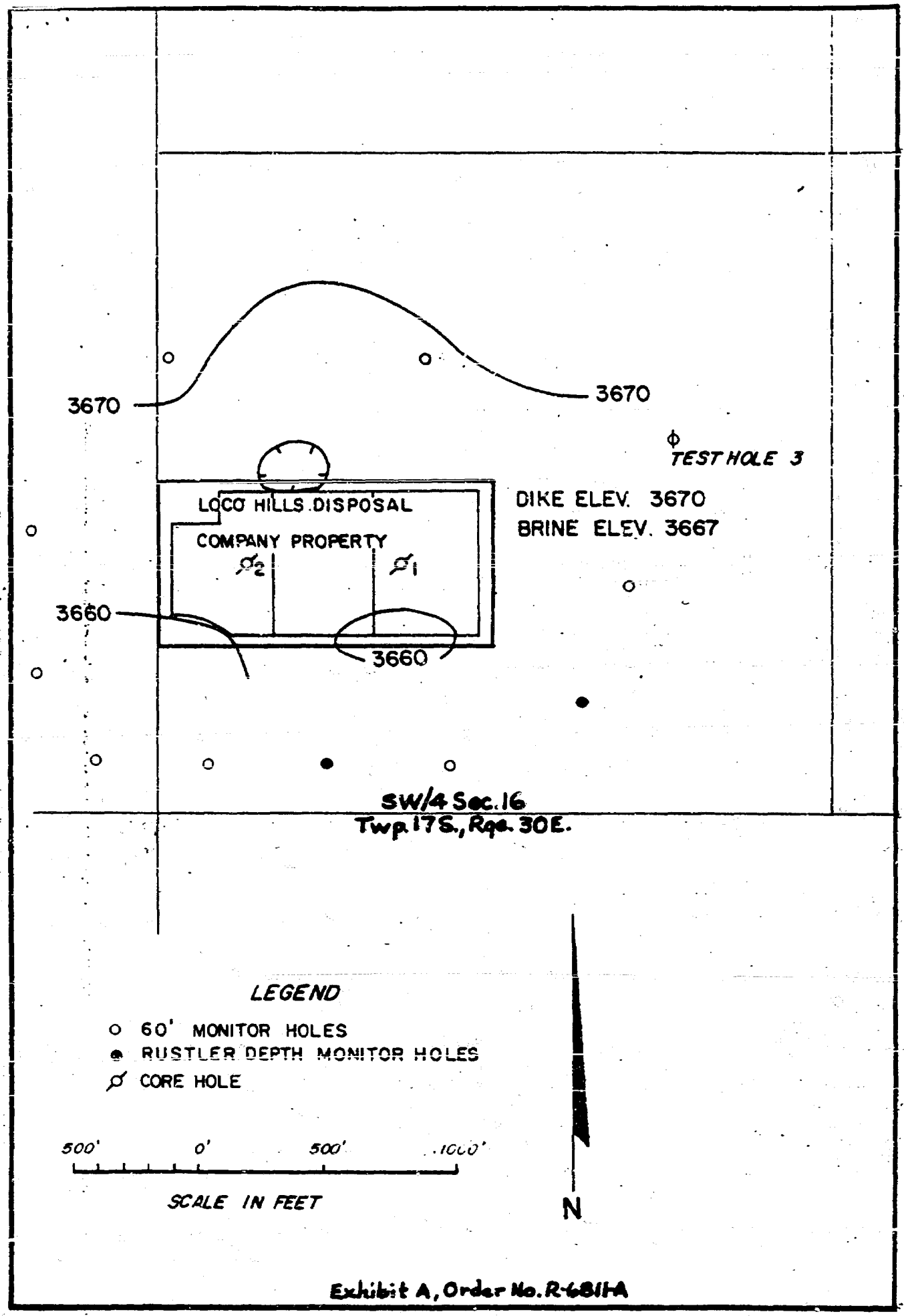


Exhibit A, Order No. R-6811-A

LAW OFFICES OF
JENNINGS & CHRISTY
1012 SECURITY NATIONAL BANK BUILDING
P.O. BOX 1180
ROSWELL, NEW MEXICO 88202-1180

JAMES T. JENNINGS
SIM B. CHRISTY III
PHILLIP T. BREWER

TELEPHONE 622-8432
AREA CODE 505

November 25, 1981

Oil Conservation Commission
State of New Mexico
P. O. Box 2088
Santa Fe, NM 87501

Attention: Mr. Joe D. Ramey, Director

Re: Case No. 7329; Order No. R-6811

Dear Mr. Ramey:

Enclosed herewith you will find an Application for De Novo Hearing which we are filing on behalf of Loco Hills Water Disposal Company in the above-numbered case for a de novo hearing.

It is our desire that the Application not be set for hearing at this time, as the Applicant desires to seek additional data relative to the protection of the waters in the Rustler Formation and Pecos River. The Application for De Novo Hearing is filed at this time to preserve our right for a de novo hearing and we will forward a request that the matter be set down for hearing some time after the first of the year if this is satisfactory.

Yours very truly,

JENNINGS & CHRISTY

James T. Jennings

JTJ/jb

Encl.

BEFORE THE OIL CONSERVATION DIVISION
ENERGY & MINERALS DEPARTMENT
STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION OF LOCO HILLS WATER DISPOSAL COMPANY FOR AN EXCEPTION TO ORDER NO. R-3221 AS AMENDED, EDDY COUNTY, NEW MEXICO.

Case No. 7329

Order No. R-6811

APPLICATION FOR DE NOVO HEARING

COMES NOW Loco Hills Water Disposal Company, by and through its attorneys, Jennings & Christy, and applies to the Oil Conservation Commission for a hearing de novo in this case and, as grounds therefore, states:

1. On August 26, 1981, and September 23, 1981, a hearing was held before Examiner Richard L. Stamets on the Application of Loco Hills Water Disposal Company for an exception to Oil Conservation Division Order No. R-3221, as amended, said Application being No. 7329, a copy of which is attached as Exhibit "A".

2. As a result of the hearings on August 26, 1981, and September 23, 1981, Order R-6811 was issued by the Oil Conservation Division on October 30, 1981, denying the Application, a copy of the Order is attached as Exhibit "B".

3. Applicant, Loco Hills Water Disposal Company, is a party adversely affected by the decision of the Oil Conservation Division in Order R-6811 pursuant to Section 70-2-13, N.M.S.A., 1978 Compilation.

WHEREFORE, Applicant asks that this Application be heard de novo before the Oil Conservation Commission.

JENNINGS & CHRISTY

By _____
James T. Jennings, Attorneys
for Applicant Loco Hills
Water Disposal Company
P. O. Box 1180
Roswell, New Mexico 88201

I hereby certify that a true and correct copy of the foregoing Application was mailed to W. Thomas Kellahin, Esq., on the 25th day of November, 1981.

_____
James T. Jennings

BEFORE THE OIL CONSERVATION DIVISION
ENERGY & MINERALS DEPARTMENT
STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF LOCO HILLS WATER DISPOSAL COMPANY
FOR AN EXCEPTION TO ORDER NO. R-3221
AS AMENDED, EDDY COUNTY, NEW MEXICO.

APPLICATION

COMES NOW Loco Hills Water Disposal Company, a New Mexico corporation, by its attorneys, Jennings & Christy, and seeks an exception to Order R-3221 as amended to permit the disposal of brine and water produced in conjunction with the production of oil or gas, or both, into unlined, open surface pits located in the SW¼SW¼ of Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, and in support of its Application states:

1. Applicant has made application to the Commissioner of Public Lands of the State of New Mexico for a business lease covering the S½SW¼SW¼ of Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, and proposes to construct thereon the necessary tanks and pits to permit the commercial disposal of water produced in connection with the production of oil or gas, or both, in tanks and pits located thereon.

2. That there are a great number of stripper wells and other wells within a 15-mile radius of Loco Hills, which are producing a large volume of water in connection with their production of oil and gas. It is necessary for operators who have not obtained a permit to dispose of such water in their own pits pursuant to an exception to Order No. R-3221, to truck the produced water to a disposal facility.

EXHIBIT "A"

3. That there is no fresh potable water in the immediate vicinity of the well site. There is no evidence of ground water in the Santa Rose Formation within a 4-mile radius of the proposed site and there is no Triassic water in the immediate vicinity. The only available water in the Loco Hills vicinity is supplied by a pipeline which also serves the potash mines.

4. That the water disposed of into the pits will evaporate or will migrate downward through the Santa Rose Formation to the Rustler Formation. To detect any undue horizontal migration of the water a ring of monitor holes will be drilled around the disposal site at intervals of 500 feet, which wells will be located 500 feet from the perimeter of the disposal pits.

5. That Applicant proposes to install three 500-barrel and two 250-barrel steel tanks and to construct four earthen ponds or pits. The pits will be maintained with a minimum 3-foot freeboard and prior to discharging of the water into the disposal pits, residual hydrocarbons will be removed by gravity separation in steel tanks. Discharge water will enter a 50 x 50 earthen skimmer pit which will remove the last remaining hydrocarbons. Water will be discharged into the disposal pit by siphoning from the bottom of the skimmer pit.

6. There is a great need for a commercial disposal water system in the immediate area, as there are four trucking companies operating more than fifty water trucks in the area.

7. Approval of this Application for an exception to Order R-3221 as amended will prevent waste, protect correlative rights and will not injure any fresh water or present any threat of such injury.

WHEREFORE, Applicant requests that this Application be set for hearing and that after notice and hearing, the Division enter its Order granting Applicant an exception to Order R-3221 as amended and in accordance with this Application.

JENNINGS & CHRISTY

By _____
James T. Jennings
Attorneys for Loco Hills
Water Disposal Company
P. O. Box 1180
Roswell, New Mexico 88201

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING CALLED BY THE OIL CONSERVATION DIVISION FOR THE PURPOSE OF CONSIDERING:

CASE NO. 7329
Order No. R-6811

APPLICATION OF LOCO HILLS WATER DISPOSAL COMPANY FOR AN EXCEPTION TO ORDER NO. R-3221, AS AMENDED, EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on September 23 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 30th day of October, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That Order (3) of Division Order No. R-3221, as amended, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which would constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(3) That the aforesaid Order No. R-3221 was issued in order to afford reasonable protection against contamination of fresh water supplies designated by the State Engineer through disposal of water produced in conjunction with the production of oil or gas, or both, in unlined surface pits.

EXHIBIT "B"

(4) That the State Engineer has designated, pursuant to Section 70-2-23 (15), NMSA, 1978 Compilation, all underground water in the State of New Mexico containing 10,000 parts per million or less of dissolved solids as fresh water supplies to be afforded reasonable protection against contamination; except that said designation does not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination.

(5) That the applicant, Loco Hills Water Disposal Company, seeks as an exception to the provisions of the aforesaid Order (3) to permit the commercial disposal of salt water into an unlined surface pit or pits containing from 5 to 15 surface acres to be located in the N/2 SW/4 SW/4 of Section 16, Township 17 South, Range 30 East, Eddy County, New Mexico.

(6) That disposal rates would be from 2000 to 2500 barrels per month per acre or from 1000 to 1250 barrels per day at the maximum pit size.

(7) That neither the pit(s) nor the immediate underlying sediments are impervious and a percentage of the disposed water would leak into the subsurface to enter the Santa Rosa and Rustler Anhydrite formations.

(8) That while the Santa Rosa formation contains no fresh water in the immediate vicinity of the proposed pit(s), it does contain fresh water at various locations both up-dip and down-dip therefrom.

(9) That clay zones within the Santa Rosa could contribute to the horizontal migration of waters percolating from said pits which waters could reach and contaminate down-dip fresh water supplies in said formation.

(10) That if the salt water from said pits should percolate vertically through the Santa Rosa formation, it would enter the Rustler formation and move therethrough in a generally Southward direction to the Pecos River.

(11) That insufficient data was presented relative to the long term effect of the disposal of salt water in the proposed pit(s) and its potential affect on surface and subsurface waters in the following areas:

(a) percolation rates;

(b) fluid retention by the Santa Rosa formation (volume and area);

(c) Rustler formation water quality outside the immediate area; and,

(d) the ground water regime vis-a-vis the Rustler formation and the Pecos River.

(12) That because of the potential for contamination of fresh water supplies in the Santa Rosa formation and because of insufficient data upon which to make reasonable determinations relative to the need for protection of or the long term effects upon waters in the Rustler formation or Pecos River, the subject application should be denied.

IT IS THEREFORE ORDERED:

(1) That the application of Loco Hills Water Disposal Company for approval of commercial surface salt water disposal facility, as an exception to Order (3) of Division Order No. R-3221, is hereby denied.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY,
Director

S E A L

Ed L. Reed and Associates, Inc.

Consulting Hydrologists

MIDLAND · CORPUS CHRISTI

TEXAS

ED L. REED, P.E.
PRESIDENT
A. JOSEPH REED
EXECUTIVE VICE PRESIDENT
CHESTER F. SKRABACZ
VICE PRESIDENT FIELD OPERATIONS
1108 N. BIG SPRING
MIDLAND, TEXAS 79701
915 682-0556

V. STEVE REED
VICE PRESIDENT GEOLOGY
OIL INDUSTRIES BLDG.
SUITE 315
723 UPPER N. BROADWAY
CORPUS CHRISTI, TEXAS 78403
512-883-1333

AUG 26
DIST. 2 N.M.
Carlsbad New Mexico

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7329 Exhibit No. 2
Submitted by Loco Hills
Hearing Date 7-14-82

May 25, 1982

Mr. James T. Jennings
Jennings & Christy
P.O. Box 1180
Roswell, New Mexico 88201

Dear Mr. Jennings:

Subsequent to our last report, we initiated a core test program in conjunction with Southwestern Laboratories in which we cored two locations in Section 16, T-17-S, R-30-E, Eddy County, New Mexico. Both core tests were stopped at a depth of 45 feet. The first test hole was located approximately 1000 feet from the south line and 950 feet from the west line of Section 16 and the second test hole was located approximately 1000 feet from the south line and 350 feet from the west line of Section 16.

The procedure was to drill from the surface down until clay zones were encountered at which time either Shelby tube cores or pitcher cores were obtained of the clay material. These cores were preserved and sent to Southwestern Laboratories for analysis and the data are presented in the attached laboratory report.

Three zones were encountered within the 45 feet penetrated by these two core tests which had low permeabilities. A zone in Boring No. 2 was encountered at 22 feet which had a permeability of $1.4X10^{-7}$ centimeters per second (cm/sec). In the same bore hole, at 36 to 39 feet the material had a permeability of $4.9X10^{-6}$ cm/sec. In Boring No. 1 a zone was encountered between 36-38 feet which had a coefficient of permeability of less than $1X10^{-9}$ cm/sec.

The zone with the lowest permeability will be the controlling influence for downward migration of any water stored in unlined ponds upon the land surface. Therefore we have calculated velocities of fluid movement, time of complete penetration and seepage rate per acre for the tightest two clay zones. Using a permeability of $1.4X10^{-7}$ we calculate that the rate of fluid movement through a two-foot thick bed of this material would be approximately $8.93X10^{-3}$ feet per day

requiring 224 days for a particle of fluid to move completely through this entire bed. At this rate, water would seep through a one-acre segment of this clay at 1.2 gallons per minute.

Using the permeability of $1X10^{-9}$ cm/sec which occurs at 36 to 38 feet in Boring No. 1, we calculate that the velocity of fluid movement through this zone would be $1.02X10^{-4}$ feet per day requiring 54 years for a particle of water to move entirely through this zone. At this rate, a one-acre tract would bleed 0.014 gallons per minute.

On the basis of sample descriptions from bore holes previously drilled under the supervision of our geologists, additional clays can be expected to a depth of at least 180 feet.

In summary, we have calculated that it will take at least 224 days to 54 years for water to move through the first 22 to 38 feet of Triassic material beneath the disposal site. We further calculate that between 0.014 and 1.2 gallons per minute of fluid can bleed through these clays per acre. Since the Rustler formation appears to occur at a depth of approximately 200 to 225 feet and additional clays are present to a depth of 180 feet as shown by previous borings, these additional clay zones may further impede the flow of water to the Rustler aquifer.

If additional information is needed concerning this matter, please advise.

Very truly yours,

ED L. REED & ASSOCIATES, INC.

A. Joseph Reed

AJR/lb

SWL SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical consultation, fundamental testing and analytical services
P.O. Box 1589 • 812 Great Southwest Parkway • Arlington, Texas 76010 • 817/640-4425

April 6, 1982

Re: Test Borings
Laboratory Tests
Loco Hills, New Mexico
SWL Report No. 82-276

Mr. Steve Reed
315 Oil Industries Building
Corpus Christi, Texas 78403

Dear Mr. Reed:

Attached are copies of the field logs for the two test borings made at the locations you specified on the above site. Also attached are Summaries of the Atterberg Limits, Mechanical Grain Size, and Constant Head Permeabilities performed on the samples you designated.

We appreciate this opportunity to be of service. Please contact us if we can be of further assistance.

Sincerely,

SOUTHWESTERN LABORATORIES

R B Barnes

Ralph B. Barnes, Jr., P.E.
Geotechnical Division

RBB:pa

SUMMARY OF PERMEABILITY TESTS

BORING NUMBER	DEPTH (FEET)	INITIAL MOISTURE	DRY DENSITY (PCF)	COEFFICIENT OF PERMEABILITY (CM/SEC)
1	36-38	14.5	119.2	less than 10-9
1	40-43	17.8	102.8	3.4×10^{-5}
2	20-22	19.5	106.1	1.4×10^{-7}
2	33-36	18.1	100.6	3.4×10^{-4}
2	36-39	16.2	100.3	4.9×10^{-6}

SWL Report No. 82-276

SOUTHWESTERN LABORATORIES
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SUMMARY OF CLASSIFICATION TESTS

BORING NUMBER	DEPTH (FEET)	LIQUID LIMIT	PLASTICITY INDEX	PERCENT PASSING U.S. STANDARD SIEVES						
				#4	#8	#16	#30	#50	#100	#200
1	12-13	26	8	79	71	66	62	53	13	8
	22-23	26	8	98	94	90	87	79	32	21
	37-38	36	18	100	100	99	97	94	74	70
	40-43	23	6	99	99	98	84	13	7	
2	9-10	33	15	69	53	42	24	16	13	11
	20-22	20	3	99	98	95	60	4	2	
	33-36	22	5	100	98	95	92	76	18	10
	36-39	24	6	90	83	77	71	59	15	10

Report No. 82-276

SOUTHWESTERN LABORATORIES
SOUTHWESTERN LABORATORIES

LOG OF BORING

PROJECT: Loco Hills Disposal
CLIENT: Ed Reed and Associates

BORING NO.: 1
LOCATION: Loco Hills, New Mexico

DATE: 3/16/82 TYPE: Sample CASED TO: GROUND ELEVATION:

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft.	HAND PEN. tsf.	LEGEND: ■ SAMPLE ✕ STANDARD PENETRATION ▼ WATER	WATER INFORMATION
						Drilled with air seepage not encountered

DESCRIPTION OF STRATUM

0	Tan clayey sand
5	Light tan caliche
10	Reddish tan and red clayey, cemented sand
15	
20	
25	
30	
35	
40	Tan clayey sand with pebbles
45	Bottom of boring at 45'
50	

SOUTHWESTERN LABORATORIES

LOG OF BORING

PROJECT: Loco Hills Disposal
CLIENT: Ed Reed and Associates

BORING NO.: 2
LOCATION: Loco Hills, Texas

DATE: 3/16/82 TYPE: Sample CASED TO: GROUND ELEVATION:

LEGEND:
- ■ SAMPLE
- X STANDARD PENETRATION
- ▼ WATER

WATER INFORMATION: Drilled with air
Seepage not encountered

DEPTH IN FEET	SYMBOL	SAMPLE	STANDARD PENETRATION BLOWS/ft.	HAND PEN. tsf.	DESCRIPTION OF STRATUM
					Tan sand
5					Light tan caliche w/broken rock
10					Tan and reddish tan clayey cemented sand with some gravel
15					
20					
25					
30					
35					Tan clayey sand with pebbles
40					
45					Bottom of boring at 45'
50					

SOUTHWESTERN LABORATORIES

NEW MEXICO STATE LAND OFFICE

BUSINESS LEASE

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7329 Exhibit No. 3
Submitted by Loco Hills
Hearing Date

APPLICATION NO. BL-1044

LEASE NO. BL-1044

THIS INDENTURE, Made and entered into this 17th day of July, 19 81, by and between the State of New Mexico, acting by and through its Commissioner of Public Lands, hereinafter called the Lessor, and Loco Hills Water Disposal Company whose post office address is P.O. BOX 4, Loco Hills, New Mexico, hereinafter called the Lessee(s).

WITNESSETH:

1. The Lessor, in consideration of the covenants and agreements of the Lessee(s) hereinafter set forth, has this day leased to the Lessee(s) the following described tract of land for the sole and only purpose of using the tract for erecting, maintaining and operating a site for the dispsal of produced oil field brine.

(Be Specific).

2. The tract of land included in this lease is as follows:

N½SW¼SW¼ Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico.

3. TO HAVE AND TO HOLD the same for the term of 5 years, beginning at the date of this lease and ending July 17, 1986, for which Lessee(s) agree(s) to pay: $400.00 annually in advance.

4. The Lessee(s) expressly grant(s) to the Lessor a first and prior lien upon any and all improvements and equipment which have been or shall have been placed upon the above described premises during the term of this lease as security for the payment of any due and unpaid rentals provided for in this lease.

5. That the Lessee(s) shall be permitted to remove any or all improvements placed upon the tract embraced in this lease on or before the expiration of this lease, provided that all rentals have been fully paid. In the event of sale of the land, all authorized improvements not so removed shall be appraised by the Commissioner and disposed of in the same manner as provided by law in the case of improvements upon grazing leases. Any improvements placed upon the land without the prior written approval of the Lessor shall be deemed unauthorized and become the property of the Lessor.

6. This lease shall terminate upon default of any payments due, upon thirty (30) days' notice by registered mail to the Lessee(s), evidenced by return receipt, unless such default be curd within such thirty (30) day period.

7. This lease includes the right to Lessee(s) of ingress and egress to and from said premises and any part thereof.

8. This lease is made for the sole use and benefit of Lessee(s), for the express purposes here intended; that except for the purposes of this lease, no sub-lease or under-lease (either written or verbal) shall be made by the Lessee(s) without the written consent of the Commissioner of Public Lands and any violation of this agreement and understanding will subject the lease to cancellation. This lease is not assignable except upon written approval by the Commissioner of Public Lands.

9. The Lessee(s) may at any time surrender and be relieved of any obligations under this lease by the payment of Ten ($10.00) Dollars to the Lessor, provided, however that all rentals then due have been fully paid and the terms of this lease have been complied with. However, upon such surrender, no part of any rentals already paid by the Lessee(s) shall be refunded.

(over)

10. This lease is issued subject to all valid existing rights upon the tract included herein.

11. Applications for a new lease should be submitted to the Lessor for consideration at least thirty (30) days prior to the expiration of the term herein.

12. Lessee(s) is authorized to place the following described improvements upon the land, the total valuation of which shall in no event exceed $50.000.00 xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx without the prior written approval of the lessor, and future improvements shall not be placed on the land without the written approval of the lessor.

13. Lessor reserves the right to execute leases on the above land for mining purposes or for the extraction of petroleum, oil, gas, salt, geothermal resources, and other mineral deposits therefrom and the right to go upon, explor for, mine, remove and sell same. Lessor further reserves the right to grant rights-of-way and easements over, upon, or across the said land for public highways, railroads, tramways, telephone, telegraph and power lines, irrigation works, sewer lines, drainage ditches, mining, logging, and for other purposes.

14. Lessees, including their heirs, assigns, agents, and contractors shall at their own expense fully comply with all laws, regulations, rules, ordinances, and requirements of the city, county, state, federal authorities and agencies, in all matters and things affecting the premises and operations thereon which may be enacted or promulgated under the governmental police powers pertaining to public health and welfare, including but not limited to conservation, sanitation, aesthetics, pollution, cultural properties, fire, and ecology. Such agencies are not to be deemed third party beneficiaries hereunder; however, this clause is enforceable by the Grantor as herein provided or as otherwise permitted by law.

All the terms of this agreement shall extend to and bind the successors and assigns of the parties hereto.

Executed in duplicate.

Witness the hands and seals of the parties aforesaid the day and year first above written.

LOCO HILLS WATER DISPOSAL COMPANY

Ray Westall
LESSEE

President
LESSEE

SUBSCRIBED AND SWORN TO BEFORE ME THIS 23rd DAY OF September, 1981.

(SEAL)

My Commission expires: 9-27-84

Olivia B. Vigil
NOTARY PUBLIC

Ray D. Arnold
COMMISSIONER OF PUBLIC LANDS

THIS LEASE WILL NOT BECOME EFFECTIVE UNLESS THE OIL CONSERVATION DIVISION APPROVES THE SALT WATER DISPOSAL SYSTEM.

BL-1 (Revised 6/77)

4" Load Lines

4" Load Line

4" Load Line

4" Load Line

4" Load Line

500 BBL Tank

250 BBL Tank

6" Bypass Line

6" water leg

SKIM PIT

500 BBL Tank

250 BBL Tank

6" Bypass Line

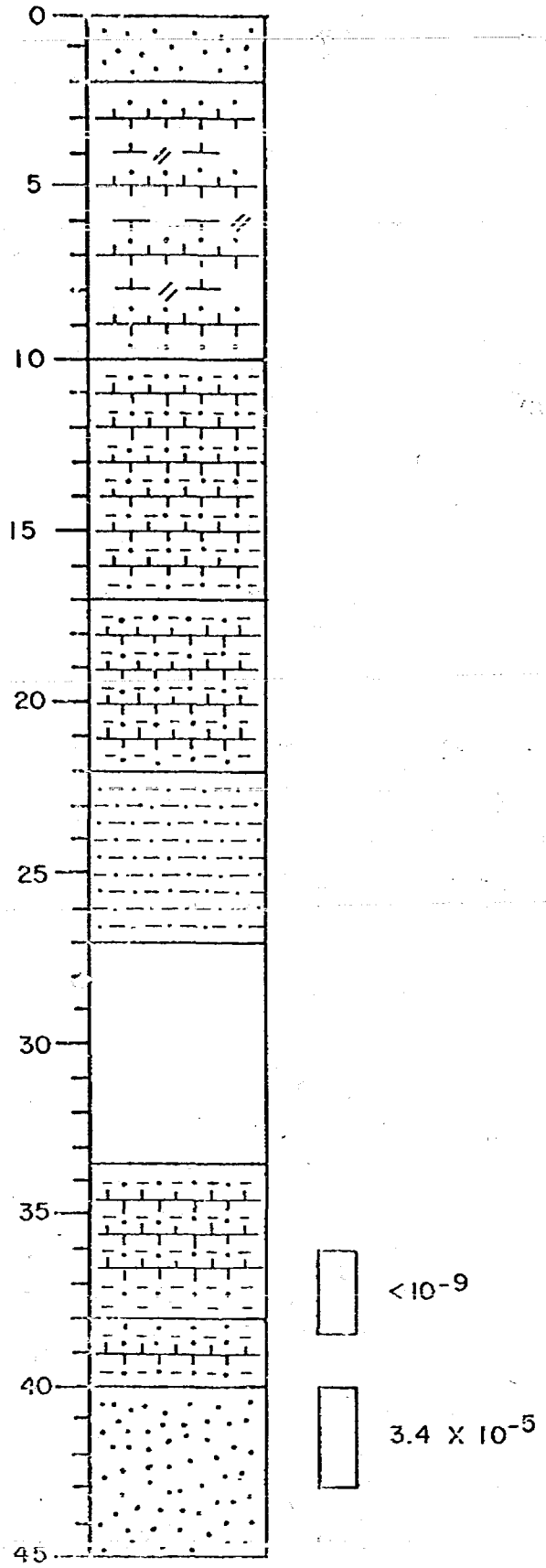
6" water leg

500 BBL Tank

BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7329 Exhibit No. 6
Submitted by Loco Hills
Hearing Date 7-14-52

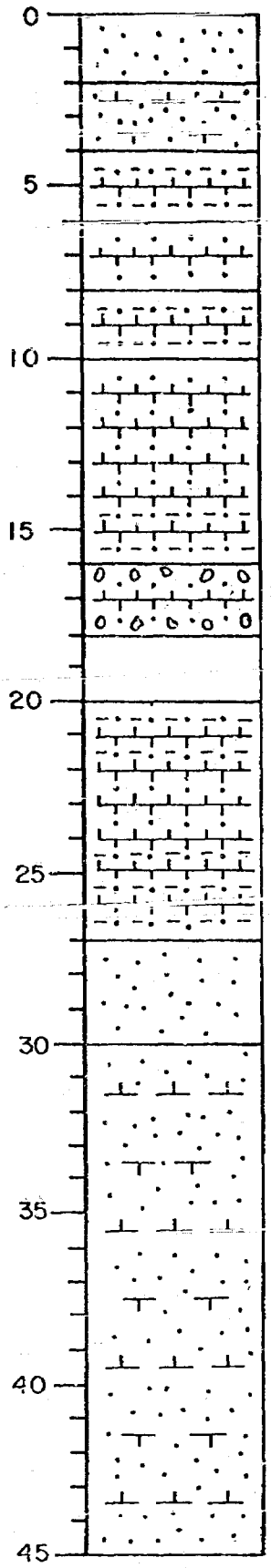
PROPOSED WATER DISPOSAL PLANT

BORING NO. 1



BEFORE THE
OIL CONSERVATION COMMISSION
Santa Fe, New Mexico
Case No. 7299 Exhibit No. 3
Submitted by Lovo Hills
Hearing Date 7-14-82

BORING NO. 2





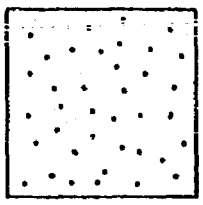
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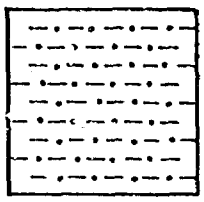
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4.9×10^{-6}

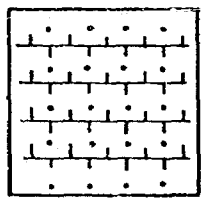
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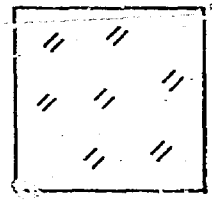
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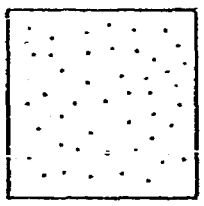
SANDY CLAY OR CLAYEY SAND



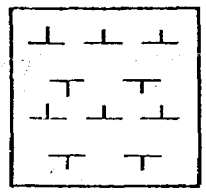
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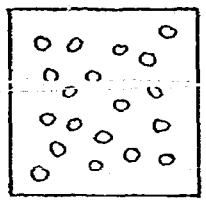
GYPSUM



SILT



CALICHE



GRAVEL

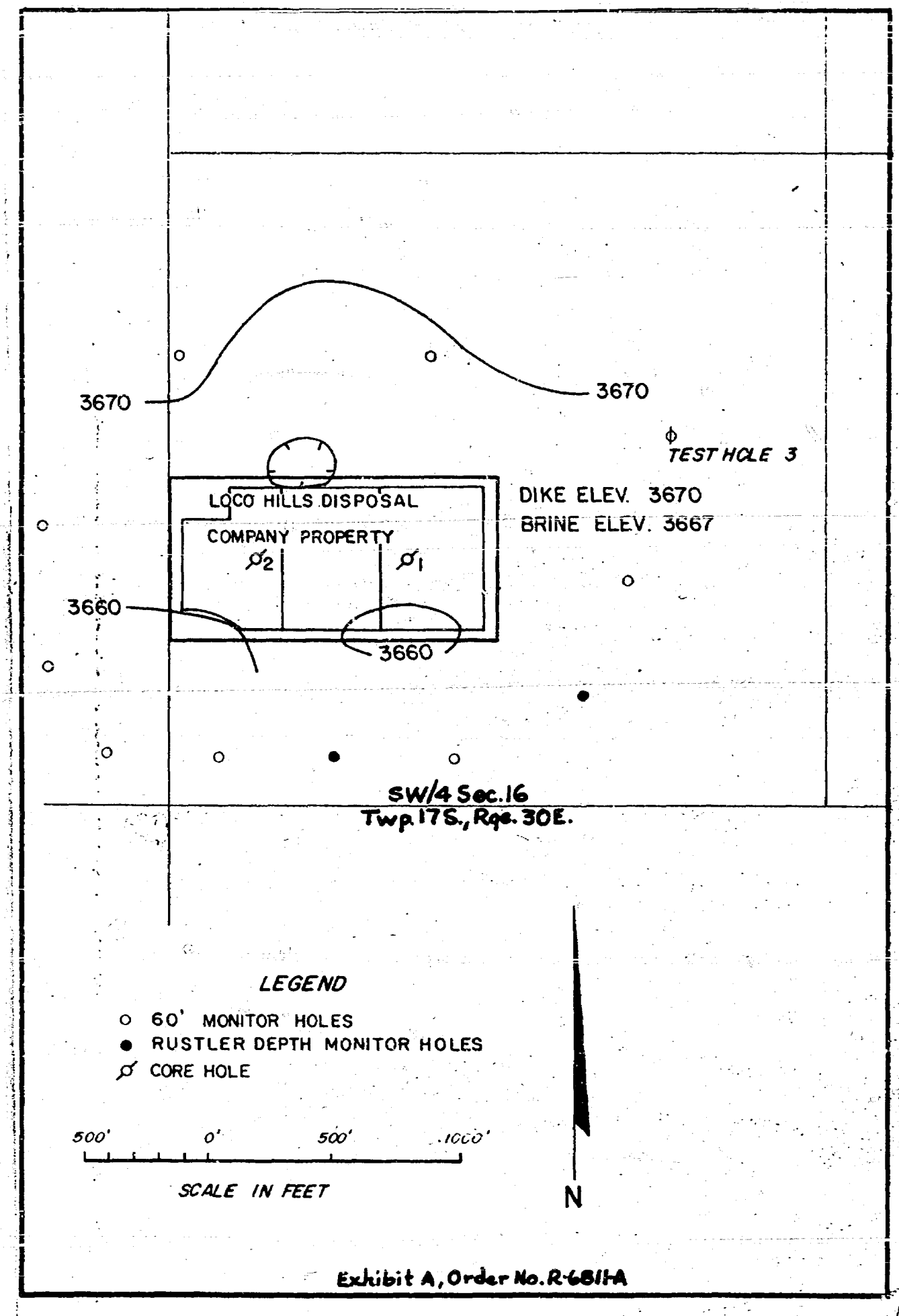


Exhibit A, Order No. R-6811-A

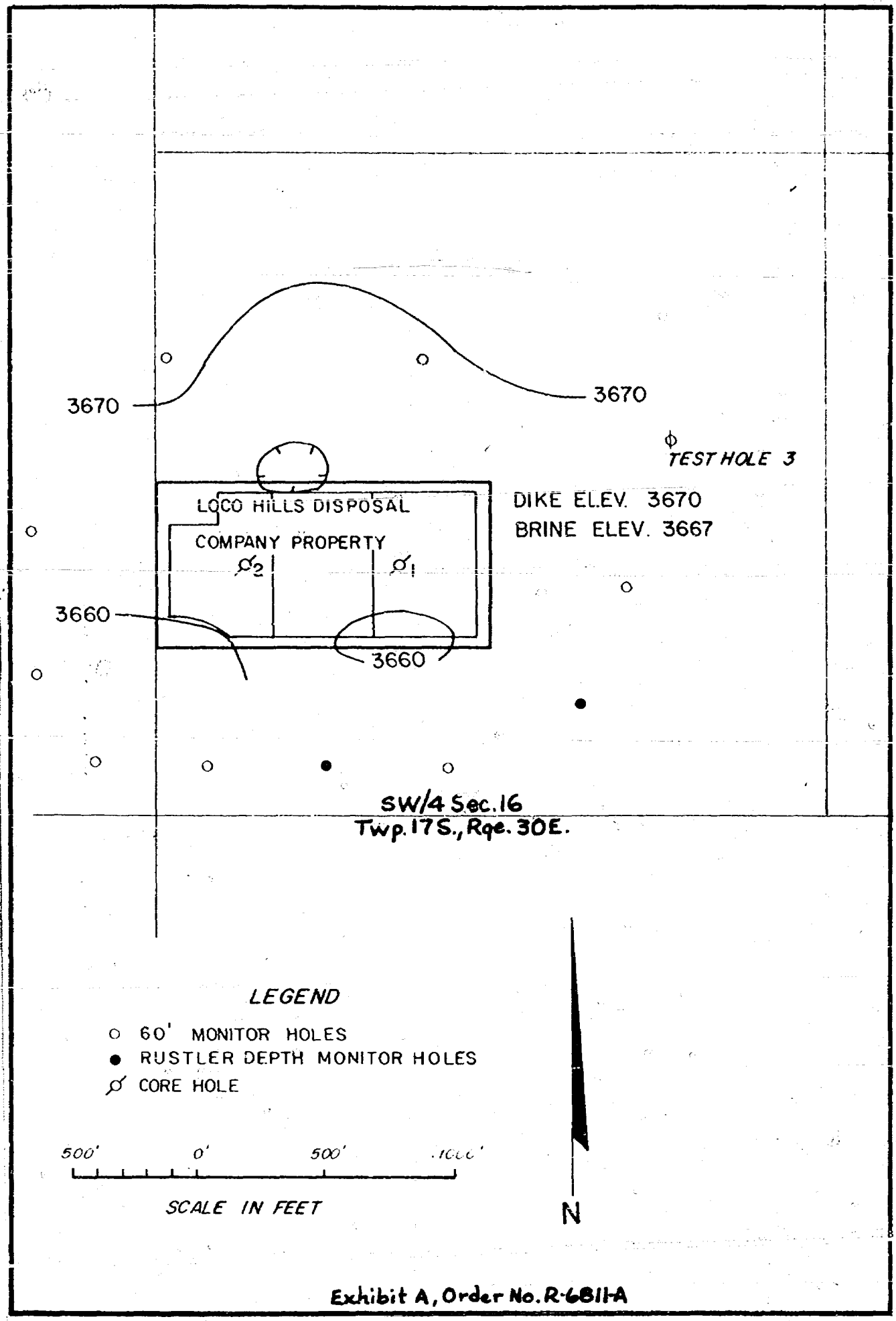


Exhibit A, Order No. R-6811-A

CASE 7329: LOCO HILLS WATER DISPOSAL COMPANY FOR AN EXCEPTION TO ORDER NO. R-3221, EDDY COUNTY, NEW MEXICO

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
14 July 1982

COMMISSION HEARING

IN THE MATTER OF:

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. CASE 7329

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: James T. Jennings, Esq.
JENNINGS & CHRISTY
P. O. Box 1180
Roswell, New Mexico 88201

and

A P P E A R A N C E S

For the Applicant:
Doug Perrin, Esq.
JENNINGS AND CHRISTY
P. O. Box 1180
Roswell, New Mexico 88201

For Snyder Ranches:
W. Thomas Kellahin, Esq.
KELLAHIN & KELLAHIN
117 N. Guadalupe
P. O. Box 2265
Santa Fe, New Mexico 87501

I N D E X

STEVEN REED

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I N D E X

RAY WESTALL

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ED REED

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LARRY C. SQUIRES

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MR. RAMEY: The hearing will please come to order.

We'll call next Case 7329.

MR. PEARCE: This case is the application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico.

MR. RAMEY: Ask for appearances at this time.

MR. PERRIN: For the applicant, Mr. Ramey, I'm Doug Perrin, the firm of Jennings and Christy, together with Mr. Jim Jennings we'll be appearing on behalf of the applicant.

I will be calling three witnesses.

MR. RAMEY: Okay.

MR. PERRIN: Mr. Steve Reed, Mr. RAy Westall, and Mr. Ed Reed.

MR. RAMEY: How do you spell your last name?

MR. PERRIN: P-E-R-R-I-N.

MR. KELLAHIN: I'm Tom Kellahin of Santa Fe, New Mexico, appearing in opposition to the application on behalf of Snyder Ranches.

I have one witness.

MR. RAMEY: I'd ask that the witnesses

stand at this time and be sworn.

(Witnesses sworn.)

MR. PERRIN: We call Mr. Steve Reed as our first witness.

STEVEN REED

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PERRIN:

Q. Would you state your name, please, sir?

A. My name is Steven Reed.

Q. Where do you live, Mr. Reed?

A. Corpus Christi, Texas.

Q. What is your occupation?

A. I'm a hydrogeologist with the firm of Ed Reed and Associates.

Q. How long have you been with that firm?

A. Approximately seven and a half years.

Q. And what did you do prior to your employment by that firm?

A. I was employed for approximately seven years by the U. S. Geological Survey.

Q. Was that also in the field of hydrogeologist?

A. No, sir, it was in the field of geology.

Q. What is your educational background?

A. I've got a Bachelor's and a Master's degree from Northern Arizona University in geology.

Q. Have you testified previously before this Oil Conservation Division?

A. I have.

Q. And what is your area of expertise?

A. My area of expertise is investigation of geohydrologic problems.

Q. Have you conducted such an investigation in connection with the application in this case?

A. I have.

MR. PERRIN: I think Mr. Reed has been qualified before. I'd ask the Commission to recognize him as an expert in the field of geohydrology.

MR. RAMEY: He is so qualified, Mr. Perrin.

Q. Prior to getting into testimony, Mr. Reed, would you please describe just briefly for the Commission the proposed plan of salt water disposal that is in this application?

A. The applicant here today is requesting an exemption so that they can operate a 15-acre brine disposal operation in the southwest quarter of Section 16, Township 17, Range 30 East.

Q. Thank you, sir. Have you performed a study of the hydrogeology in the area of the proposed disposal site in preparation for this hearing?

A. Yes, I have.

Q. When did you commence your work on that study?

A. We began our investigation in 1980, I believe.

Q. Has it been ongoing even to this point?

A. Yes, it has.

Q. Can you describe for the Commission the kind of study that you made?

A. Yes. In general our investigation included four major topics, that being the evaluation of the geology in the vicinity, the evaluation of the hydrologic conditions in the vicinity of the site, the evaluation of the materials beneath the site, and investigation or identification of other salt water disposal operations in the vicnity.

Q. Have you prepared a formal report which embodies the result of your study?

A. Yes, I have.

Q. And is that what has been marked as Exhibit One?

A. It is.

MR. PERRIN: I believe a copy of that exhibit has been furnished to the Commissioners, has it not, Mr. Ramey?

Q. Mr. Reed, is that report prepared by you or under your supervision?

A. It was.

Q. If you would, then, please go through your report and explain what you found in your study.

A. Okay. To summarize our -- our findings, we found that in the vicinity of this proposed site there is virtually no ground water that has any -- of any beneficial use, and that the materials underlying the site will -- will be such that the site can be used for the disposal of brine.

If I could go through and summarize the main points of our investigation without going into too much detail, I'll be glad to supply that on request.

I'd first like to in general terms outline the geology of the site. I would refer the Commission, if I could, to Figure 2 in Exhibit One.

MR. RAMEY: What is Figure 2, Mr. Reed?

A. Figure 2 is a cross section. It's toward the back of the volume.

MR. RAMEY: I gather Figure 1 is a cross section, also?

A. That's right.

MR. RAMEY: Okay, thank you.

A. Figure 2 in Exhibit One is a cross section that runs just south of the proposed facility, showing the nature of the materials down to a significant depth. This cross section is comprised of -- primarily of oil and gas tests, logs from oil and gas tests and one water supply well.

This cross section shows that the materials which we assign to the Triassic age Santa Rosa occur from very near the surface to a depth of between 230 and 290 feet below the surface.

The Santa Rosa materials consist principally of silts, sands, with some clay and silty clay interbedded. As I say, the base of the Santa Rosa occurs at a depth interval between 230 and 290 feet.

The Santa Rosa lies on top of the Rustler formation, which, if you will look at the Anadarko water supply well that is Well No. 2 on the Figure 2, it's the one where we have a lithologic log, that the Rustler, at least in its upper part, is comprised principally of gypsum and

anhydrite with a few clays and silts in the lower part.

In the immediate vicinity of the location we see, indeed, that the Rustler is comprised principally of anhydrite and gypsum. An occasional dolomite bed appears to occupy the lower part of the formation.

The Rustler formation is underlain by the Salado salt section, which in this area is -- lies between 200 and 300 feet beneath the top of the Rustler formation.

Q. Is there anything else you need to say about that particular figure at this time, Mr. Reed?

A. No, there is not.

Q. Moving on, then, to Figure 3 of Exhibit One, can you explain to the Commission what that figure shows?

A. Figure 3 in Exhibit One is also a cross section. This cross section traverses just east of the site. It includes, once again, logs from oil and gas tests as well as some -- two holes, I believe, which we drilled for this investigation. Principally the cross section shows that, again, that the Santa Rosa is comprised principally of silts and sands and clays, with the Rustler top in the neighborhood of 250 feet below the surface.

The Rustler outcrop lies approximately nine miles to the west of this site.

Q. When you refer to "this site", are you

referring to the proposed disposal site?

A. Yes, I am.

If I could now refer you to Figure 4 in Exhibit Number One, Figure 4 shows the elevation of the top of the Rustler formation in the general vicinity of Section 16. The Rustler formation, the top of the Rustler formation dips from the vicinity of the proposed site in an easterly direction toward what appear to be a closed depression in the far southeast corner of Section 16.

The top of the Rustler formation in the vicinity of the proposed site is at a sea level elevation of approximately 24 -- 3425. The top of the Salado formation is at a sea level elevation of approximately 3200.

Regionally the Rustler formation dips towards the southeast at a rate of approximately 80 feet per mile.

Q. Did I understand you to say previously that the outcrop of the Rustler is west of this proposed site?

A. The outcrop of the Rustler formation lies approximately nine miles west of the facility, or the proposed site.

Q. The down dip is east?

A. Down dip is southeast.

Q. Is there anything else at this time that

you would wish to say about your Figure 4, Mr. Reed?

A. No.

Q. All right, sir. Would you like to move then to the hydrological study which you conducted and your conclusions?

A. Yes, I would.

I'd like to refer you now to Figure 5 in Exhibit Number One. Figure 5 basically contains all the data which we have compiled on the hydrology of this area. We investigated the hydrology from two standpoints. Number one, we drilled six test holes, one of which totally panned the Santa Rosa, and number two, we inventoried the water wells in at least a six mile radius of the proposed facility.

Q. What was your purpose in doing this?

A. Our purpose was to examine the availability, if any, of potable ground water within a reasonable distance of this site.

Q. Please continue, Mr. Reed.

A. We drilled, as I said, a series of fixed test holes, one of which went to the Santa Rosa. I will not speak to each one of them individually but will point out where they are.

We have one test hole just to the west of the proposed site in Section 17.

We have one in Section 19.

Three in Section 21, just south of the proposed site.

And one in Section 16 itself.

These holes were drilled principally with air with a minor assist of drilling fluid at times, jetted dry, and examined for fluids, and we found no evidence of Santa Rosa water in this area of investigation.

In other words, the Santa Rosa is totally without saturated sediments in this particular area.

Q. Did you also check the Rustler formation?

A. We drilled one test hole, Test Hole 6 in Section 21, 90 feet into the Rustler formation. We encountered principally anydrite and gypsum in the upper 90 feet of the Rustler and encountered no ground water.

We also investigated an abandoned water supply well in Section 21. This is referred to as -- on the map as Anadarko Abandoned Water Supply Well. This is the same well that is shown on Figure 2 of Exhibit One, if I could briefly refer you back to that figure. You will see that the top of the Rustler formation at that locality is approximately 290 feet from the surface and the water level depth is 330 feet from the surface, so the water level is indeed down below the top of the Rustler formation. We have sup-

porting data that says the fluid level is well within the Rustler formation from nearby cable tool holes. Most of the holes that we see in this particular township, where we have the data, indicate the fluid level in the Rustler and not in the Santa Rosa.

The Anadarko Water Supply Well has an analysis, showing the chloride concentration in excess of 10,000 milligrams per liter, as shown on our map. That is a 1952 analysis.

We are not surprised at the poor quality of the Rustler water considering that the formation, as we see it in this particular well, is composed primarily of anhydrite and gypsum, with rocks of very little, we anticipate, permeability and porosity.

Q. Did you find any potable ground water in the vicinity, in the immediate vicinity of the proposed disposal site?

A. Within a 4-mile radius of the proposed facility we found no evidence of potable ground water.

The nearest well which we could find is in Section 35, Township 17 South, Range 29 East. This particular well, which is now abandoned, has a reported chloride concentration by the New Mexico Oil Conservation Commission of 4000 parts per million.

There are --

Q. What formation would that well have been in?

A. That formation, probably, is -- is the Triassic formation, but it may into the underlying Rustler. We do not know for sure.

There are isolated instances where the Santa Rosa does produce minor amounts of ground water. I refer you to Section 22, Township 17 South, Range 29 East, there are two stock wells. These are very shallow wells with shallow water levels. They appear to coincide with the streambed going through this section. One of these wells was sampled and had a total dissolved solids concentration of 27.2.

Q. How far away are those wells from the proposed site?

A. Those wells are approximately five miles to the west of the proposed site.

There are other wells which show on Figure 5, which produce water from the Santa Rosa formation. I won't go into all of them. They're listed on the map. They are all over six miles southwest and south of the proposed facility.

In Section 36, 18 South, 29 East, there

is a well completed into what appears to be the top of the Salado that has a total dissolved solids concentration in excess of 300,000 parts per million.

Q. Did your investigation uncover any wells completed in the Rustler formation which contained potable water?

A. Yes, they did. We do see evidence of water in the Rustler formation but we don't see potable Rustler water anywhere except in the area of the Rustler outcrop.

There is a line on Figure 5 labeled eastern margin of the Rustler outcrop. West of this line the Rustler is at the surface and as you will see in Township 19 South, Range 28 East, there are two wells completed in the Rustler formation. Both of these wells have total dissolved solids concentrations of less than 5,000 milligrams per liter.

There is also a Rustler well in Section 20 of 19 South, 29 East, and a Rustler well in Section 28, Township 20 South, Range 28 East. These two wells also have total dissolved solids concentration less than 5,000 milligrams per liter.

Q. So you find some potable water in the area of the outcrop of the Rustler but none east of that. Would that be an accurate statement?

A. That is an accurate statement, yes.

Q. Do you have any opinion as to why that is the case?

A. Yes, I do. The reason we feel that these wells produce potable Rustler water is that they are in the area of the outcrop and therefor in the -- in the recharge zone for the Rustler formation. Where the Rustler becomes buried beneath -- beneath Santa Rosa formations to the east, the Rustler formation deteriorates rapidly in quality. This is also the structurally down dip direction, and we expect the quality to deteriorate towards the east and southeast.

If you will also look on Figure 5, you will see that we have plotted the hydraulic gradient as we measured it from the available wells, and also incorporated data provided by the State. The hydraulic gradient trends in a southeasterly direction at the rate of approximately 25 to 30 feet per mile. The gradient is at least somewhat away from the outcrop in this particular area. It's not -- it's not toward the outcrop but away from it and subparallel to it.

Q. For approximately what distance, if you can say or estimate, does the gradient continue to go southeast?

A. In our particular area of investigation the gradient continues to the southeast to the -- at least to the approximate northern boundary of Clayton Basin exemption,

which is Township 19 South.

Q. And at that point does it seem to turn a different direction?

A. The data that we have available to us from the State reports, that is to say the 1952 Eddy County Report, indicates that the hydraulic gradient ultimately turns towards the south and then towards the southwest.

The occurrence of good quality Rustler water in the outcrop and poor quality Rustler water in the vicinity of the proposed site tells us that there is no hydrologic continuity between -- between these two areas. That is to say that at a minimum the Rustler water in the vicinity of the proposed site does not drain towards areas of good quality Rustler water. If it did, the good quality Rustler water would not exist, and indeed, the drainage appears to be the other way, from the area of the outcrop or the area of the good quality Rustler water towards the southeast, toward the area where the Rustler quality is considerably poorer.

To summarize this particular part of our study, we see no water in the Santa Rosa within the four or five mile radius of the proposed facility; find very poor quality water in the Rustler formation beneath this particular site.

The next part of our investigation involved

examining the permeability of material beneath this particular location. If I can refer you to Figure 7 in Exhibit One, Figure 7 shows the proposed configuration of the facility in the north half of the southwest quarter southwest quarter of Section 16. You will see two borings called core borings on the map. Those are locations where we cored two holes to approximate depths of 35 -- 45 feet from the surface. Select samples were taken from those borings and analyzed for permeability.

Exhibits Two and Three address this permeability data.

Exhibit Two is a letter that we wrote subsequent to our evaluation of the permeability data, giving our opinion of what these data mean, and Exhibit Three is a lithologic log of these two core borings, showing the lithology that we encountered in the boring.

As you can see, the Santa Rosa, which we cored, consists of sands, sandy clays, clays, with varying amounts of minor gypsum, caliche, and minor gravel.

The numbers that lie -- that we have placed beside each of these core borings represent permeabilities in centimeters per second of those layers for which samples were analyzed. These laboratory data are also shown attached to our letter in Exhibit Number Two.

Referring to --

Q. Were Exhibit Two and Exhibit Three also prepared by you or under your supervision?

A. They were. Exhibit Number Three shows that at a depth of approximately 36 to 38 feet there is a clay zone which has a permeability less than 10^{-9} centimeters per second, and an underlying sand with a permeability of 3.4 times 10^{-5} centimeters per second.

Boring No. 2 at a depth of 20 feet contained a material principally of clay with a permeability of 1.4 times 10^{-7} centimeters per second.

Underlying sands had permeabilities between 3.4 and 4. -- 3.4 times 10^{-4} and 4.9 times 10^{-6} centimeters per second.

Q. What is the significance of those permeabilities?

A. The clay that we encountered and the corresponding low permeabilities are going to be a limiting factor on percolation rates of the brine that's injected -- that's placed in the pits on Section 16.

The -- we have chosen a clay in each of these bores, one which has a very low permeability of less than 10^{-9}; the other one, 1.4 times 10^{-7}, and said that in each of these borings that particular clay body is the limiting

factor in percolation rates.

Q. Are you using the most restrictive permeability number that you came up with?

A. That is correct, because the material -- the brine, as it passes through these materials, has to pass through these materials with the lowest permeability and are thereby restricted by those -- those materials.

Using these permeabilities, we calculate that the volume of leakage through a one acre tract, through a pond one acre in size, is between 1.2 and 0.014 gallons per minute.

For a fifteen acre tract, the leakage rate through these two clay bodies will be from 18 gallons per minute to 0.21 gallons per minute for the entire fifteen acre tract.

Time of arrival at the Rustler formation is estimated to be between 10 and 15 years.

Using these numbers, we have also tried to calculate the effect that leakage through these clays would have on the Rustler formation, even though we see the poor quality water in the Rustler, we have looked at the anticipated effect on that zone.

Using velocity calculations, published by the USGS, we calculate a flow rate in the Rustler formation

just beneath the fifteen acre pond, of approximately 100 gallons per minute.

The highest rate of infiltration from a fifteen acre pond is 18 gallons per minute.

Now, if I assumed that brine does not leak straight down but -- but actually forms a cone beneath the -- the facility, then I calculated inflow from the pit into the Rustler formation itself of approximately 22 gallons per minute.

Looking at dilution factors, therefor, if we assume a total dissolved solids and a brine of 80,000 parts per million, and a total dissolved concentration in the Rustler formation at this site of 20,000 parts per million, we calculate that the Rustler leaving the pond area will have a total dissolved solids concentration of 30,800.

Q. That number you derived by using the maximum leakage rate, is that correct?

A. The maximum leakage rate through the clays.

Q. Did you also do some study with regards to horizontal permeability?

A. Yes, we did. We calculate that the average permeability of the remaining material, that is to say the silts and clays in the Santa Rosa, has a permeability in

the range of 1 times 10^{-5} centimeters per second, on the average.

The head on a -- on a ground water system, moving in a horizontal direction, is obviously significantly less than -- than when you are looking at vertical percolation.

So even though we calculate a permeability in the sand of two orders of magnitude, essentially, higher than those clays which we know will restrict the movement vertically, we still only see a horizontal migration rate through the sandier layers of the Santa Rosa formation, of 0.001 feet per day.

Using this velocity, it would take particles of water in excess of 500 years to travel 200 feet.

We recognize that we have analyzed these data as available, we want to insure ourselves and our neighbors that our calculations are correct, and that we will not have undue horizontal migration of fluids away from the site. In this light, then, we have proposed a monitor well ring, which is shown in Figure 7 of Exhibit One.

Our test hole data has shown that the uppermost clay body in the Santa Rosa formation occurred at a depth somewhat less than 60 feet, in terms of 30 to 45 feet. Therefor we have proposed the bulk of our monitoring wells be completed at depths of 60 feet; however, we also

recognize the possibility that horizontal migration could occur at a depth below the base of these monitoring wells. We have therefor positioned two monitor wells, which we propose to drill to the top of the Rustler formation, which are situated structurally, geologically down dip from the proposed facility. Any leakage that occurs below the 60-foot level will be detected in those two Rustler monitors.

We are not concerned about the brine reaching the Rustler formation, primarily because of the poor quality of the Rustler formation in this area. We further believe that the Rustler water in this particular area does not ultimately end up in the Pecos River; however, we look at the gradient provided in the State report, and use velocities presented by the State, we see that once the ground water has -- once the brine has entered the Rustler formation at this particular site, it would take over 1000 years to reach the river.

I believe that the State agencies in the past have recognized these two primary items, that is, the Santa Rosa contains virtually no -- in this area contains virtually no fresh water, and the Rustler formation beneath it is also containing extremely poor quality water, and this, we believe, is the basis for granting an exemption for a pit in the vicinity of Section 16.

Q. Mr. Reed, I've handed you what has been marked for identification as Exhibit Four. You've distributed that to the Commissioners. I wonder if you could explain briefly what Exhibit Four represents?

A. Exhibit Four is an enlarged view of Figure 6, contained in Exhibit One, showing the approximate locations of other salt water disposal pits in the general vicinity of Section 16, 17 South, 30 East. These numbers are barrels of brine disposed in these particular pits between 1970 and 1980.

You will notice in Section 21, for instance, that between these two periods, approximately ten years, in excess of 350,000 barrels was placed in pits in Section 21. Over 182,000 barrels in Section 20; over 200,000 barrels in Section 22.

Farther south and farther north, there are also pits which have received significant amounts of salt water.

I have recently looked at 1981 data with the following results: We have seen in the year 1981 reported brine in production in Section 20 of 25,650 in one instance, and 2374 barrels in the other pit.

In Section 21 we see introduced into the pit in excess of 12,000 barrels, and in Section 22, we see

introduced in excess of 12,000 in 1981.

Q. And you also show on Exhibit Four several potash mines, if I read it correctly, is thatright?

A. Yes. Those are the approximate locations of potash mines in the general vicinity of our proposed site.

Q. What is the purpose of showing those on this exhibit?

A. The potash mines also discharge large volumes of salt water on the surface. It has been determined by the State that those potash mines do not -- do not jeopardize fresh water in this vicinity, and, of course, this is the reason why they are allowed to operate in the manner in which they do.

These mines also lie hydrologically down dip from our proposed facility and as do many of the -- of the lease pits which we show on our figure -- on our Exhibit Four.

Q. I just attempted to count the number of disposal pits which you show on your Exhibit Four and I counted approximately 33. Would that sound --

A. That's --

Q. -- correct to you?

A. -- probably correct, yes.

Q. Are there any other specific pits or mines

that you'd like to speak to at this time?

A. I do not believe so.

Q. Do you know, Mr. Reed, whether or not salt water disposal is still on-going in these sites that are shown on Exhibit Four?

A. Yes, sir, the most recent record that we can obtain, it appears as though disposal is on-going.

Q. In Township 18 South, Range 31 East, I note one particularly large pit, or I assume so, in Section 22. Do you see what I'm referring to?

A. Yes, I do.

Q. You have a number there of 476,832, is that correct?

A. That is correct.

Q. And that number represents what?

A. That's the total number of barrels introduced in that area in the ten year period, 1970 to 1980.

Q. Does that pit lie in the general hydrologic gradient that you referred to awhile ago from our proposed site?

A. It does lie down gradient from our site, yes.

Q. Now, Mr. Reed, let's talk a minute about the proposed operations at the Loco Hills Water Disposal site.

A. Okay. As you will see on Figure 7, Exhibit One, we propose a series of three pits, with an approximate surface acreage of 15 acres, wherein we would introduce salt water.

Prior to the introduction of salt water in these pits, the water would pass through a series of 500 barrel and 250 barrel tanks, located in the northwest part of the property, which would remove the majority of the hydrocarbons from the brine. This is important from an operational standpoint because any oil that we have on the surface of the water reduces our evaporation and reduces the amount of intake.

We also propose, and it's not drawn on this map because of its small size, we also propose that discharge from the tanks goes into an earthen pond and then siphoned into the larger ponds. The earthen pond serves to trap the last bit of hydrocarbon, so that we do not get any hydrocarbons out on our evaporative surface.

We have used this procedure in other areas and find it to be quite satisfactory.

Q. Is this method generally similar to the Wallach Project which was previously approved by the Commission?

A. It is.

Now I would like to address myself to the evaporation potential of these ponds. In data we have previously reported to the Commission, we have shown that the average input into a pond can be as high as 3500 barrels per month per acre, based on evaporation data from the Red Bluff Reservoir.

In order to not have an unusual and perhaps cumulative -- accumulation during the winter months, we have calculated that one can introduce approximately 3180 barrels per month per acre. This figure allows no winter accumulation. Obviously, the summer evaporation is considerably higher and the winter evaporation is somewhat lower.

Now these data at Red Bluff, we recognize, certainly, that the evaporation potential is somewhat higher down there than it is in this area in question today because we're about sixty miles north of that reservoir, number one; about 1000 feet higher in elevation, number two; and number three, that we're -- these evaporation numbers are based on fresh water and as we know, the salt water evaporation is somewhat less than fresh water.

With all these considerations, however, with some evaporation data from other sites, that says that brine evaporation will reasonably approximate that that we calculated from the Red Bluff data, we have estimated that the

Loco Hills site can receive a minimum of 1000 barrels of brine per day for the 15 acre tract. This is a monthly input of 2000 - 2500 barrels per month per acre.

Q. Mr. Reed, on Exhibit Four I meant to ask you one other question and I failed to.

The -- you show several pits virtually immediately south of our proposed disposal area. Can you tell me if the hydrogeology in that area is similar to that which you previously reported for the immediate area of our proposal?

A. Yes. To our knowledge, it is.

Q. Mr. Reed, based upon your studies, upon your experience and expertise in this area, have you formed an opinion concerning the potential effect of the disposal of salt water in the proposed pit on fresh water supplies?

A. Yes, I have.

Q. And what is that opinion?

A. In my opinion there will be no adverse effect on potable ground water or surface water by the introduction of brine into this facility.

Q. Is there anything else which we have not covered which you would like to give at this time?

A. Not at this time.

MR. PERRIN: Pass the witness at this

point.

MR. RAMEY: Any questions of Mr. Reed?

MR. KELLAHIN: Mr. Ramey, I anticipate discussing Mr. Reed's direct testimony with him for some time. I note that it's about five minutes of twelve, and you might like to take a lunch break at this time.

MR. RAMEY: I thought maybe we could get Mr. Reed off the stand.

If you want to do that, Mr. Kellahin, we'll recess until 1:15.

(Thereupon the noon recess was taken.)

MR. RAMEY: The hearing will come to order.

Are there any questions of Mr. Reed? Mr. Kellahin.

MR. KELLAHIN: Yes, Mr. Ramey.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Reed, you testified on behalf of the applicant in the Examiner Hearing in this case, did you not?

A. That is correct.

Q. You told us a little bit about the design of the proposed disposal operation. Did you contribute to or propose designs for the actual facility?

A. I recall discussing the matter with my clients, yes.

Q. What is your understanding of the -- the daily capacity in barrels of water of the proposed disposal plant?

A. Approximately 1000 barrels a day.

Q. You had one of your figures in Exhibit One showed, I believe, the disposal property. Did that have the schematic of the plant, the location of the tanks?

A. No, it did not.

Q. All right, sir. Have you made a study of or any recommendations to the applicant with regards as to the size of any of the tanks involved in the disposal project?

A. I have not.

Q. All right, sir. Principally, then, your consulting work for the applicant has been to determine what is going to happen with the salt water that's introduced at a location he proposes to use.

A. That's correct.

Q. Now in doing that study last year and again in preparation of your testimony today, you presented at the last hearing a packet of exhibits with a few exceptions that was very much like what you've talked about today.

A. That is correct.

Q. The exhibits at the last hearing are almost the same as the ones you've used today. We can talk about the exceptions in just a minute.

A. Okay.

Q. All right. In talking about the geology then at the Examiner Hearing and then at the hearing today, Mr. Reed, you were of the opinion then, and I assume you're still of the opinion, that the pits are located in a soil that is not impervious.

A. There is no such thing as an impervious soil.

Q. I understand. And it was your conclusion or opinion that the salt water placed in these evaporation ponds was going to infiltrate into the ground.

A. There will be some minor volumes of water infiltrate, yes.

Q. In doing your study you, as I understood your testimony this morning, made an effort to find sands that might contain fresh water sources in the area of the

project, and commencing with the surface and going down, the first formations you looked at were the Triassic formation and in particular the San Andres member of that formation, is that not true?

A. No, that is not the correct formation, no, sir.

Q. All right, starting from the surface and going down, what is the first sand that you encounter that could be a source of fresh water?

A. The uppermost materials at this site we assigned to the Santa Rosa formation.

Q. All right, is that not a part of the Triassic formation?

A. It is part of the Triassic sequence, yes.

Q. All right, sir. And then below the San Andres the next possible source of --

MR. RAMEY: Are you trying to say Santa Rosa instead of San Andres?

MR. KELLAHIN: Did I say San Andres? I meant Santa Rosa, I'm sorry. I meant Santa Rosa.

Q. Below the Santa Rosa, then, the next formation in which we might encounter a fresh water source is going to be the Rustler.

A. The next formation is the Rustler, yes.

Q. All right, sir. Let's turn for a moment to your Figure 5, Mr. Reed, in your packet of exhibits.

I believe you told us this morning in reference to this exhibit that in the area of investigation you found the Santa Rosa formation approximately 230 to 290 feet below the surface.

A. That is correct.

Q. You also indicated to us that you had drilled some six test wells.

A. Yes, sir.

Q. And you identified them as being located in Sections 16, 17, and 21. If you will, sir, would you start with the test well in Section 16 and tell us what depth that test hole is drilled?

A. It was drilled to a depth of 153 feet.

Q. All right, sir, and the test hole in Section 17 to the west was drilled to what depth?

A. 150 feet.

Q. And then looking in Section 19, you had a test hole. What was the depth of that one?

A. 130 feet.

Q. And then you had three of them in Section 21. Commencing then with the one in the northern portion, northwest quarter of Section 21, what was the depth of that

one?

A. 200 feet.

Q. And then its southeast offset?

A. We don't have a test hole in the southeast portion of that.

Q. No, sir, in the southeast quarter of the northwest quarter of 21? Is that not a test hole? It says TH-4?

A. Oh, that's the 200 foot hole. The other one is 150 feet.

Q. All right, sir. And then the next one going to the south, this is the 320 foot Rustler test?

A. Correct.

Q. I note the Anadarko Well, which was in -- was this Anadarko's water source well for a waterflood?

A. I don't know what it was used for.

Q. All right. The information indicated on that well on your exhibit shows the water level at 330 feet.

A. That's correct.

Q. Why didn't you take your test hole for the Rustler down to 330 feet as opposed to 320 feet?

A. We were test drilling the Santa Rosa to determine both the presence of water and the -- and the nature of the materials, and that was strictly a test hole

program to evaluate those two items.

We -- the time at which we gathered the data on the Anadarko Well may have been prior to or after that.

Q. And if I understand what you've told me, Mr. Reed, of the six test holes you drilled, only one of which was drilled to a depth sufficient enough to test the Santa Rosa?

A. No, sir, they all tested the Santa Rosa.

Q. You just told me the Santa Rosa was located 230 feet.

A. It's located from near the surface to 230 feet.

Q. Do you have a cross section in your exhibits to show an effort to correlate the Santa Rosa sands or clays?

A. We have cross sections in our report.

Q. And can you correlate the Santa Rosa from the surface?

A. We can correlate the top of the Rustler on those cross sections.

Q. Yes, sir, and can you also correlate the Santa Rosa?

A. Everything above the top of the Rustler is the Santa Rosa.

Q. What figure are you looking at, Figure 2?

A. I'm just looking at my cross section in Figure 1.

Q. And in studying those cross sections, Mr. Reed, you discovered that those clays in the Santa Rosa are essentially discontinuous, are they not?

A. We -- at the density of wells here, the density of spacing, we are not able to, with any degree of confidence, correlate the Santa Rosa clays over a large area.

Q. Let me direct your attention to Exhibit Number Two, which is a letter dated May 25th, 1982 by Reed and Associates to Mr. Jennings. If I understood you correctly, Mr. Reed, this was a calculation to show what the rate of infiltration of the salt water used in the evaporation pit would be through some of these clays?

A. It was an attempt to examine the permeability, yes, the uppermost Santa Rosa, yes.

Q. All right, sir, and if I read the report correctly, the last paragraph, the third line from the bottom says, if I understand it, the tightest two clay zones in the core tests were used to make the permeability tests.

A. We used those clays as the limiting factor on the downward movement.

Q. And in using the tightest two clay zones core samples you then came up with a calculation to show that the seepage rate through one acre of sediment, of that particular clay, was going to be at the rate of 1.2 gallons per minute.

A. The seepage, the maximum seepage rate through either of those two clays, those precise clays, is 1.2 gallons per minute, yes.

Q. All right. sir.

A. Correct.

Q. And we can convert that to barrels of water a day for the entire fifteen acres of the project by some simple arithmetic.

A. You could do it.

Q. By taking the 1.2 gallons and multiplying that by sixty minutes times 24 hours times the fifteen acres, divided by 55 gallons per barrel and you get 471 barrels a day.

A. I've not made those calculations.

Q. All right, sir. Go on to the last paragraph of page two in summary and you calculate that it will take at least 224 days to 54 years for the water to move through the first 22 to 38 feet of the Triassic material.

Is that your calculation?

A. Those are our calculations, yes.

Q. That's a pretty big ballpark to work in, Mr. Reed, 2/3rds of a year to 54 years. Can you refine that a little better?

A. No, sir, because I have two order of magnitude difference in permeability calculated for those two clays and I am presenting the most optimistic and the most pessimistic view.

Q. What is your best estimate, then, of the length of time involved for water introduced at the surface in the disposal to reach the Santa Rosa formation?

A. Between ten and fifteen years.

Q. Does that rate of infiltration change depending upon the volume of water placed in the disposal pit?

A. Not significantly, no.

Q. You talked this morning, Mr. Reed, about poor water and good water. Perhaps we could define those in terms of some standard number, Mr. Reed, and I'd like to suggest to you that we use the State Engineer's definition of waters to be protected, and that is underground waters containing 10,000 parts per million, or less, of total dissolved solids, as defined by the State Engineer as fresh water, as you know.

A. That's fine.

Q. All right, sir. In terms of human consumption, Mr. Reed, what would be potable water for chloride content?

A. Flood program recommendations are on the order of 250 milligrams per liter.

Q. And for stock purposes, Mr. Reed, what is your opinion of the chloride content of the chloride content acceptable for the consumption by stock?

A. Stock, in my opinion, will -- will accept water that has up to 3 to 5000 milligrams per liter.

Q. That would be the chloride.

A. Correct.

Q. Will stock drink water that has in excess of 10,000 parts per million of total dissolved solids?

A. I'm not aware of it, no.

Q. Let's turn to your Figure number 5 again. Of the fresh water sources, under the State Engineer's definition, Mr. Reed, that you've outlined on the exhibit, there are wells both above and below the hydrologic gradient at the disposal site that contain Santa Rosa fresh water, do they not?

A. That is correct.

Q. And you said this morning that although

the area immediately around the disposal site does not have Triassic water that is fresh water quality, there is -- I'm sorry, does not have Rustler water of fresh water quality, there are Rustler water wells down dip from the project area that do have fresh water in the Rustler.

A. No, sir, I would not say that they are down dip. There are Rustler wells that contain less than 10,000, yes.

Q. All right, sir, where is the closest one of the Rustler wells to your target area?

A. The closest one that I see here on this Figure 5, it must be, estimating, 10 to 12 miles to the southwest.

Q. If I understood you correctly, Mr. Reed, in the immediate area around the project area the hydraulic gradient is generally to the south and southeast, and that at some point along the northern line of Township 19 South, 30 East, it takes a further swing and goes to the southwest, is that not your testimony, Mr. Reed?

A. It ultimately bends towards the southwest, yes.

Q. The only change I'm aware of in Exhibit -- Figure 5 in Exhibit One, Mr. Reed, is that you have drawn the Rustler outcrop, was it not?

A. Yes, I believe so.

Q. Across your exhibit. Have you drilled any new test wells?

A. Yes, we have.

Q. Since the last hearing?

A. Yes, we have.

Q. Are those identified on Exhibit --

A. Those are identified on Figure 7.

Q. All right, sir, let's look at those. What test holes have you drilled since the September hearing, Mr. Reed?

A. I drilled two bore holes on the proposed site itself.

Q. What was the reason for drilling those, Mr. Reed?

A. To investigate the permeabilities of the uppermost Santa Rosa material.

Q. And it was that information, then, that was used for this report that you reduced to the May 25th letter?

A. That is correct.

Q. Turn for a moment, Mr. Reed, to the evaporation data that you used in the report.

What was your conclusion with regards to

the evaporation rate of salt water at the project area?

A. We calculated that between 2000 and 2500 barrels per month per acre could be disposed in this area without undue winter accumulation.

Q. Did you make any adjustment in your evaporation calculations with regards to a possibility that oil would collect on the surface of the evaporation ponds?

A. No, sir.

Q. What, in your opinion, Mr. Reed, would be the effect of oil on the surface of the evaporation ponds?

A. It would reduce the evaporation rate by some amount.

Q. Is there a standard formula or table or calculation from which to determine the change in the evaporation rate if there is oil on the surface?

A. There have been some calculations made, yes.

Q. You have not made that calculation for this project?

A. No, sir, I have not.

Q. Let's turn to your Exhibit Number Four, Mr. Reed.

Is this the same exhibit and the same information as you introduced in the Examiner Hearing?

A. It is.

Q. If I understood you correctly, these represent cumulative numbers of barrels of water disposed over some period of time between 1970 and 1980 at these various disposal sites?

A. That's correct.

Q. Okay. Can you tell us what amounts, if any, of salt water are currently being disposed of at any of these locations?

A. Yes, sir, I can.

Q. I think you mentioned one in Section 21 of 17 South, 30 East?

A. Yes, sir.

Q. Yes, sir, and what was that?

A. In 1981 in Section 21 we saw evidence of slightly over 12,000 barrels discharged into a pit in that section.

Q. That was the whole year, was it 12,000?

A. The year 1981.

Q. All right, sir, are there any others that you can give us an annusal 1981 disposal amount?

A. Yes, sir, we saw two pits in Section 20, one that had 25, 650 barrels.

Q. Uh-huh.

A. One that 2374 barrels, and in Section 22 for 1981 we saw 12,599 barrels.

Q. And at the proposed surface disposal site for the applicant in Section 16, if he disposes at the rate of 1000 barrels a day there is a potential for 365,000 barrels of oil in a year.

A. That is correct.

Q. Or of salt water. Apart from those disposal areas, Mr. Reed, are you aware of any others that are currently being used for disposal?

A. I have not investigated the current usage.

Q. Have you investigated any of these other disposal areas to determine whether the rate of infiltration will be similar to that you anticipate in your project area?

A. I anticipate the infiltration rate to be similar.

Q. Have you made tests of the cores in the area to determine what the infiltration rates would be for those other areas?

A. No, I have not.

Q. I'm interested in your monitor wells, Mr. Reed, that you propose around the project. If I understood you correctly there was going to be six monitor wells drilled

to a depth of 60 feet?

A. No, sir, there's one, two, nine, I believe, drilled to a depth of 60 feet.

Q. Nine to 60 feet and then you would have two that are drilled into the Rustler?

A. That is correct.

Q. Are those nine 60-foot monitor wells drilled to a depth sufficient enough to detect the horizontal migration of waters in the Santa Rosa?

A. Yes, they are.

Q. Perhaps it escapes me, Mr. Reed, but how can they detect the motion of water if the Santa Rosa is encountered at some three times that depth?

A. They are designed to detect movement on top of the uppermost clays. This is the site where the movement will be.

Q. And if there is movement of salt water below that, how is it going to be detected?

A. If that occurs, it will be detected in the two Rustler depth monitor wells.

Q. Now the two Rustler depth monitor wells, tell me how they work. How are they going to detect the movement of salt water?

A. They will examine or be able to detect

movement of salt water throughout the entire section of the Santa Rosa.

Q. The casing, then, of those monitor wells is perforated through its entire vertical length?

A. That is correct.

Q. And what will happen, then, if you detect the movement of salt water in the monitor wells?

A. Should that occur, a study would be initiated to determine the cause and remedial activity initiated if it is deemed necessary.

Q. Is that a test that the applicant proposes to undertake as far as his project?

A. Should -- should salt water ever be detected in any of these monitor holes the applicant will investigate the cause.

Q. Would a provision in an order if this site is approved that requires the applicant to cease operations if salt water is detected in those monitoring wells, would that kind of provision be unreasonable, in your opinion?

A. Yes, it would.

Q. If salt water is detected in those Rustler monitoring wells, the only reasonable source for that salt water is bound to be the disposal pits, is it not?

A. That is one source, yes.

Q. Why would such a provision not be reasonable, in your opinion, Mr. Reed?

A. Because short of knowing what the cause of the occurrence is, I feel it would be unreasonable to merely shut the disposal operation down because of an occurrence.

Q. You mentioned an earthen pit of some kind prior to the evaoporation pit?

A. Yes, I did.

Q. I believe the dimensions on that were some 30 by 50 feet, is that correct?

A. The dimensions -- the dimensions can vary from 30 x 30 to 50 x 50. The dimensions are not particularly critical.

Q. What's the purpose of that pit?

A. The purpose of that pit is to remove any residual hydrocarbons that did not get removed in the -- in the tank battery.

Q. And will that pit be lined with some type of barrier material?

A. No, sir.

Q. Mr. Reed, correct me if I'm wrong. I believe the opinions and conclusions you've expressed today are the same opinions and conclusions you expressed before the Examiner back in September and August of 1981, are they not?

A. They are similar, yes.

MR. KELLAHIN: Thank you, Mr. Ramey, I have no further questions.

MR. RAMEY: Any other questions of Mr. Reed?

MR. PERRIN: I might have a few.

MR. RAMEY: Let me -- let me ask a couple of questions first.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Reed, on your, I think your Figure 7 of Exhibit One --

A. Yes, sir.

Q. assuming an order is approved -- or an order is issued approving this disposal system, do you think could the order just refer to this Figure 7 for the monitor wells?

A. Yes, it could.

Q. And how deep -- how deep are the Rustler monitor wells going to be? Are they just going to --

A. They will just tag --

Q. They will just tag the top of the Rustler?

A. Yes, sir, they will just tag the top of

the Rustler.

Q. And you would propose perforated tubing of some kind the whole length of the -- of all the holes.

A. That is correct, within just a few feet of surface so that we could route that area near the surface and prevent rainwater from percolating down around the well.

Q. It seemed there was a Santa Rosa well in here that had chlorides of 4000 in a sample. Do you recall that well, Mr. Reed?

A. Yes, sir, that is in -- that is in Section 35, 17 South, 29 East.

Q. Is that an anhydrite well or is that a -- a Rustler well, rather, or is that a shallower well?

A. We could not make that determination specifically. I do not know.

Q. With chlorides of 4000, what -- what would be your estimate of total dissolved solids?

A. In the neighborhood of 10 to 11,000 milligrams per liter.

Q. So that probably would not be water that would be protected.

A. No, I would not think so.

Q. Under the State Engineer's definition.

A. Correct.

Q. I assume some other witness will testify to the actual physical equipment that will be at the site?

A. Yes.

Q. The proposed site.

MR. RAMEY: Any other questions of Mr. Reed?

MR. PERRIN: Mine are just a fairly brief thing.

REDIRECT EXAMINATION

BY MR. PERRIN:

Q. Mr. Reed, would you be willing to undertake to submit a plan of recommended construction for those monitoring wells to the Commission in the event that should prove necessary?

A. Yes, sir, I would.

Q. Now, a couple of things on cross examination. First of all, I believe you testified that the capacity of the pit would be about 1000 barrels a day. Is that a minimum figure or a maximum figure?

A. That's a minimum figure.

Q. Secondly, the question was asked, how long it would take water that might infiltrate from the pit to reach the Santa Rosa, and I believe your answer was 10 to 15

years. Were you referring to the Rustler formation?

A. Yes, I was.

Q. How long will it take water to get to the Santa Rosa from the pit?

A. The Santa Rosa is very near the surface, so it will essentially be there when -- when the disposal operation starts.

Q. Finally, since the hearings in August and September of 1981, have you undertaken some additional studies?

A. Yes, I have. I have examined the permeability of the near surface materials.

Q. And I think your testimony concerning that matter is supplemental to what you testified to previously.

A. It is.

Q. One other thing we did not get into on the operation of the disposal site itself, concerns the freeboard that's put into the plan.

Would you tell the Commission about that?

A. Yes. We have proposed a minimum 3-foot freeboard between the maximum fluid level allowable in the pit and the top of the docking.

Q. The purpose of that is what?

A. The purpose for that is to insure that

rainwater does not cause the pits to over top, primarily.

Q. Does that have any relationship to oil on the surface that Mr. Kellahin was asking?

A. The freeboard?

Q. Yeah, would it have any --

A. Well --

Q. -- role to play in connection to that?

A. The freeboard itself, of course, is basically designed not to allow any materials in the pond to -- to escape.

MR. PERRIN: I don't believe I have anything further.

MR. RAMEY: Any other questions of Mr. Reed? He may be excused.

MR. REED: Thank you.

MR. PERRIN: Our next witness is Mr. Ray Westall.

RAY WESTALL

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PERRIN:

Q. Would you state your name, please, sir?

A. Ray Westall.

Q. What is your occupation, sir?

A. I'm an independent oil producer and also own Hughes Hot Oil Service in Loco Hills, and also President of Loco Hills Water Company.

Q. Where do you live?

A. In Loco Hills.

Q. How long have you lived in Loco Hills?

A. Off and on for thirty-two years.

Q. Are you familiar with oil production and the oil industry in general in the vicinity of Loco Hills?

A. Yes, sir, I am.

Q. Can you tell the Commission, or give them an estimate of the number of producing wells in, say, a fifteen mile radius of Loco Hills?

A. I'd say within 1500 to 2000 wells.

Q. Are a number of those wells older wells?

A. Yes, sir.

Q. Are some of them stripper wells?

A. Yes, sir, I imagine there's probably 80 to 90 percent of the ones that are not under waterflood that are stripper wells.

Q. And is salt water produced by a number

of those wells in connection with the production of oil?

A. Yes, sir, there is.

Q. Where is that salt water currently disposed of?

A. At the Laguna disposal.

Q. Can you tell the Commission the approximate distance from Loco Hills to the Laguna Gatuna --

A. I'd say around 14 miles.

Q. How long does it take a truck to make the round trip down to Laguna Gatuna and unload the salt water?

A. Between three and four hours.

Q. What is the cost to the oil producer of disposing of this water in that fashion?

A. It runs around $1.50 a barrel.

Q. Is there a closer commercial disposal site than Laguna Gatuna for the Loco Hills area?

A. No.

Q. So the other pits that were shown on the exhibit that we looked at previously are all private disposal pits?

A. Yes.

Q. You are President of Loco Hills Water Disposal Company?

A. Yes, sir.

Q. Who else owns stock in that?

A. Mr. Jennings and also First Roswell Company.

MR. RAMEY: Who was the third one?

A. First Roswell Company.

Q. Is that a Jennings family corporation?

A. Yes, uh-huh.

Q. I hand you, Mr. Westall, what's been marked Exhibit Five. Can you identify that document?

A. This is an Application for Lease and approval of the lease on Loco Hills Water Disposal Company.

Q. Business lease form --

A. Business lease form.

Q. -- by the State Land Office?

Now, I've handed you what's been marked Exhibit Number Six. Can you identify that document?

A. Yes, this is our proposed tank battery we're going to use at the disposal. We have three 500 barrel tanks we'll primarily pump into. We're going to skim it off in the two 250 tanks and then go out into the smaller skimmer pits to pick up all hydrocarbons so we won't have any oil on the surface.

Q. Now the purpose of the tanks is precisely to do what?

A. To skim all the hydrocarbons off the water.

Q. And if it doesn't work there, then it gets to a skimming pit and you skim them off at that point?

A. Yes, sir.

Q. Now how many acres does the proposed site cover?

A. This site here is adjacent to a paved highway and this site here will probably cover about, oh, a half acre or so.

Q. You operate some wells yourself in this area, do you not?

A. Yes, sir.

Q. Approximately how many?

A. About forty.

Q. On Exhibit Six, next to the notation 4-inch load line, there's a straight line coming down. What -- what does that line represent?

A. Okay, well, that's just a line tying in all these load lines into the -- into the -- you mean over there on the lefthand side?

Q. Yes, sir.

A. Well, this will be a paved road over here on this lefthand side. On the left side will be a paved road.

Q. Does the highway run right past this?

A. Right beside our disposal site line.

Q. What highway is that?

A. It's a county road. I don't know what the number is. It runs right north of Loco Hills there.

Q. Now how many trucking concerns are there in the Loco Hills area who haul salt water down to Laguna Gatuna for disposal?

A. I'd say there's five.

Q. And do you have any idea how many trucks total there are?

A. I'd say about 100 trucks.

Q. Do you have any idea how many loads each day are carried to Laguna Gatuna?

A. I imagine there's, oh, ten to fifteen.

Q. What hours is the Laguna Gatuna disposal station open?

A. I don't know now. They were closed at night at one time but I don't think they are now.

Q. Do you think they're open all day now? What are your plans for the hours that you're open on the proposed sisposal site?

A. We plan to run 24-hour a day disposal.

Q. Have you had the opportunity to check any

numbers concerning the amount of water that's been disposed of into Laguna Gatuna?

A. I've -- yes, sir, I've checked up at their -- they've run around 100,000 barrels a month.

Q. In your opinion, Mr. Westall, is it possible that some wells will be prematurely abandoned if a closer disposal site is not available for the salt water?

A. This could happen if the economics of hauling the water down that far is greater than the amount of production they will make.

Q. Can you give the Commission some idea as to a point -- at what point you get to that?

A. No, I don't believe I can do that.

Q. Well, let's use an example. If you produced 10 barrels a day and 100 barrels of salt water, what would the economics of that be?

A. Well, I don't think you could make just around 200 barrels -- I mean $200 worth of oil and 100 barrels would be around, what, $150, a 100 barrels of water would be around $150 for hauling.

Q. Would it be safe to say that in the one to five barrel a day production, assuming some salt water production along with that, would it --

A. I imagine 10 to 20 barrels a day would

be the most, you know, the maximum.

Q. Do you have an opinion, Mr. Westall, whether the construction of this disposal site and the granting of this application will prevent waste and not impair correlative rights?

A. Definitely. I feel like it will help on the cost of the producer as far as not having to haul the water as far, and also on, probably on the surrounding area to keep -- where some of the trucks are dumping water.

Q. What -- what amount of salt water do you propose to dispose of per day if the application is granted?

A. I'd say around 1500 barrels a day.

Q. Would that be a maximum figure?

A. Probably.

MR. PERRIN: I don't believe I have anything further, Mr. Commissioner.

MR. RAMEY: Any questions of Mr. Westall?

MR. KELLAHIN: Yes, sir.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Westall, in your experience in the oil industry, have you ever operated or worked for a disposal facility before?

A. No, I haven't.

Q. This Exhibit Number Six which you talked about, which is a schematic of the plant, this is the same exhibit as used at the Examiner Hearing, is it not?

A. Yes, sir.

Q. You said that you yourself operate some 40 wells. For your own business needs, Mr. Westall, how many barrels of water do you have to dispose of on a daily basis?

A. Oh, approximately 100 barrels.

Q. So you would propose to use this for other than your own purposes?

A. Definitely.

Q. How did you come up with the configuration for the disposal site?

A. Well, I went down and looked at the Wallach plant down in (inaudible).

Q. Who operates that?

A. I unserstand Wallach's (inaudible.)

Q. That's the only source of information you used in your design of the plant?

A. Well, you use about the same thing in a producing well and also on the waterfloods you have to have a skimming type process.

Q. At the Examiner Hearing you testified, did

you not, Mr. Westall?

A. Yes, I did.

Q. And in response to the question from Mr. Stamets you gave this answer. Mr. Stamets asked you, "And you would be willing to accept disposal limits of 2500 barrels per acre per month?"

And your answer was, "I believe that we could probably stay with that. I believe that would work."

Is that still your answer?

A. Well, I think we could run the plant that way.

Q. You wouldn't have any objection then to an order that contains a limitation that says the disposal rates would be from 200 to 2500 barrels per month per acre or from 1000 to 1250 barrels per day as the maximum pit size?

A. Not knowing how much we'll have -- water we'll have disposed of in the site, I don't really know right now what it will basically hold, you know, or what we'd basically deal with on the thing.

MR. RAMEY: What were those figures again Mr. Kellahin?

MR. KELLAHIN: The question posed by Mr. Stamets was that would you be willing to accept a disposal limit of 2500 barrels per acre per month. The answer was, I

think that would work. The finding, finding, I mean Order R-6811, provision number six, says that disposal rates would be from 2000 to 2500 barrels per month per acre, or from 1000 to 1250 barrels per day as a maximum pit size.

MR. RAMEY: And you testified that you thought 1500 barrels a day would be the maximum?

A. I imagine right around 1500 barrels a day, yes, sir.

Q. Mr. Westall, you told us that you believed the cost per barrel to truck the salt water to Laguna Gatuna was about $1.50 a barrel?

A. Yes, sir.

Q. Do you have an opinion as to what it will cost for disposal on a per barrel basis at your site?

A. I think it will cut the cost as far as most of the water is hauled from a trucking firm around our area down to the Laguna and back instead of just right around the area where they can go right back to the -- to somebody else.

Q. What do you plan to charge at your plant, then, for the disposal of a barrel?

A. Probably twenty-five cents a barrel (in audible).

MR. KELLAHIN: Thank you. I have nothing

further.

MR. RAMEY: Any other questions of Mr. Westall?

MR. PERRIN: Just one, Your Honor.

REDIRECT EXAMINATION

BY MR. PERRIN:

Q. That $1.50 figure that you gave includes the trucking cost as well as the cost of actually loading and unloading at Laguna Gatuna?

A. Yes.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Westall, I'd like to go over your disposal plant a little more thoroughly here.

I assume the trucks will pull up to the -- where it's marked 4-inch load line.

A. Yes, sir.

Q. And hook on, pump, and the water will then go into one or all three of the 500 barrel tanks?

A. Yes, sir, with waterleg type connections on the back, where, you know, so we could keep the water higher in the tanks, you know.

Q. Then as the 500 barrel tanks fill it will, the water will go over into the 250 barrel tanks?

A. Yes, sir.

Q. Now where does the oil go?

A. The oil will stay in these tanks and we'll have -- we're proposing a skimming type system on top of the tanks to skim it off and just put it into one 500 barrel tank.

Q. Well, then only two of the 500 barrel tanks will --

A. Yes, sir.

Q. -- accept water?

A. Yes, sir.

Q. And one of them will -- will be for oil.

A. Yes, sir. We may have to revise it and put some other tanks in, you know.

Q. At the figure of 1500 barrels a day, now what would be your -- the retention time of water in the 500 barrel tanks, to make sure you have adequate separation of the oil and water?

A. Well, with this gunbarrel type situation, the water will come off the bottom of the tanks, using a waterleg on the back of the tanks, and all the water will come off the back of the tanks, and then go up and into the 250

off the bottom.

And the oil and the water that we're putting into the tanks will come in at the top.

Q. Possibly you're -- you show four or five load lines. Possibly you're going to have five trucks there at one time?

A. Well, I don't know, but you know, when you get them in there, you may want to get them trucks unloaded and get them out.

Q. But between the 500 barrel tanks, the 250 barrel tanks, and the skim pit, you feel like that the oil will be removed.

A. Yes, sir, I sure do.

Q. Are you going to have any provisions for picking up oil off the skim pit?

A. I have vacuum trucks.

Q. And you're proposing a maximum of 1500 barrels per day?

A. I'd say that would be approximately what we'll have come in there.

MR. RAMEY: Any other questions of the witness? He may be excused.

MR. PERRIN: Call Mr. Ed Reed.

ED REED

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PERRIN:

Q. Would you state your name, sir?

A. My name is Ed L. Reed.

Q. What do you do for a living?

A. I am a consulting hydrologist.

Q. And where is your principal place of business?

A. In Midland, Texas.

Q. Are you President of your own corporation?

A. I'm Chairman of the Board, yes, sir.

Q. And how many years experience have you had in the hydrology business, Mr. Reed?

A. I formed this firm a little over thirty years ago in , after spending about thirteen years in various categories of work in the oil industry.

Q. Have you testified before this Commission previously?

A. Yes, sir, I have.

Q. Are you familiar with the hydrogeology in the Loco Hills area and even running south and southwest to the Pecos River?

A. Yes, sir, I am.

MR. PERRIN: We request that Mr. Reed be recognized as an expert hydrologist.

MR. RAMEY; He is so qualified.

Q. Based on your study and experience, Mr. Reed, do you have an opinion as to where water in the Rustler formation in the vicinity of Loco Hills winds up?

A. Yes, sir.

Q. And what is that opinion?

A. Based upon a number of studies that I have made in this part of New Mexico, including some early studies for the Red Bluff Water Power and Control District, involving the Malaga Bend Diversion Works and other studies that led to our design of salinity alleviation, additional salinity alleviation projects in the Pecos River below Malaga Bend.

I had occasion to examine the hydrology and the geology of the Rustler on both sides of the river for a good many miles in an effort to evaluate the impact of all the waters that were tributary to the Pecos River in the design and construction of this facility at Red Bluff in New

Mexico.

Based upon these studies, which principally were done in 1965 and 1966, I prepared some maps that showed the general direction of movement of water in the Rustler, utilizing the State Engineer's report on Eddy County, as well as some additional data which we acquired in the field, and based upon this background and based upon the review of the data that has been accumulated in the course of the investigation by our firm of the Lobo Hills site, it is my opinion that Rustler water in the area of the proposed disposal site will move southeastward and southward and finally southwestward toward a trough in the Rustler, not a structural but a hydraulic trough in the Rustler, which parallels Nash Draw and culminates, basically, in the salt, the large salt lakes that occur near Loving. And it is my opinion that most, if not all of this water, this part of the Rustler water, discharges by evaporation, either directly into the salt lakes or by a capillary movement into the salt lakes, directly from the Rustler or from the Rustler through Alluvium and thence into the lakes themselves.

It is further my opinion, based again upon the studies that have been made of this site, that the water that would leak from a fifteen acre pond would move essentially vertically into the Rustler, rather than move any

significant distance horizontally into the Triassic. The absence of saturation at any level in the Triassic in the several thousands of feet around the area that we have examined would be indicative of the absence of a regionally distributed impermeable bed within the Triassic sequence of sufficient regional extent to support a water table or an accumulation of water, and it is for this reason that I am of the opinion that over the thousands of years that water has percolated from the surface, recognizing that all of the water we're dealing with here is recharged, all of the aquifers are recharged by percolation at the outcrop and over the site itself, it is my opinion that that water that does leak will eventually, and in a very short distance from the site, enter into the Rustler sequence.

Q. Mr. Reed, during Steve Reed's cross examination by Mr. Kellahin, reference was made to some Rustler wells southwest of the proposed site. Do you recall that particular line of questioning?

A. Yes, sir, I do.

Q. Is water from this disposal site, in your opinion, going to get to those wells?

A. No, sir.

Q. Why not?

A. Because those wells are structurally

higher and also hydraulically higher than the area underlying this site, as far as the Rustler is concerned.

Q. And in your opinion, should water try to flow that way, would the monitor wells catch that?

A. In the Santa Rosa, yes, it would. The total volume of water that has been calculated would leak from this fifteen acre site, in my judgment is insufficient to create any sort of detectable ground water mound or bump in the water table surface underneath the site; therefor, it is my opinion that this water entering into a ground water system would follow whatever hydraulic characteristics already exist with very little modification.

Q. Have you reached an opinion, Mr. Reed, based on your study and experience, concerning the effect of the disposal of salt water into the proposed pit on both surface and ground water supplies in this area?

A. Yes, sir, I have.

Q. What is that opinion?

A. My opinion is that the disposal of salt water at this site into this fifteen acre pit will have no adverse effect upon surface or ground waters in the area.

MR. PERRIN: I have no further questions.

MR. RAMEY: Any questions of Mr. Ed Reed?

MR. KELLAHIN: Yes, Mr. Ramey.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. What is your relation with Steve Reed, Mr. Reed?

A. He's my son.

Q. And do you consider him a competent hydrogeologist?

A. Yes, sir.

Q. You would trust his judgment and opinion with regards to the hydrology of this area as he's testified to?

A. Yes, sir.

Q. Mr. Reed, I'd like to read you a portion of Mr. Steve Reed's testimony from the August 26, 1981, hearing in this matter, commencing at the bottom of page 38. Mr. Steve Reed is testifying. He says, "We anticipate that the brine introduced in these pits will migrate directly into the Rustler formation, into a formation which otherwise contains extremely poor quality water, and we believe that the brine introduced in these pits, once it arrives at the Rustler, will migrate along this otherwise very poor quality water."

"QUESTION: Where does it go?

ANSWER: The ultimate discharge line or

direction of flow on these formations of this ground water in the Rustler is regionally in a southwesterly direction towards the Pecos River."

At the hearing on September 23rd, 1981, at page 44, Mr. Steve Reed is asked this question: "And that the Rustler itself discharges into the Pecos River?"

"ANSWER: Ultimately, yes."

Do you agree or disagree with those statements by Mr. Reed?

A. The first statement, Mr. Kellahin, he said, if I heard you correctly, and I have not read that statement, that the water is discharged in a -- moves in a southwesterly direction towards the Pecos River, and I will agree with this. It did not say discharged into the Pecos River.

In a southwesterly direction, yes, the direction is toward the river. The only point that I would raise here is that the salt lakes intervene between this site and the river and form, in my judgment, the point of discharge of most, if not all, of the water.

The second statement you would have to read to me again because I'm not sure what increment, what portion of the Rustler water he is speaking of. There are segments of the Rustler, particularly to the southwest of

this site and to the south of the site that do discharge directly into the Pecos River. I have actually measured flow into the Pecos River from the Rustler.

But whether we're speaking of the specific water that wuld be involved in an infiltration from this pit, is quite another matter, and in that opinion, I would say it did not go into the river.

Q. Well, I won't belabor the point.

In the second hearing on page 44, we were talking about the same water introduced in the pit and whether it eventually reached Rustler and then migrated on to the Pecos River, but that is not your opinion, is it?

A. No, sir, it is not.

MR. KELLAHIN: I have nothing further.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Reed, I intended to ask a couple of questions of Mr. Steve Reed, which I forgot to do, so maybe you could answer these questions.

What would be your recommendation if water showed up in any of these monitor wells?

A. The first thing I think, Mr. Ramey, that I would suggest is an additional drilling program to define

with some greater accuracy the source of the water. I would want to know if it were really water from the pits or water from some other source, another pit, or an oil well, a tank battery, or other disposal site that may be thirty years old.

This investigation would include detailed chemical analyses to see if there is any comparison of the water or any reason to suspect that the water is of the same character.

It would involve some rather extensive inflow/outflow studies to determine really how much might be leaking from the pond. This might involve instrumentation with evaporation stations and actual metering of the fluids into the pit and staff gauges, the type of inflow/outflow studies that we have made in the past in the -- many pond studies, for example, a series of lagoons and other types of surface disposal where we need to know with some precision the infiltration rates.

In the final analysis, if it were determined, if it were determined that there were appearances of brine in these monitor wells from the pit, I think two things would have to happen. One, there would have to be a rather prominently in the pond, one of sufficient size that it could be regularly evaluated in engineering terms, and secondly, there would have to be a path of movement with much higher

permeability than we have anticipated in the Santa Rosa.

In either event the -- a possible solution that we have considered would be drilling directly into the Santa Rosa, into the Rustler at that point, and draining directly with the head that would be available, which should be no problem, injecting directly into the Santa Rosa, into the Rustler after the Rustler water had been identified as to its quality.

Q. Okay. Would you suggest, or maybe I would suggest, that the order might state that in the event water is found in any of the monitor wells, that the matter be brought back for hearing, say, a ninety day period?

A. I think that would be entirely appropriate.

MR. RAMEY: Any other questions of Mr. Reed? He may be excused.

A. Thank you, sir.

MR. PERRIN: Mr. Ramey, I have no other witnesses but I would move the admission of our Exhibits One through Six.

MR. RAMEY: Exhibits One through Six will be admitted.

Mr. Kellahin, will you call your witness?

MR. KELLAHIN: May we have about five minutes?

MR. RAMEY: All right, let's do.

(Thereupon a brief recess was taken.)

MR. RAMEY: The hearing will come to order.

MR. KELLAHIN: Mr. Ramey, I will call Mr. Larry Squires to the stand.

LARRY C. SQUIRES

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Squires, would you please state your name and occupation?

A. My name is Larry C. Squires. I am an owner and operator of Snyder Ranches.

Q. Where are the Snyder Ranches properties located in general, Mr. Squires?

A. In Lea and Eddy County, between Hobbs and Carlsbad, in the vicinity of Loco Hills, Maljamar.

Q. In addition to managing the Snyder Ranches, Mr. Squires, do you hold any professional degree?

A. Yes, sir, I'm a veterinarian.

Q. When and where did you obtain your degree in veterinary medicine?

A. I graduated from Colcrado State University with a Doctor of Veterinary Medicine degree in 1960.

Q. And subsequent to graduation have you practiced veterinary medicine?

A. Yes, sir, I practiced for eight years in Hobbs from 1960 to 1968.

Q. Let me direct your attention to what has been introduced as the Applicant Exhibit Number One, Figure 5 of that package of exhibits.

A. Yes, sir.

Q. You see identified on there Section 16 of 17 South, 30 East, which is the proposed disposal area.

In relation to the disposal location, Mr. Squires, where are the Snyder Ranch boundaries?

A. Our ranch begins approximately six miles to the southeast of the location and continues on a south-westerly line for about five miles and then turns back to the northwest another three or four miles and then back -- back south to the Carlsbad-Hobbs highway.

Q. Based upon your experience as a rancher and as a doctor of veterinary medicine, Mr. Squires, let me

ask you some questions with regards to the quality of water that livestock will be willing to drink without detriment.

Based upon your experience, what is the maximum chloride content of water that livestock can accept without adverse conditions?

A. Livestock can handle water as high as 10,000 parts per million without causing -- they can survive. They won't survive very profitably but they will survive.

Q. All right, sir.

MR. RAMEY: Is this chloride content, Mr. Squires, or --

MR. KELLAHIN: He said total dissolved solids.

MR. RAMEY: And you asked chlorides and I don't think he understood the question.

A. Oh, well, I meant chlorides.

MR. RAMEY: You meant 10,000 parts per million chlorides.

A. Yes. As I testified to earlier,in some researching work done at Oklahoma State University, that they would -- they could handle salts as high as 1-1/2 to 1.7 percent, which I think would be from 15 to 17,000 parts per million.

Q. Let me ask you generally, Mr. Squires, to

summarize why you're opposed to the applicant's proposed disposal application.

A. Because we have a water well that's very valuable to our ranching operations in Section 26, 18, 30.

Q. Just a minute, let's find it here on Figure Number 5. Is that 18 South, 30 East, Section 26?

A. Yes, sir.

Q. I see two well symbols in that section.

A. Yes, sir. I don't know where the two well symbols come from unless there's -- we're only operating, producing one well at that site. There may be an old caved in well or something there that I'm not familiar with.

Q. What do you do with that water?

A. We pump water from that well into a storage tank about a half a mile to the west. The storage tank, we go downhill to five watering tubs along about a five mile pipeline.

Q. Do you recall what the quality of that water is?

A. It's very good. It's -- it tasts a lot better than the water in Roswell. It's very good, sweet water.

Q. The exhibit indicates a chloride content of about 162 parts -- milligrams per liter?

A. Yes, sir.

Q. Do you have any other sources of fresh water for the ranch in this area?

A. We have some other sources but we're a little afraid about the permanency of these sources. We have abandoned some other water wells in this area because of the high quality of the water that is available to our use through some of the potash company's pipelines, and where we're allowed to use this water, because this water is a lot better quality and we would prefer to use it.

Q. How long have you been associated with the Snyder Ranches?

A. Since 1967.

Q. During that period of time, would you describe generally what has been the activity of the oil and gas operators and the potash mine operations insofar as the disposal of salt -- produced salt waters has been?

A. Yes, sir. They -- the oil industry, of course, since the no-pit order that's been referred to earlier today, the oil industry has looked for ways to dispose of water that's suitable, and they're climintaing a lot of these old pits that are being used in the area and they're not using as much and they're putting them in acceptable places such as disposal wells and natural salt lakes.

The potash industry, due to their economics, you know, because of the economics of the potash industry, they appear not to be putting out as much water as they have been in the past. In the last few years their lakes have receded somewhat.

Q. Let me show you what has been introduced as the Applicant's Exhibit Number Four. If you'll locate Section 26 in your township and range where your water well is, I note to the west there is a symbol indicating Duval. What is yiur knowledge of that?

A. That's a mine shaft. It's not a lake. It's not a salt lake at all. It's just a mine shaft.

Q. Are you aware of any disposal or salt water on the surface in the immediate area of your water well?

A. No, sir. We have protested any application that we found out that came up in our -- in the immediate area of this -- of our water in that area, and really, there is not too much water being disposed of in unlined pits in that area at the present time.

Most of it is being hauled off somewhere else.

Q. Is there anything else you'd like to add to your testimony, Mr. Squires?

A. Well, yes, that this is about the only

fresh water well that's really uncontaminated in this area, and certainly, you know, we sure want to protect it. We don't want to see it -- we don't want to see it be contaminated.

And quite frankly, I didn't realize that all these disposal sites in this area were still being used, and had I had the time and the energy and the money, I'd have protested every stinking one of them around these water wells because there certainly is available Rustler water in this area to use in the event the other water that's being piped there from the Ogallala is not -- is no longer available to us, we will have to go back and we'll have to use some of these water wells that have got high chloride and high total solids in them, as far as livestock water.

And just that we're very protective against the water and I hate to see it get polluted.

MR. KELLAHIN: I have nothing further of this witness.

MR. RAMEY: Any questions of Mr. Squire?

MR. PERRIN: Yes, Mr. Ramey.

CROSS EXAMINATION

BY MR. PERRIN:

Q. Mr. Squires, how deep is the said well in Section 26?

A. It's approximately 210 to 230, somewhere in that area.

A. And as I understand you, you're -- you're here today because you're simply afraid that that well might be contaminated.

A. That water well is vital to our ranching operation, yes.

Q. Yes, I understand that, but you don't -- don't have any evidence of proof to offer that it will be contaminated as a result of this disposal site, do you?

A. Well, only that Mr. Reed testified that it would migrate as far as the Pecos River, and if it will go that far, why, it will go to our water well.

Q. That was through the Rustler formation, ws it not?

A. Whatever.

Q. Do you also have an interest in Laguna Gatuna, don't you, Mr. Squires?

A. Yes, sir.

Q. Corporation for Pollution Control?

A. Yes, sir.

Q. What is your position with that company?

A. I'm a principal owner.

Q. You're also president of it, I think?

A. Yes, uh-huh.

Q. And I assume that you agree with Mr. West-ll's testimony that most, if not all, of the salt water produced from those Loco Hills wells is disposed of in Laguna Gatuna right now.

A. I don't know. I'm sure that some of it is, yes.

Q. And you dispose a pretty good amount of water in that lake, in Laguna Gatuna every month, do you not?

A. We dispose of whatever is hauled to us, yes.

Q. Did that 100,000 barrel a month figure sound about right?

A. Uh-huh. I was wondering where you got it.

Q. I think we have a report here someplace.

MR. JENNINGS: You report every month.

A. Sure do.

Q. Does the oil ever get into Laguna Gatuna?

A. No, sir. We -- we make every effort to keep it out.

Q. I assume any prudent operator would do that same thing.

A. Yes, uh-huh.

Q. Now how far away in miles is that Section 26 well from the proposed disposal site? Do you have any idea?

A. Yeah. I believe Mr. Jennings helped me count these last time. I believe it was nine, approximately.

Q. About nine miles?

A. Our ranch boundaries is -- is approximately six miles from it.

Q. Now you're not trained as a hydrologist or a geologist, are you, Mr. Squires?

A. No, sir.

MR. PERRIN: Nothing further.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Squires, I'm sure you've seen Figure 7 in Exhibit One of the applicant. This is the monitor well configuration.

A. Oh, yes, sir.

Q. Do you think if water leaked out the bottom of this pit and started moving horizontally towards your well, would it not be picked up by one of the monitor wells?

A. Well, I would assume so, yes, sir.

Q. And if we had a provision, provided appro-

val was given to this, if we had a provision to, in the event water was detected in these monitor wells, that they come back to hearing after, say, a ninety day period, or something --

A. Yes, sir, that --

Q. -- it surely wouldn't be any danger to your water well --

A. If they get it stopped before it gets in my water well, you know, but --

Q. Well, I certainly have the same interest in mind.

A. I know you do.

Q. To protect your water well. I also want maximum oil and gas recovery from this State.

MR. RAMEY: Any other questions of Mr. Squires?

MR. PERRIN: No, sir.

MR. RAMEY: He may be excused.

Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: No, sir.

MR. RAMEY: Any closing statements?

MR. PERRIN: I don't believe so, Your -- Mr. Ramey.

I would just request that the Commission take administrative notice of the transcript and its decision

in Case Number 6659. That was an Amoco case and I believe it's Order No. 6134.

MR. RAMEY: What was that case?

MR. PERRIN: It was in 18, 31, I think. It was an application by Amoco for an exception to Order R-3221, and they're still disposing of water in that.

MR. RAMEY: That's Case No. what?

MR. PERRIN: 6659. I believe it was Order No. 6132.

MR. RAMEY: Are you going to object to that, Mr. Kellahin?

MR. KELLAHIN: No, sir, there is also another case I'd like you to take administrative notice of. I'll have to get the order number for you. It's Tahoe Oil and Gas. A similar issue was presented and Mr. Reed also testified as a hydrologist, in which case the Commission denied the application for a disposal site.

I'd like to say something very briefly. It would seem like a small point to fight in terms of all the disposal things that are going on, but I think it's very important the Commission not forget that back in '67 when the no-pit rule, there was a very good reason, and I think there is a continuing good reason to use diligence to monitor these things.

Mr. Reed told us that in the immediate area in his search he found one pit disposed of, I think, 25,000 barrels of water in 1981, and his testimony is all we have on that point, and I guess that's the maximum one in this immediate area.

Mr. Westall's talked about the possibility of disposing of 365,000 barrels of water in an area where it's admitted the pond's going to leak to some extent.

I made a quick calculation and it looks like based upon Mr. Reed's testimony some 471 barrels of water would infiltrate on a daily basis. You know, who knows? We can calculate all we want, but we are introducing an impact to an area and we think it's not warranted. There is a facility elsewhere that can handle it. There's a possibility of disposal wells and all other sorts of solutions.

We don't believe the applicant has shown a sufficient economic incentive to justify the Division to approve this application and run the potential risk of further diminishing the quality of water in the area when over the years we've made an effort to improve the quality of water and we're just now seeing where the water is improving.

Mr. Squires testified the potash water disposal has diminished and the area is beginning to dry up a little bit, and as one problem is solved, Mr. Westall seeks

to introduce another one, and we would implore upon you that if you approve this application, that it be done in some fashion that it will protect the fresh water sources in the area.

We have suggested to the Examiner that it be a lined pit and that the disposal amount be limited to the evaporation formula that Mr. Reed has presented. It would appear that that would allow the operator to dispose of 1000 barrels of salt water a day. He's asked for 1500. It's not much of a trade-off if he's required to line the pits and relies on evaporation as a disposal.

We think that is, of course, the action you ought to take. Thank you.

MR. RAMEY: Thank you, Mr. Kellahin.

Is Steve still here?

MR. STEVE REED: Yes.

MR. RAMEY: Steve, would you take the stand, please?

MR. STEVE REED: Okay.

MR. RAMEY: Did you drill core holes on the proposed site?

MR. REED: That's correct.

MR. RAMEY: How were those plugged?

MR. REED: They were plugged with cement.

MR. RAMEY: Okay, thank you.

MR. PERRIN: Mr. Ramey, could I respond to one thing?

MR. RAMEY: Yes.

MR. PERRIN: Mr. Kellahin mentioned the possibility of lining the pits. There was no testimony, no questioning about that possibility today. I think the Commission is probably aware that that would be an extremely expensive proposition and we feel that the testimony that's been presented, together with the built-in protection we've tried to put into this plan to insure that fresh water supplies will not be polluted or contaminated in any way, makes the proposal feasible, and we'd ask the Commission to approve it with reasonable conditions (inaudible).

MR. RAMEY: Thank you, Mr. Perrin.

Does anyone else have anything further to offer in Case 7329?

If not, the Commission will take the case under advisement, and the hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd C.S.R.

SALLY W. BOYD, C.S.R.
Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

14 July 1982

COMMISSION HEARING

BUREAU OF LAND MANAGEMENT
RECEIVED
AUG 25 1982
DIST. 6 N.M.
Carlsbad New Mexico

IN THE MATTER OF:

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. CASE 7329

BEFORE: Commissioner Ramey
Commissioner Arnold

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: James T. Jennings, Esq.
JENNINGS & CHRISTY
P. O. Box 1180
Roswell, New Mexico 88201

and

A P P E A R A N C E S

For the Applicant: Doug Perrin, Esq.
JENNINGS AND CHRISTY
P. O. Box 1180
Roswell, New Mexico 88201

For Snyder Ranches: W. Thomas Kellahin, Esq.
KELLAHIN & KELLAHIN
117 N. Guadalupe
P. O. Box 2265
Santa Fe, New Mexico 87501

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MR. RAMEY: The hearing will please come to order.

We'll call next Case 7329.

MR. PEARCE: This case is the application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico.

MR. RAMEY: Ask for appearances at this time.

MR. PERRIN: For the applicant, Mr. Ramey, I'm Doug Perrin, the firm of Jennings and Christy, together with Mr. Jim Jennings we'll be appearing on behalf of the applicant.

I will be calling three witnesses.

MR. RAMEY: Okay.

MR. PERRIN: Mr. Steve Reed, Mr. RAy Westall, and Mr. Ed Reed.

MR. RAMEY: How do you spell your last name?

MR. PERRIN: P-E-R-R-I-N.

MR. KELLAHIN: I'm Tom Kellahin of Santa Fe, New Mexico, appearing in opposition to the application on behalf of Snyder Ranches.

I have one witness.

MR. RAMEY: I'd ask that the witnesses

stand at this time and be sworn.

(Witnesses sworn.)

MR. PERRIN: We call Mr. Steve Reed as our first witness.

STEVEN REED

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PERRIN:

Q. Would you state your name, please, sir?

A. My name is Steven Reed.

Q. Where do you live, Mr. Reed?

A. Corpus Christi, Texas.

Q. What is your occupation?

A. I'm a hydrogeologist with the firm of Ed Reed and Associates.

Q. How long have you been with that firm?

A. Approximately seven and a half years.

Q. And what did you do prior to your employment by that firm?

A. I was employed for approximately seven years by the U. S. Geological Survey.

Q. Was that also in the field of hydrogeologist?

A. No, sir, it was in the field of geology.

Q. What is your educational background?

A. I've got a Bachelor's and a Master's degree from Northern Arizona University in geology.

Q. Have you testified previously before this Oil Conservation Division?

A. I have.

Q. And what is your area of expertise?

A. My area of expertise is investigation of geohydrologic problems.

Q. Have you conducted such an investigation in connection with the application in this case?

A. I have.

MR. PERRIN: I think Mr. Reed has been qualified before. I'd ask the Commission to recognize him as an expert in the field of geohydrology.

MR. RAMEY: He is so qualified, Mr. Perrin.

Q. Prior to getting into testimony, Mr. Reed, would you please describe just briefly for the Commission the proposed plan of salt water disposal that is in this application?

A. The applicant here today is requesting an exemption so that they can operate a 15-acre brine disposal operation in the southwest quarter of Section 16, Thownship 17, Range 30 East.

Q. Thank you, sir. Have you performed a study of the hydrogeology in the area of the proposed disposal site in preparation for this hearing?

A. Yes, I have.

Q. When did you commence your work on that study?

A. We began our investigation in 1980, I believe.

Q. Has it been ongoing even to this point?

A. Yes, it has.

Q. Can you describe for the Commission the kind of study that you made?

A. Yes. In general our investigation included four major topics, that being the evaluation of the geology in the vicinity, the evaluation of the hydrologic conditions in the vicinity of the site, the evaluation of the materials beneath the site, and investigation or identification of other salt water disposal operations in the vicnity.

Q. Have you prepared a formal report which embodies the result of your study?

A. Yes, I have.

Q. And is that what has been marked as Exhibit One?

A. It is.

MR. PERRIN: I believe a copy of that exhibit has been furnished to the Commissioners, has it not, Mr. Ramey?

Q. Mr. Reed, is that report prepared by you or under your supervision?

A. It was.

Q. If you would, then, please go through your report and explain what you found in your study.

A. Okay. To summarize our -- our findings, we found that in the vicinity of this proposed site there is virtually no ground water that has any -- of any beneficial use, and that the materials underlying the site will -- will be such that the site can be used for the disposal of brine.

If I could go through and summarize the main points of our investigation without going into too much detail, I'll be glad to supply that on request.

I'd first like to in general terms outline the geology of the site. I would refer the Commission, if I could, to Figure 2 in Exhibit One.

MR. RAMEY: What is Figure 2, Mr. Reed?

A. Figure 2 is a cross section. It's toward the back of the volume.

MR. RAMEY: I gather Figure 1 is a cross section, also?

A. That's right.

MR. RAMEY: Okay, thank you.

A. Figure 2 in Exhibit One is a cross section that runs just south of the proposed facility, showing the nature of the materials down to a significant depth. This cross section is comprised of -- primarily of oil and gas tests, logs from oil and gas tests and one water supply well.

This cross section shows that the materials which we assign to the Triassic age Santa Rosa occur from very near the surface to a depth of between 230 and 290 feet below the surface.

The Santa Rosa materials consist principally of silts, sands, with some clay and silty clay interbedded. As I say, the base of the Santa Rosa occurs at a depth interval between 230 and 290 feet.

The Santa Rosa lies on top of the Rustler formation, which, if you will look at the Anadarko water supply well that is Well No. 2 on the Figure 2, it's the one where we have a lithologic log, that the Rustler, at least in its upper part, is comprised principally of gypsum and

anhydrite with a few clays and silts in the lower part.

In the immediate vicinity of the location we see, indeed, that the Rustler is comprised principally of anhydrite and gypsum. An occasional dolomite bed appears to occupy the lower part of the formation.

The Rustler formation is underlain by the Salado salt section, which in this area is -- lies between 200 and 300 feet beneath the top of the Rustler formation.

Q. Is there anything else you need to say about that particular figure at this time, Mr. Reed?

A. No, there is not.

Q. Moving on, then, to Figure 3 of Exhibit One, can you explain to the Commission what that figure shows?

A. Figure 3 in Exhibit One is also a cross section. This cross section traverses just east of the site. It includes, once again, logs from oil and gas tests as well as some -- two holes, I believe, which we drilled for this investigation. Principally the cross section shows that, again, that the Santa Rosa is comprised principally of silts and sands and clays, with the Rustler top in the neighborhood of 250 feet below the surface.

The Rustler outcrop lies approximately nine miles to the west of this site.

Q. When you refer to "this site", are you

referring to the proposed disposal site?

A. Yes, I am.

If I could now refer you to Figure 4 in Exhibit Number One, Figure 4 shows the elevation of the top of the Rustler formation in the general vicinity of Section 16. The Rustler formation, the top of the Rustler formation dips from the vicinity of the proposed site in an easterly direction toward what appear to be a closed depression in the far southeast corner of Section 16.

The top of the Rustler formation in the vicinity of the proposed site is a sea level elevation of approximately 24 -- 3425. The top of the Salado formation is at a sea level elevation of approximately 3200.

Regionally the Rustler formation dips towards the southeast at a rate of approximately 80 feet per mile.

Q. Did I understand you to say previously that the outcrop of the Rustler is west of this proposed site?

A. The outcrop of the Rustler formation lies approximately nine miles west of the facility, or the proposed site.

Q. The down dip is east?

A. Down dip is southeast.

Q. Is there anything else at this time that

you would wish to say about your Figure 4, Mr. Reed?

A. No.

Q. All right, sir. Would you like to move then to the hydrological study which you conducted and your conclusions?

A. Yes, I would.

I'd like to refer you now to Figure 5 in Exhibit Number One. Figure 5 basically contains all the data which we have compiled on the hydrology of this area. We investigated the hydrology from two standpoints. Number one, we drilled six test holes, one of which totally panned the Santa Rosa, and number two, we inventoried the water wells in at least a six mile radius of the proposed facility.

Q. What was your purpose in doing this?

A. Our purpose was to examine the availability, if any, of potable ground water within a reasonable distance of this site.

Q. Please continue, Mr. Reed.

A. We drilled, as I said, a series of fixed test holes, one of which went to the Santa Rosa. I will not speak to each one of them individually but will point out where they are.

We have one test hole just to the west of the proposed site in Section 17.

We have one in Section 19.

Three in Section 21, just south of the proposed site.

And one in Section 16 itself.

These holes were drilled principally with air with a minor assist of drilling fluid at times, jetted dry, and examined for fluids, and we found no evidence of Santa Rosa water in this area of investigation.

In other words, the Santa Rosa is totally without saturated sediments in this particular area.

Q. Did you also check the Rustler formation?

A. We drilled one test hole, Test Hole 6 in Section 21, 90 feet into the Rustler formation. We encountered principally anhydrite and gypsum in the upper 90 feet of the Rustler and encountered no ground water.

We also investigated an abandoned water supply well in Section 21. This is referred to as -- on the map as Anadarko Abandoned Water Supply Well. This is the same well that is shown on Figure 2 of Exhibit One, if I could briefly refer you back to that figure. You will see that the top of the Rustler formation at that locality is approximately 290 feet from the surface and the water level depth is 330 feet from the surface, so the water level is indeed down below the top of the Rustler formation. We have sup-

porting data that says the fluid level is well within the Rustler formation from nearby cable tool holes. Most of the holes that we see in this particular township, where we have the data, indicate the fluid level in the Rustler and not in the Santa Rosa.

The Anadarko Water Supply Well has an analysis, showing the chloride concentration in excess of 10,000 milligrams per liter, as shown on our map. That is a 1952 analysis.

We are not surprised at the poor quality of the Rustler water considering that the formation, as we see it in this particular well, is composed primarily of anhydrite and gypsum, with rocks of very little, we anticipate, permeability and porosity.

Q Did you find any potable ground water in the vicinity, in the immediate vicinity of the proposed disposal site?

A. Within a 4-mile radius of the proposed facility we found no evidence of potable ground water.

The nearest well which we could find is in Section 35, Township 17 South, Range 29 East. This particular well, which is now abandoned, has a reported chloride concentration by the New Mexico Oil Conservation Commission of 4000 parts per million.

There are --

Q. What formation would that well have been in?

A. That formation, probably, is -- is the Triassic formation, but it may into the underlying Rustler. We do not know for sure.

There are isolated instances where the Santa Rosa does produce minor amounts of ground water. I refer you to Section 22, Township 17 South, Range 29 East, there are two stock wells. These are very shallow wells with shallow water levels. They appear to coincide with the streambed going through this section. One of these wells was sampled and had a total dissolved solids concentration of 27.2.

Q. How far away are those wells from the proposed site?

A. Those wells are approximately five miles to the west of the proposed site.

There are other wells which show on Figure 5, which produce water from the Santa Rosa formation. I won't go into all of them. They're listed on the map. They are all over six miles southwest and south of the proposed facility.

In Section 36, 18 South, 29 East, there

is a well completed into what appears to be the top of the Salado that has a total dissolved solids concentration in excess of 300,000 parts per million.

Q Did your investigation uncover any wells completed in the Rustler formation which contained potable water?

A Yes, they did. We do see evidence of water in the Rustler formation but we don't see potable Rustler water anywhere except in the area of the Rustler outcrop.

There is a line on Figure 5 labeled eastern margin of the Rustler outcrop. West of this line the Rustler is at the surface and as you will see in Township 19 South, Range 28 East, there are two wells completed in the Rustler formation. Both of these wells have total dissolved solids concentrations of less than 5,000 milligrams per liter.

There is also a Rustler well in Section 20 of 19 South, 29 East, and a Rustler well in Section 28, Township 20 South, Range 28 East. These two wells also have total dissolved solids concentration less than 5,000 milligrams per liter.

Q So you find some potable water in the area of the outcrop of the Rustler but none east of that. Would that be an accurate statement?

A That is an accurate statement, yes.

Q. Do you have any opinion as to why that is the case?

A. Yes, I do. The reason we feel that these wells produce potable Rustler water is that they are in the area of the outcrop and therefor in the -- in the recharge zone for the Rustler formation. Where the Rustler becomes buried beneath -- beneath Santa Rosa formations to the east, the Rustler formation deteriorates rapidly in quality. This is also the structurally down dip direction, and we expect the quality to deteriorate towards the east and southeast.

If you will also look on Figure 5, you will see that we have plotted the hydraulic gradient as we measured it from the available wells, and also incorporated data provided by the State. The hydraulic gradient trends in a southeasterly direction at the rate of approximately 25 to 30 feet per mile. The gradient is at least somewhat away from the outcrop in this particular area. It's not -- it's not toward the outcrop but away from it and subparallel to it.

Q. For approximately what distance, if you can say or estimate, does the gradient continue to go southeast?

A. In our particular area of investigation the gradient continues to the southeast to the -- at least to the approximate northern boundary of Clayton Basin exemption,

which is Township 19 South.

Q And at that point does it seem to turn a different direction?

A The data that we have available to us from the State reports, that is to say the 1952 Eddy County Report, indicates that the hydraulic gradient ultimately turns towards the south and then towards the southwest.

The occurrence of good quality Rustler water in the outcrop and poor quality Rustler water in the vicinity of the proposed site tells us that there is no hydrologic continuity between -- between these two areas. That is to say that at a minimum the Rustler water in the vicinity of the proposed site does not drain towards areas of good quality Rustler water. If it did, the good quality Rustler water would not exist, and indeed, the drainage appears to be the other way, from the area of the outcrop or the area of the good quality Rustler water towards the southeast, toward the area where the Rustler quality is considerably poorer.

To summarize this particular part of our study, we see no water in the Santa Rosa within the four or five mile radius of the proposed facility; find very poor quality water in the Rustler formation beneath this particular site.

The next part of our investigation invclved

examining the permeability of material beneath this particular location. If I can refer you to Figure 7 in Exhibit One, Figure 7 shows the proposed configuration of the facility in the north half of the southwest quarter southwest quarter of Section 16. You will see two borings called core borings on the map. Those are locations where we cored two holes to approximate depths of 35 -- 45 feet from the surface. Select samples were taken from those borings and analyzed for permeability.

Exhibits Two and Three address this permeability data.

Exhibit Two is a letter that we wrote subsequent to our evaluation of the permeability data, giving our opinion of what these data mean, and Exhibit Three is a lithologic log of these two core borings, showing the lithology that we encountered in the boring.

As you can see, the Santa Rosa, which we cored, consists of sands, sandy clays, clays, with varying amounts of minor gypsum, caliche, and minor gravel.

The numbers that lie -- that we have placed beside each of these core borings represent permeabilities in centimeters per second of those layers for which samples were analyzed. These laboratory data are also shown attached to our letter in Exhibit Number Two.

Referring to --

Q. Were Exhibit Two and Exhibit Three also prepared by you or under your supervision?

A. They were. Exhibit Number Three shows that at a depth of approximately 36 to 38 feet there is a clay zone which has a permeability less than 10^{-9} centimeters per second, and an underlying sand with a permeability of 3.4 times 10^{-5} centimeters per second.

Boring No. 2 at a depth of 20 feet contained a material principally of clay with a permeability of 1.4 times 10^{-7} centimeters per second.

Underlying sands had permeabilities between 3.4 and 4. -- 3.4 times 10^{-4} and 4.9 times 10^{-6} centimeters per second.

Q. What is the significance of those permeabilities?

A. The clay that we encountered and the corresponding low permeabilities are going to be a limiting factor on percolation rates of the brine that's injected -- that's placed in the pits on Section 16.

The -- we have chosen a clay in each of these bores, one which has a very low permeability of less than 10^{-9}; the other one, 1.4 times 10^{-7}, and said that in each of these borings that particular clay body is the limiting

factor in percolation rates.

Q Are you using the most restrictive permeability number that you came up with?

A That is correct, because the material -- the brine, as it passes through these materials, has to pass through these materials with the lowest permeability and are thereby restricted by those -- those materials.

Using these permeabilities, we calculate that the volume of leakage through a one acre tract, through a pond one acre in size, is between 1.2 and 0.014 gallons per minute.

For a fifteen acre tract, the leakage rate through these two clay bodies will be from 18 gallons per minute to 0.21 gallons per minute for the entire fifteen acre tract.

Time of arrival at the Rustler formation is estimated to be between 10 and 15 years.

Using these numbers, we have also tried to calculate the effect that leakage through these clays would have on the Rustler formation, even though we see the poor quality water in the Rustler, we have looked at the anticipated effect on that zone.

Using velocity calculations, published by the USGS, we calculate a flow rate in the Rustler formation

just beneath the fifteen acre pond, of approximately 100 gallons per minute.

The highest rate of infiltration from a fifteen acre pond is 18 gallons per minute.

Now, if I assumed that brine does not leak straight down but -- but actually forms a cone beneath the -- the facility, then I calculated inflow from the pit into the Rustler formation itself of approximately 22 gallons per minute.

Looking at dilution factors, therefor, if we assume a total dissolved solids and a brine of 80,000 parts per million, and a total dissolved concentration in the Rustler formation at this site of 20,000 parts per million, we calculate that the Rustler leaving the pond area will have a total dissolved solids concentration of 30,800.

Q. That number you derived by using the maximum leakage rate, is that correct?

A. The maximum leakage rate through the clays.

Q. Did you also do some study with regards to horizontal permeability?

A. Yes, we did. We calculate that the average permeability of the remaining material, that is to say the silts and clays in the Santa Rosa, has a permeability in

the range of 1 times 10^{-5} centimeters per second, on the average.

The head on a -- on a ground water system, moving in a horizontal direction, is obviously significantly less than -- than when you are looking at vertical percolation.

So even though we calculate a permeability in the sand of two orders of magnitude, essentially, higher than those clays which we know will restrict the movement vertically, we still only see a horizontal migration rate through the sandier layers of the Santa Rosa formation, of 0.001 feet per day.

Using this velocity, it would take particles of water in excess of 500 years to travel 200 feet.

We recognize that we have analyzed these data as available, we want to insure ourselves and our neighbors that our calculations are correct, and that we will not have undue horizontal migration of fluids away from the site. In this light, then, we have proposed a monitor well ring, which is shown in Figure 7 of Exhibit One.

Our test hole data has shown that the uppermost clay body in the Santa Rosa formation occurred at a depth somewhat less than 60 feet, in terms of 30 to 45 feet. Therefor we have proposed the bulk of our monitoring wells be completed at depths of 60 feet; however, we also

recognize the possibility that horizontal migration could occur at a depth below the base of these monitoring wells. We have therefor positioned two monitor wells, which we propose to drill to the top of the Rustler formation, which are situated structurally, geologically down dip from the proposed facility. Any leakage that occurs below the 60-foot level will be detected in those two Rustler monitors.

We are not concerned about the brine reaching the Rustler formation, primarily because of the poor quality of the Rustler formation in this area. We further believe that the Rustler water in this particular area does not ultimately end up in the Pecos River; however, we look at the gradient provided in the State report, and use velocities presented by the State, we see that once the ground water has -- once the brine has entered the Rustler formation at this particular site, it would take over 1000 years to reach the river.

I believe that the State agencies in the past have recognized these two primary items, that is, the Santa Rosa contains virtually no -- in this area contains virtually no fresh water, and the Rustler formation beneath it is also containing extremely poor quality water, and this, we believe, is the basis for granting an exemption for a pit in the vicinity of Section 16.

Q Mr. Reed, I've handed you what has been marked for identification as Exhibit Four. You've distributed that to the Commissioners. I wonder if you could explain briefly what Exhibit Four represents?

A Exhibit Four is an enlarged view of Figure 6, contained in Exhibit One, showing the approximate locations of other salt water disposal pits in the general vicinity of Section 16, 17 South, 30 East. These numbers are barrels of brine disposed in these particular pits between 1970 and 1980.

You will notice in Section 21, for instance, that between these two periods, approximately ten years, in excess of 350,000 barrels was placed in pits in Section 21. Over 182,000 barrels in Section 20; over 200,000 barrels in Section 22.

Farther south and farther north, there are also pits which have received significant amounts of salt water.

I have recently looked at 1981 data with the following results: We have seen in the year 1981 reported brine in production in Section 20 of 25,650 in one instance, and 2374 barrels in the other pit.

In Section 21 we see introduced into the pit in excess of 12,000 barrels, and in Section 22, we see

introduced in excess of 12,000 in 1981.

Q And you also show on Exhibit Four several potash mines, if I read it correctly, is thatright?

A Yes. Those are the approximate locations of potash mines in the general vicinity of our proposed site.

Q What is the purpose of showing those on this exhibit?

A The potash mines also discharge large volumes of salt water on the surface. It has been determined by the State that those potash mines do not -- do not jeopardize fresh water in this vicinity, and, of course, this is the reason why they are allowed to operate in the manner in which they do.

These mines also lie hydrologically down dip from our proposed facility and as do many of the -- of the lease pits which we show on our figure -- on our Exhibit Four.

Q I just attempted to count the number of disposal pits which you show on your Exhibit Four and I counted approximately 33. Would that sound --

A That's --

Q -- correct to you?

A -- probably correct, yes.

Q Are there any other specific pits or mines

that you'd like to speak to at this time?

A. I do not believe so.

Q. Do you know, Mr. Reed, whether or not salt water disposal is still on-going in these sites that are shown on Exhibit Four?

A. Yes, sir, the most recent record that we can obtain, it appears as though disposal is on-going.

Q. In Township 18 South, Range 31 East, I note one particularly large pit, or I assume so, in Section 22. Do you see what I'm referring to?

A. Yes, I do.

Q. You have a number there of 476,832, is that correct?

A. That is correct.

Q. And that number represents what?

A. That's the total number of barrels introduced in that area in the ten year period, 1970 to 1980.

Q. Does that pit lie in the general hydrologic gradient that you referred to awhile ago from our proposed site?

A. It does lie down gradient from our site, yes.

Q. Now, Mr. Reed, let's talk a minute about the proposed operations at the Loco Hills Water Disposal site.

A. Okay. As you will see on Figure 7, Exhibit One, we propose a series of three pits, with an approximate surface acreage of 15 acres, wherein we would introduce salt water.

Prior to the introduction of salt water in these pits, the water would pass through a series of 500 barrel and 250 barrel tanks, located in the northwest part of the property, which would remove the majority of the hydrocarbons from the brine. This is important from an operational standpoint because any oil that we have on the surface of the water reduces our evaporation and reduces the amount of intake.

We also propose, and it's not drawn on this map because of its small size, we also propose that discharge from the tanks goes into an earthen pond and then siphoned into the larger ponds. The earthen pond serves to trap the last bit of hydrocarbon, so that we do not get any hydrocarbons out on our evaporative surface.

We have used this procedure in other areas and find it to be quite satisfactory.

Q. Is this method generally similar to the Wallach Project which was previously approved by the Commission?

A. It is.

Now I would like to address myself to the evaporation potential of these ponds. In data we have previously reported to the Commission, we have shown that the average input into a pond can be as high as 3500 barrels per month per acre, based on evaporation data from the Red Bluff Reservoir.

In order to not have an unusual and perhaps cumulative -- accumulation during the winter months, we have calculated that one can introduce approximately 3180 barrels per month per acre. This figure allows no winter accumulation. Obviously, the summer evaporation is considerably higher and the winter evaporation is somewhat lower.

Now these data at Red Bluff, we recognize, certainly, that the evaporation potential is somewhat higher down there than it is in this area in question today because we're about sixty miles north of that reservoir, number one; about 1000 feet higher in elevation, number two; and number three, that we're -- these evaporation numbers are based on fresh water and as we know, the salt water evaporation is somewhat less than fresh water.

With all these considerations, however, with some evaporation data from other sites, that says that brine evaporation will reasonably approximate that that we calculated from the Red Bluff data, we have estimated that the

Loco Hills site can receive a minimum of 1000 barrels of brine per day for the 15 acre tract. This is a monthly input of 2000 - 2500 barrels per month per acre.

Q Mr. Reed, on Exhibit Four I meant to ask you one other question and I failed to.

The -- you show several pits virtually immediately south of our proposed disposal area. Can you tell me if the hydrogeology in that area is similar to that which you previously reported for the immediate area of our proposal?

A. Yes. To our knowledge, it is.

Q. Mr. Reed, based upon your studies, upon your experience and expertise in this area, have you formed an opinion concerning the potential effect of the disposal of salt water in the proposed pit on fresh water supplies?

A. Yes, I have.

Q. And what is that opinion?

A. In my opinion there will be no adverse effect on potable ground water or surface water by the introduction of brine into this facility.

Q. Is there anything else which we have not covered which you would like to give at this time?

A. Not at this time.

MR. PERRIN: Pass the witness at this

point.

MR. RAMEY: Any questions of Mr. Reed?

MR. KELLAHIN: Mr. Ramey, I anticipate discussing Mr. Reed's direct testimony with him for some time. I note that it's about five minutes of twelve, and you might like to take a lunch break at this time.

MR. RAMEY: I thought maybe we could get Mr. Reed off the stand.

If you want to do that, Mr. Kellahin, we'll recess until 1:15.

(Thereupon the noon recess was taken.)

MR. RAMEY: The hearing will come to order.

Are there any questions of Mr. Reed? Mr. Kellahin.

MR. KELLAHIN: Yes, Mr. Ramey.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Reed, you testified on behalf of the applicant in the Examiner Hearing in this case, did you not?

A. That is correct.

Q. You told us a little bit about the design of the proposed disposal operation. Did you contribute to or propose designs for the actual facility?

A. I recall discussing the matter with my clients, yes.

Q. What is your understanding of the -- the daily capacity in barrels of water of the proposed disposal plant?

A. Approximately 1000 barrels a day.

Q. You had one of your figures in Exhibit One showed, I believe, the disposal property. Did that have the schematic of the plant, the location of the tanks?

A. No, it did not.

Q. All right, sir. Have you made a study of or any recommendations to the applicant with regards as to the size of any of the tanks involved in the disposal project?

A. I have not.

Q. All right, sir. Principally, then, your consulting work for the applicant has been to determine what is going to happen with the salt water that's introduced at a location he proposes to use.

A. That's correct.

Q. Now in doing that study last year and again in preparation of your testimony today, you presented at the last hearing a packet of exhibits with a few exceptions that was very much like what you've talked about today.

A. That is correct.

Q. The exhibits at the last hearing are almost the same as the ones you've used today. We can talk about the exceptions in just a minute.

A. Okay.

Q. All right. In talking about the geology then at the Examiner Hearing and then at the Hearing today, Mr. Reed, you were of the opinion then, and I assume you're still of the opinion, that the pits are located in a soil that is not impervious.

A. There is no such thing as an impervious soil.

Q. I understand. And it was your conclusion or opinion that the salt water placed in these evaporation ponds was going to infiltrate into the ground.

A. There will be some minor volumes of water infiltrate, yes.

Q. In doing your study you, as I understood your testimony this morning, made an effort to find sands that might contain fresh water sources in the area of the

project, and commencing with the surface and going down, the first formations you looked at were the Triassic formation and in particular the San Andres member of that formation, is that not true?

A. No, that is not the correct formation, no, sir.

Q. All right, starting from the surface and going down, what is the first sand that you encounter that could be a source of fresh water?

A. The uppermost materials at this site we assigned to the Santa Rosa formation.

Q. All right, is that not a part of the Triassic formation?

A. It is part of the Triassic sequence, yes.

Q. All right, sir. And then below the San Andres the next possible source of --

MR. RAMEY: Are you trying to say Santa Rosa instead of San Andres?

MR. KELLAHIN: Did I say San Andres? I meant Santa Rosa, I'm sorry. I meant Santa Rosa.

Q. Below the Santa Rosa, then, the next formation in which we might encounter a fresh water source is going to be the Rustler.

A. The next formation is the Rustler, yes.

Q All right, sir. Let's turn for a moment to your Figure 5, Mr. Reed, in your packet of exhibits.

I believe you told us this morning in reference to this exhibit that in the area of investigation you found the Santa Rosa formation approximately 230 to 290 feet below the surface.

A That is correct.

Q You also indicated to us that you had drilled some six test wells.

A Yes, sir.

Q And you identified them as being located in Sections 16, 17, and 21. If you will, sir, would you start with the test well in Section 16 and tell us what depth that test hole is drilled?

A It was drilled to a depth of 153 feet.

Q All right, sir, and the test hole in Section 17 to the west was drilled to what depth?

A 150 feet.

Q And then looking in Section 19, you had a test hole. What was the depth of that one?

A 130 feet.

Q And then you had three of them in Section 21. Commencing then with the one in the northern portion, northwest quarter of Section 21, what was the depth of that

one?

A. 200 feet.

Q. And then its southeast offset?

A. We don't have a test hole in the southeast portion of that.

Q. No, sir, in the southeast quarter of the northwest quarter of 21? Is that not a test hole? It says TH-4?

A. Oh, that's the 200 foot hole. The other one is 150 feet.

Q. All right, sir. And then the next one going to the south, this is the 320 foot Rustler test?

A. Correct.

Q. I note the Anadarko Well, which was in -- was this Anadarko's water source well for a waterflood?

A. I don't know what it was used for.

Q. All right. The information indicated on that well on your exhibit shows the water level at 330 feet.

A. That's correct.

Q. Why didn't you take your test hole for the Rustler down to 330 feet as opposed to 320 feet?

A. We were test drilling the Santa Rosa to determine both the presence of water and the -- and the nature of the materials, and that was strictly a test hole

program to evaluate those two items.

We -- the time at which we gathered the data on the Anadarko Well may have been prior to or after that.

Q And if I understand what you've told me, Mr. Reed, of the six test holes you drilled, only one of which was drilled to a depth sufficient enough to test the Santa Rosa?

A No, sir, they all tested the Santa Rosa.

Q You just told me the Santa Rosa was located 230 feet.

A It's located from near the surface to 230 feet.

Q Do you have a cross section in your exhibits to show an effort to correlate the Santa Rosa sands or clays?

A We have cross sections in our report.

Q And can you correlate the Santa Rosa from the surface?

A We can correlate the top of the Rustler on those cross sections.

Q Yes, sir, and can you also correlate the Santa Rosa?

A Everything above the top of the Rustler is the Santa Rosa.

Q What figure are you looking at, Figure 2?

A I'm just looking at my cross section in Figure 1.

Q And in studying those cross sections, Mr. Reed, you discovered that those clays in the Santa Rosa are essentially discontinuous, are they not?

A We -- at the density of wells here, the density of spacing, we are not able to, with any degree of confidence, correlate the Santa Rosa clays over a large area.

Q Let me direct your attention to Exhibit Number Two, which is a letter dated May 25th, 1982 by Reed and Associates to Mr. Jennings. If I understood you correctly, Mr. Reed, this was a calculation to show what the rate of infiltration of the salt water used in the evaporation pit would be through some of these clays?

A It was an attempt to examine the permeability, yes, the uppermost Santa Rosa, yes.

Q All right, sir, and if I read the report correctly, the last paragraph, the third line from the bottom says, if I understand it, the tightest two clay zones in the core tests were used to make the permeability tests.

A We used those clays as the limiting factor on the downward movement.

Q And in using the tightest two clay zones core samples you then came up with a calculation to show that the seepage rate through one acre of sediment, of that particular clay, was going to be at the rate of 1.2 gallons per minute.

A The seepage, the maximum seepage rate through either of those two clays, those precise clays, is 1.2 gallons per minute, yes.

Q All right, sir.

A Correct.

Q And we can convert that to barrels of water a day for the entire fifteen acres of the project by some simple arithmetic.

A You could do it.

Q By taking the 1.2 gallons and multiplying that by sixty minutes times 24 hours times the fifteen acres, divided by 55 gallons per barrel and you get 471 barrels a day.

A I've not made those calculations.

Q All right, sir. Go on to the last paragraph of page two in summary and you calculate that it will take at least 224 days to 54 years for the water to move through the first 22 to 38 feet of the Triassic material.

Is that your calculation?

A. Those are our calculations, yes.

Q. That's a pretty big ballpark to work in, Mr. Reed, 2/3rds of a year to 54 years. Can you refine that a little better?

A. No, sir, because I have two order of magnitude difference in permeability calculated for those two clays and I am presenting the most optimistic and the most pessimistic view.

Q. What is your best estimate, then, of the length of time involved for water introduced at the surface in the disposal to reach the Santa Rosa formation?

A. Between ten and fifteen years.

Q. Does that rate of infiltration change depending upon the volume of water placed in the disposal pit?

A. Not significantly, no.

Q. You talked this morning, Mr. Reed, about poor water and good water. Perhaps we could define those in terms of some standard number, Mr. Reed, and I'd like to suggest to you that we use the State Engineer's definition of waters to be protected, and that is underground waters containing 10,000 parts per million, or less, of total dissolved solids, as defined by the State Engineer as fresh water, as you know.

A. That's fine.

Q. All right, sir. In terms of human consumption, Mr. Reed, what would be potable water for chloride content?

A. Flood program recommendations are on the order of 250 milligrams per liter.

Q. And for stock purposes, Mr. Reed, what is your opinion of the chloride content of the chloride content acceptable for the consumption by stock?

A. Stock, in my opinion, will -- will accept water that has up to 3 to 5000 milligrams per liter.

Q. That would be the chloride.

A. Correct.

Q. Will stock drink water that has in excess of 10,000 parts per million of total dissolved solids?

A. I'm not aware of it, no.

Q. Let's turn to your Figure number 5 again. Of the fresh water sources, under the State Engineer's definition, Mr. Reed, that you've outlined on the exhibit, there are wells both above and below the hydrologic gradient at the disposal site that contain Santa Rosa fresh water, do they not?

A. That is correct.

Q. And you said this morning that although

the area immediately around the disposal site does not have Triassic water that is fresh water quality, there is -- I'm sorry, does not have Rustler water of fresh water quality, there are Rustler water wells down dip from the project area that do have fresh water in the Rustler.

A. No, sir, I would not say that they are down dip. There are Rustler wells that contain less than 10,000, yes.

Q. All right, sir, where is the closest one of the Rustler wells to your target area?

A. The closest one that I see here on this Figure 5, it must be, estimating, 10 to 12 miles to the southwest.

Q. If I understood you correctly, Mr. Reed, in the immediate area around the project area the hydraulic gradient is generally to the south and southeast, and that at some point along the northern line of Township 19 South, 30 East, it takes a further swing and goes to the southwest, is that not your testimony, Mr. Reed?

A. It ultimately bends towards the southwest, yes.

Q. The only change I'm aware of in Exhibit -- Figure 5 in Exhibit One, Mr. Reed, is that you have drawn the Rustler outcrop, was it not?

A. Yes, I believe so.

Q. Across your exhibit. Have you drilled any new test wells?

A. Yes, we have.

Q. Since the last hearing?

A. Yes, we have.

Q. Are those identified on Exhibit --

A. Those are identified on Figure 7.

Q. All right, sir, let's look at those. What test holes have you drilled since the September hearing, Mr. Reed?

A. I drilled two bore holes on the proposed site itself.

Q. What was the reason for drilling those, Mr. Reed?

A. To investigate the permeabilities of the uppermost Santa Rosa material.

Q. And it was that information, then, that was used for this report that you reduced to the May 25th letter?

A. That is correct.

Q. Turn for a moment, Mr. Reed, to the evaporation data that you used in the report.

What was your conclusion with regards to

the evaporation rate of salt water at the project area?

A. We calculated that between 2000 and 2500 barrels per month per acre could be disposed in this area without undue winter accumulation.

Q. Did you make any adjustment in your evaporation calculations with regards to a possibility that oil would collect on the surface of the evaporation ponds?

A. No, sir.

Q. What, in your opinion, Mr. Reed, would be the effect of oil on the surface of the evaporation ponds?

A. It would reduce the evaporation rate by some amount.

Q. Is there a standard formula or table or calculation from which to determine the change in the evaporation rate if there is oil on the surface?

A. There have been some calculations made, yes.

Q. You have not made that calculation for this project?

A. No, sir, I have not.

Q. Let's turn to your Exhibit Number Four, Mr. Reed.

Is this the same exhibit and the same information as you introduced in the Examiner Hearing?

A. It is.

Q. If I understood you correctly, these represent cumulative numbers of barrels of water disposed over some period of time between 1970 and 1980 at these various disposal sites?

A. That's correct.

Q. Okay. Can you tell us what amounts, if any, of salt water are currently being disposed of at any of these locations?

A. Yes, sir, I can.

Q. I think you mentioned one in Section 21 of 17 South, 30 East?

A. Yes, sir.

Q. Yes, sir, and what was that?

A. In 1981 in Section 21 we saw evidence of slightly over 12,000 barrels discharged into a pit in that section.

Q. That was the whole year, was it 12,000?

A. The year 1981.

Q. All right, sir, are there any others that you can give us an annual 1981 disposal amount?

A. Yes, sir, we saw two pits in Section 20, one that had 25, 650 barrels.

Q. Uh-huh.

A. One that 2374 barrels, and in Section 22 for 1981 we saw 12,599 barrels.

Q. And at the proposed surface disposal site for the applicant in Section 16, if he disposes at the rate of 1000 barrels a day there is a potential for 365,000 barrels of oil in a year.

A. That is correct.

Q. Or of salt water. Apart from those disposal areas, Mr. Reed, are you aware of any others that are currently being used for disposal?

A. I have not investigated the current usage.

Q. Have you investigated any of these other disposal areas to determine whether the rate of infiltration will be similar to that you anticipate in your project area?

A. I anticipate the infiltration rate to be similar.

Q. Have you made tests of the cores in the area to determine what the infiltration rates would be for those other areas?

A. No, I have not.

Q. I'm interested in your monitor wells, Mr. Reed, that you propose around the project. If I understood you correctly there was going to be six monitor wells drilled

to a depth of 60 feet?

A. No, sir, there's one, two, nine, I believe, drilled to a depth of 60 feet.

Q. Nine to 60 feet and then you would have two that are drilled into the Rustler?

A. That is correct.

Q. Are those nine 60-foot monitor wells drilled to a depth sufficient enough to detect the horizontal migration of waters in the Santa Rosa?

A. Yes, they are.

Q. Perhaps it escapes me, Mr. Reed, but how can they detect the motion of water if the Santa Rosa is encountered at some three times that depth?

A. They are designed to detect movement on top of the uppermost clays. This is the site where the movement will be.

Q. And if there is movement of salt water below that, how is it going to be detected?

A. If that occurs, it will be detected in the two Rustler depth monitor wells.

Q. Now the two Rustler depth monitor wells, tell me how they work. How are they going to detect the movement of salt water?

A. They will examine or be able to detect

movement of salt water throughout the entire section of the Santa Rosa.

Q. The casing, then, of those monitor wells is perforated through its entire vertical length?

A. That is correct.

Q. And what will happen, then, if you detect the movement of salt water in the monitor wells?

A. Should that occur, a study would be initiated to determine the cause and remedial activity initiated if it is deemed necessary.

Q. Is that a test that the applicant proposes to undertake as far as his project?

A. Should -- should salt water ever be detected in any of these monitor holes the applicant will investigate the cause.

Q. Would a provision in an order if this site is approved that requires the applicant to cease operations if salt water is detected in those monitoring wells, would that kind of provision be unreasonable, in your opinion?

A. Yes, it would.

Q. If salt water is detected in those Rustler monitoring wells, the only reasonable source for that salt water is bound to be the disposal pits, is it not?

A. That is one source, yes.

Q. Why would such a provision not be reasonable, in your opinion, Mr. Reed?

A. Because short of knowing what the cause of the occurrence is, I feel it would be unreasonable to merely shut the disposal operation down because of an occurrence.

Q. You mentioned an earthen pit of some kind prior to the evaoporation pit?

A. Yes, I did.

Q. I believe the dimensions on that were some 30 by 50 feet, is that correct?

A. The dimensions -- the dimensions can vary from 30 x 30 to 50 x 50. The dimensions are not particularly critical.

Q. What's the purpose of that pit?

A. The purpose of that pit is to remove any residual hydrocarbons that did not get removed in the -- in the tank battery.

Q. And will that pit be lined with some type of barrier material?

A. No, sir.

Q. Mr. Reed, correct me if I'm wrong. I believe the opinions and conclusions you've expressed today are the same opinions and conclusions you expressed before the Examiner back in September and August of 1981, are they not?

A. They are similar, yes.

MR. KELLAHIN: Thank you, Mr. Ramey, I have no further questions.

MR. RAMEY: Any other questions of Mr. Reed?

MR. PERRIN: I might have a few.

MR. RAMEY: Let me -- let me ask a couple of questions first.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Reed, on your, I think your Figure 7 of Exhibit One --

A. Yes, sir.

Q. assuming an order is approved -- or an order is issued approving this disposal system, do you think could the order just refer to this Figure 7 for the monitor wells?

A. Yes, it could.

Q. And how deep -- how deep are the Rustler monitor wells going to be? Are they just going to --

A. They will just tag --

Q. They will just tag the top of the Rustler?

A. Yes, sir, they will just tag the top of

the Rustler.

Q. And you would propose perforated tubing of some kind the whole length of the -- of all the holes.

A. That is correct, within just a few feet of surface so that we could route that area near the surface and prevent rainwater from percolating down around the well.

Q. It seemed there was a Santa Rosa well in here that had chlorides of 4000 in a sample. Do you recall that well, Mr. Reed?

A. Yes, sir, that is in -- that is in Section 35, 17 South, 29 East.

Q. Is that an anhydrite well or is that a -- a Rustler well, rather, or is that a shallower well?

A. We could not make that determination specifically. I do not know.

Q. With chlorides of 4000, what -- what would be your estimate of total dissolved solids?

A. In the neighborhood of 10 to 11,000 milligrams per liter.

Q. So that probably would not be water that would be protected.

A. No, I would not think so.

Q. Under the State Engineer's definition.

A. Correct.

Q I assume some other witness will testify to the actual physical equipment that will be at the site?

A. Yes.

Q The proposed site.

MR. RAMEY: Any other questions of Mr. Reed?

MR. PERRIN: Mine are just a fairly brief thing.

REDIRECT EXAMINATION

BY MR. PERRIN:

Q Mr. Reed, would you be willing to undertake to submit a plan of recommended construction for those monitoring wells to the Commission in the event that should prove necessary?

A. Yes, sir, I would.

Q Now, a couple of things on cross examination. First of all, I believe you testified that the capacity of the pit would be about 1000 barrels a day. Is that a minimum figure or a maximum figure?

A. That's a minimum figure.

Q Secondly, the question was asked, how long it would take water that might infiltrate from the pit to reach the Santa Rosa, and I believe your answer was 10 to 15

years. Were you referring to the Rustler formation?

A. Yes, I was.

Q. How long will it take water to get to the Santa Rosa from the pit?

A. The Santa Rosa is very near the surface, so it will essentially be there when -- when the disposal operation starts.

Q. Finally, since the hearings in August and September of 1981, have you undertaken some additional studies?

A. Yes, I have. I have examined the permeability of the near surface materials.

Q. And I think your testimony concerning that matter is supplemental to what you testified to previously.

A. It is.

Q. One other thing we did not get into on the operation of the disposal site itself, concerns the freeboard that's put into the plan.

Would you tell the Commission about that?

A. Yes. We have proposed a minimum 3-foot freeboard between the maximum fluid level allowable in the pit and the top of the docking.

Q. The purpose of that is what?

A. The purpose for that is to insure that

rainwater does not cause the pits to over top, primarily.

Q. Does that have any relationship to oil on the surface that Mr. Kellahin was asking?

A. The freeboard?

Q. Yeah, would it have any --

A. Well --

Q. -- role to play in connection to that?

A. The freeboard itself, of course, is basically designed not to allow any materials in the pond to -- to escape.

MR. PERRIN: I don't believe I have anything further.

MR. RAMEY: Any other questions of Mr. Reed? He may be excused.

MR. REED: Thank you.

MR. PERRIN: Our next witness is Mr. Ray Westall.

RAY WESTALL

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PERRIN:

Q. Would you state your name, please, sir?

A. Ray Westall.

Q. What is your occupation, sir?

A. I'm an independent oil producer and also own Hughes Hot Oil Service in Loco Hills, and also President of Loco Hills Water Company.

Q. Where do you live?

A. In Loco Hills.

Q. How long have you lived in Loco Hills?

A. Off and on for thirty-two years.

Q. Are you familiar with oil production and the oil industry in general in the vicinity of Loco Hills?

A. Yes, sir, I am.

Q. Can you tell the Commission, or give them an estimate of the number of producing wells in, say, a fifteen mile radius of Loco Hills?

A. I'd say within 1500 to 2000 wells.

Q. Are a number of those wells older wells?

A. Yes, sir.

Q. Are some of them stripper wells?

A. Yes, sir, I imagine there's probably 80 to 90 percent of the ones that are not under waterflood that are stripper wells.

Q. And is salt water produced by a number

of those wells in connection with the production of oil?

A. Yes, sir, there is.

Q. Where is that salt water currently disposed of?

A. At the Laguna disposal.

Q. Can you tell the Commission the approximate distance from Loco Hills to the Laguna Gatuna --

A. I'd say around 14 miles.

Q. How long does it take a truck to make the round trip down to Laguna Gatuna and unload the salt water?

A. Between three and four hours.

Q. What is the cost to the oil producer of disposing of this water in that fashion?

A. It runs around $1.50 a barrel.

Q. Is there a closer commercial disposal site than Laguna Gatuna for the Loco Hills area?

A. No.

Q. So the other pits that were shown on the exhibit that we looked at previously are all private disposal pits?

A. Yes.

Q. You are President of Loco Hills Water Disposal Company?

A. Yes, sir.

Q. Who else owns stock in that?

A. Mr. Jennings and also First Roswell Company.

MR. RAMEY: Who was the third one?

A. First Roswell Company.

Q. Is that a Jennings family corporation?

A. Yes, uh-huh.

Q. I hand you, Mr. Westall, what's been marked Exhibit Five. Can you identify that document?

A. This is an Application for Lease and approval of the lease on Loco Hills Water Disposal Company.

Q. Business lease form --

A. Business lease form.

Q. -- by the State Land Office?

Now, I've handed you what's been marked Exhibit Number Six. Can you identify that document?

A. Yes, this is our proposed tank battery we're going to use at the disposal. We have three 500 barrel tanks we'll primarily pump into. We're going to skim it off in the two 250 tanks and then go out into the smaller skimmer pits to pick up all hydrocarbons so we won't have any oil on the surface.

Q. Now the purpose of the tanks is precisely to do what?

A. To skim all the hydrocarbons off the water.

Q. And if it doesn't work there, then it gets to a skimming pit and you skim them off at that point?

A. Yes, sir.

Q. Now how many acres does the proposed site cover?

A. This site here is adjacent to a paved highway and this site here will probably cover about, oh, a half acre or so.

Q. You operate some wells yourself in this area, do you not?

A. Yes, sir.

Q. Approximately how many?

A. About forty.

Q. On Exhibit Six, next to the notation 4-inch load line, there's a straight line coming down. What -- what does that line represent?

A. Okay, well, that's just a line tying in all these load lines into the -- into the -- you mean over there on the lefthand side?

Q. Yes, sir.

A. Well, this will be a paved road over here on this lefthand side. On the left side will be a paved road.

Q. Does the highway run right past this?

A. Right beside our disposal site line.

Q. What highway is that?

A. It's a county road. I don't know what the number is. It runs right north of Loco Hills there.

Q. Now how many trucking concerns are there in the Loco Hills area who haul salt water down to Laguna Gatuna for disposal?

A. I'd say there's five.

Q. And do you have any idea how many trucks total there are?

A. I'd say about 100 trucks.

Q. Do you have any idea how many loads each day are carried to Laguna Gatuna?

A. I imagine there's, oh, ten to fifteen.

Q. What hours is the Laguna Gatuna disposal station open?

A. I don't know now. They were closed at night at one time but I don't think they are now.

Q. Do you think they're open all day now? What are your plans for the hours that you're open on the proposed sisposal site?

A. We plan to run 24-hour a day disposal.

Q. Have you had the opportunity to check any

numbers concerning the amount of water that's been disposed of into Laguna Gatuna?

A. I've -- yes, sir, I've checked up at their -- they've run around 100,000 barrels a month.

Q. In your opinion, Mr. Westall, is it possible that some wells will be prematurely abandoned if a closer disposal site is not available for the salt water?

A. This could happen if the economics of hauling the water down that far is greater than the amount of production they will make.

Q. Can you give the Commission some idea as to a point -- at what point you get to that?

A. No, I don't believe I can do that.

Q. Well, let's use an example. If you produced 10 barrels a day and 100 barrels of salt water, what would the economics of that be?

A. Well, I don't think you could make just around 200 barrels -- I mean $200 worth of oil and 100 barrels would be around, what, $150, a 100 barrels of water would be around $150 for hauling.

Q. Would it be safe to say that in the one to five barrel a day production, assuming some salt water production along with that, would it --

A. I imagine 10 to 20 barrels a day would

be the most, you know, the maximum.

Q. Do you have an opinion, Mr. Westall, whether the construction of this disposal site and the granting of this application will prevent waste and not impair correlative rights?

A. Definitely. I feel like it will help on the cost of the producer as far as not having to haul the water as far, and also on, probably on the surrounding area to keep -- where some of the trucks are dumping water.

Q. What -- what amount of salt water do you propose to dispose of per day if the application is granted?

A. I'd say around 1500 barrels a day.

Q. Would that be a maximum figure?

A. Probably.

MR. PERRIN: I don't believe I have anything further, Mr. Commissioner.

MR. RAMEY: Any questions of Mr. Westall?

MR. KELLAHIN: Yes, sir.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Westall, in your experience in the oil industry, have you ever operated or worked for a disposal facility before?

A. No, I haven't.

Q. This Exhibit Number Six which you talked about, which is a schematic of the plant, this is the same exhibit as used at the Examiner Hearing, is it not?

A. Yes, sir.

Q. You said that you yourself operate some 40 wells. For your own business needs, Mr. Westall, how many barrels of water do you have to dispose of on a daily basis?

A. Oh, approximately 100 barrels.

Q. So you would propose to use this for other than your own purposes?

A. Definitely.

Q. How did you come up with the configuration for the disposal site?

A. Well, I went down and looked at the Wallach plant down in (inaudible).

Q. Who operates that?

A. I unserstand Wallach's (inaudible.)

Q. That's the only source of information you used in your design of the plant?

A. Well, you use about the same thing in a producing well and also on the waterfloods you have to have a skimming type process.

Q. At the Examiner Hearing you testified, did

you not, Mr. Westall?

A. Yes, I did.

Q. And in response to the question from Mr. Stamets you gave this answer. Mr. Stamets asked you, "And you would be willing to accept disposal limits of 2500 barrels per acre per month?"

And your answer was, "I believe that we could probably stay with that. I believe that would work."

Is that still your answer?

A. Well, I think we could run the plant that way.

Q. You wouldn't have any objection then to an order that contains a limitation that says the disposal rates would be from 200 to 2500 barrels per month per acre or from 1000 to 1250 barrels per day as the maximum pit size?

A. Not knowing how much we'll have -- water we'll have disposed of in the site, I don't really know right now what it will basically hold, you know, or what we'd basically deal with on the thing.

MR. RAMEY: What were those figures again, Mr. Kellahin?

MR. KELLAHIN: The question posed by Mr. Stamets was that would you be willing to accept a disposal limit of 2500 barrels per acre per month. The answer was, I

think that would work. The finding, finding, I mean Order R-6811, provision number six, says that disposal rates would be from 2000 to 2500 barrels per month per acre, or from 1000 to 1250 barrels per day as a maximum pit size.

MR. RAMEY: And you testified that you thought 1500 barrels a day would be the maximum?

A. I imagine right around 1500 barrels a day, yes, sir.

Q. Mr. Westall, you told us that you believed the cost per barrel to truck the salt water to Laguna Gatuna was about $1.50 a barrel?

A. Yes, sir.

Q. Do you have an opinion as to what it will cost for disposal on a per barrel basis at your site?

A. I think it will cut the cost as far as most of the water is hauled from a trucking firm around our area down to the Laguna and back instead of just right around the area where they can go right back to the -- to somebody else.

Q. What do you plan to charge at your plant, then, for the disposal of a barrel?

A. Probably twenty-five cents a barrel (in audible).

MR. KELLAHIN: Thank you. I have nothing

further.

MR. RAMEY: Any other questions of Mr. Westall?

MR. PERRIN: Just one, Your Honor.

REDIRECT EXAMINATION

BY MR. PERRIN:

Q That $1.50 figure that you gave includes the trucking cost as well as the cost of actually loading and unloading at Laguna Gatuna?

A. Yes.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Westall, I'd like to go over your disposal plant a little more thoroughly here.

I assume the trucks will pull up to the -- where it's marked 4-inch load line.

A. Yes, sir.

Q. And hook on, pump, and the water will then go into one or all three of the 500 barrel tanks?

A. Yes, sir, with waterleg type connections on the back, where, you know, so we could keep the water higher in the tanks, you know.

Q. Then as the 500 barrel tanks fill it will, the water will go over into the 250 barrel tanks?

A. Yes, sir.

Q. Now where does the oil go?

A. The oil will stay in these tanks and we'll have -- we're proposing a skimming type system on top of the tanks to skim it off and just put it into one 500 barrel tank.

Q. Well, then only two of the 500 barrel tanks will --

A. Yes, sir.

Q. -- accept water?

A. Yes, sir.

Q. And one of them will -- will be for oil.

A. Yes, sir. We may have to revise it and put some other tanks in, you know.

Q. At the figure of 1500 barrels a day, now what would be your -- the retention time of water in the 500 barrel tanks, to make sure you have adequate separation of the oil and water?

A. Well, with this gunbarrel type situation, the water will come off the bottom of the tanks, using a waterleg on the back of the tanks, and all the water will come off the back of the tanks, and then go up and into the 250

off the bottom.

And the oil and the water that we're putting into the tanks will come in at the top.

Q. Possibly you're -- you show four or five load lines. Possibly you're going to have five trucks there at one time?

A. Well, I don't know, but you know, when you get them in there, you may want to get them trucks unloaded and get them out.

Q. But between the 500 barrel tanks, the 250 barrel tanks, and the skim pit, you feel like that the oil will be removed.

A. Yes, sir, I sure do.

Q. Are you going to have any provisions for picking up oil off the skim pit?

A. I have vacuum trucks.

Q. And you're proposing a maximum of 1500 barrels per day?

A. I'd say that would be approximately what we'll have come in there.

MR. RAMEY: Any other questions of the witness? He may be excused.

MR. PERRIN: Call Mr. Ed Reed.

ED REED

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. PERRIN:

Q. Would you state your name, sir?

A. My name is Ed L. Reed.

Q. What do you do for a living?

A. I am a consulting hydrologist.

Q. And where is your principal place of business?

A. In Midland, Texas.

Q. Are you President of your own corporation?

A. I'm Chairman of the Board, yes, sir.

Q. And how many years experience have you had in the hydrology business, Mr. Reed?

A. I formed this firm a little over thirty years ago in 1952, after spending about thirteen years in various categories of work in the oil industry.

Q. Have you testified before this Commission previously?

A. Yes, sir, I have.

Q Are you familiar with the hydrogeology in the Loco Hills area and even running south and southwest to the Pecos River?

A Yes, sir, I am.

MR. PERRIN: We request that Mr. Reed be recognized as an expert hydrologist.

MR. RAMEY: He is so qualified.

Q Based on your study and experience, Mr. Reed, do you have an opinion as to where water in the Rustler formation in the vicinity of Loco Hills winds up?

A Yes, sir.

Q And what is that opinion?

A Based upon a number of studies that I have made in this part of New Mexico, including some early studies for the Red Bluff Water Power and Control District, involving the Malaga Bend Diversion Works and other studies that led to our design of salinity alleviation, additional salinity alleviation projects in the Pecos River below Malaga Bend.

I had occasion to examine the hydrology and the geology of the Rustler on both sides of the river for a good many miles in an effort to evaluate the impact of all the waters that were tributary to the Pecos River in the design and construction of this facility at Red Bluff in New

Mexico.

Based upon these studies, which principally were done in 1965 and 1966, I prepared some maps that showed the general direction of movement of water in the Rustler, utilizing the State Engineer's report on Eddy County, as well as some additional data which we acquired in the field, and based upon this background and based upon the review of the data that has been accumulated in the course of the investigation by our firm of the Lobo Hills site, it is my opinion that Rustler water in the area of the proposed disposal site will move southeastward and southward and finally southwestward toward a trough in the Rustler, not a structural but a hydraulic trough in the Rustler, which parallels Nash Draw and culminates, basically, in the salt, the large salt lakes that occur near Loving. And it is my opinion that most if not all of this water, this part of the Rustler water, discharges by evaporation, either directly into the salt lakes or by a capillary movement into the salt lakes, directly from the Rustler or from the Rustler through Alluvium and thence into the lakes themselves.

It is further my opinion, based again upon the studies that have been made of this site, that the water that would leak from a fifteen acre pond would move essentially vertically into the Rustler, rather than move any

significant distance horizontally into the Triassic. The absence of saturation at any level in the Triassic in the several thousands of feet around the area that we have examined would be indicative of the absence of a regionally distributed impermeable bed within the Triassic sequence of sufficient regional extent to support a water table or an accumulation of water, and it is for this reason that I am of the opinion that over the thousands of years that water has percolated from the surface, recognizing that all of the water we're dealing with here is recharged, all of the aquifers are recharged by percolation at the outcrop and over the site itself, it is my opinion that that water that does leak will eventually, and in a very short distance from the site, enter into the Rustler sequence.

Q Mr. Reed, during Steve Reed's cross examination by Mr. Kellahin, reference was made to some Rustler wells southwest of the proposed site. Do you recall that particular line of questioning?

A Yes, sir, I do.

Q Is water from this disposal site, in your opinion, going to get to those wells?

A No, sir.

Q Why not?

A Because those wells are structurally

higher and also hydraulically higher than the area underlying this site, as far as the Rustler is concerned.

Q And in your opinion, should water try to flow that way, would the monitor wells catch that?

A In the Santa Rosa, yes, it would. The total volume of water that has been calculated would leak from this fifteen acre site, in my judgment is insufficient to create any sort of detectable ground water mound or bump in the water table surface underneath the site; therefor, it is my opinion that this water entering into a ground water system would follow whatever hydraulic characteristics already exist with very little modification.

Q Have you reached an opinion, Mr. Reed, based on your study and experience, concerning the effect of the disposal of salt water into the proposed pit on both surface and ground water supplies in this area?

A Yes, sir, I have.

Q What is that opinion?

A My opinion is that the disposal of salt water at this site into this fifteen acre pit will have no adverse effect upon surface or ground waters in the area.

MR. PERRIN: I have no further questions.

MR. RAMEY: Any questions of Mr. Ed Reed?

MR. KELLAHIN: Yes, Mr. Ramey.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q What is your relation with Steve Reed, Mr. Reed?

A He's my son.

Q And do you consider him a competent hydrogeologist?

A Yes, sir.

Q You would trust his judgment and opinion with regards to the hydrology of this area as he's testified to?

A Yes, sir.

Q Mr. Reed, I'd like to read you a portion of Mr. Steve Reed's testimony from the August 26, 1981, hearing in this matter, commencing at the bottom of page 38. Mr. Steve Reed is testifying. He says, "We anticipate that the brine introduced in these pits will migrate directly into the Rustler formation, into a formation which otherwise contains extremely poor quality water, and we believe that the brine introduced in these pits, once it arrives at the Rustler, will migrate along this otherwise very poor quality water."

"QUESTION: Where does it go?

ANSWER: The ultimate discharge line or

direction of flow on these formations of this ground water in the Rustler is regionally in a southwesterly direction towards the Pecos River."

At the hearing on September 23rd, 1981, at page 44, Mr. Steve Reed is asked this question: "And that the Rustler itself discharges into the Pecos River?"

"ANSWER: Ultimately, yes."

Do you agree or disagree with those statements by Mr. Reed?

A. The first statement, Mr. Kellahin, he said, if I heard you correctly, and I have not read that statement, that the water is discharged in a -- moves in a southwesterly direction towards the Pecos River, and I will agree with this. It did not say discharged into the Pecos River.

In a southwesterly direction, yes, the direction is toward the river. The only point that I would raise here is that the salt lakes intervene between this site and the river and form. in my judgment. the point of discharge of most, if not all, of the water.

The second statement you would have to read to me again because I'm not sure what increment, what portion of the Rustler water he is speaking of. There are segments of the Rustler, particularly to the southwest of

this site and to the south of the site that do discharge directly into the Pecos River. I have actually measured flow into the Pecos River from the Rustler.

But whether we're speaking of the specific water that wuld be involved in an infiltration from this pit, is quite another matter, and in that opinion, I would say it did not go into the river.

Q. Well, I won't belabor the point.

In the second hearing on page 44, we were talking about the same water introduced in the pit and whether it eventually reached Rustler and then migrated on to the Pecos River, but that is not your opinion, is it?

A. No, sir, it is not.

MR. KELLAHIN: I have nothing further.

CROSS EXAMINATION

BY MR. RAMEY:

Q. Mr. Reed, I intended to ask a couple of questions of Mr. Steve Reed, which I forgot to do, so maybe you could answer these questions.

What would be your recommendation if water showed up in any of these monitor wells?

A. The first thing I think, Mr. Ramey, that I would suggest is an additional drilling program to define

with some greater accuracy the source of the water. I would want to know if it were really water from the pits or water from some other source, another pit, or an oil well, a tank battery, or other disposal site that may be thirty years old.

This investigation would include detailed chemical analyses to see if there is any comparison of the water or any reason to suspect that the water is of the same character.

It would involve some rather extensive inflow/outflow studies to determine really how much might be leaking from the pond. This might involve instrumentation with evaporation stations and actual metering of the fluids into the pit and staff gauges, the type of inflow/outflow studies that we have made in the past in the -- many pond studies, for example, a series of lagoons and other types of surface disposal where we need to know with some precision the infiltration rates.

In the final analysis, if it were determined, if it were determined that there were appearances of brine in these monitor wells from the pit, I think two things would have to happen. One, there would have to be a rather prominently in the pond, one of sufficient size that it could be regularly evaluated in engineering terms, and secondly, there would have to be a path of movement with much higher

permeability than we have anticipated in the Santa Rosa.

In either event the -- a possible solution that we have considered would be drilling directly into the Santa Rosa, into the Rustler at that point, and draining directly with the head that would be available, which should be no problem, injecting directly into the Santa Rosa, into the Rustler after the Rustler water had been identified as to its quality.

Q. Okay. Would you suggest, or maybe I would suggest, that the order might state that in the event water is found in any of the monitor wells, that the matter be brought back for hearing, say, a ninety day period?

A. I think that would be entirely appropriate.

MR. RAMEY: Any other questions of Mr. Reed? He may be excused.

A. Thank you, sir.

MR. PERRIN: Mr. Ramey, I have no other witnesses but I would move the admission of our Exhibits One through Six.

MR. RAMEY: Exhibits One through Six will be admitted.

Mr. Kellahin, will you call your witness?

MR. KELLAHIN: May we have about five minutes?

MR. RAMEY: All right, let's do.

(Thereupon a brief recess was taken.)

MR. RAMEY: The hearing will come to order.

MR. KELLAHIN: Mr. Ramey, I will call Mr. Larry Squires to the stand.

LARRY C. SQUIRES

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Squires, would you please state your name and occupation?

A. My name is Larry C. Squires. I am an owner and operator of Snyder Ranches.

Q. Where are the Snyder Ranches properties located in general, Mr. Squires?

A. In Lea and Eddy County, between Hobbs and Carlsbad, in the vicinity of Loco Hills, Maljamar.

Q. In addition to managing the Snyder Ranches, Mr. Squires, do you hold any professional degree?

A. Yes, sir, I'm a veterinarian.

Q. When and where did you obtain your degree in veterinary medicine?

A. I graduated from Colorado State University with a Doctor of Veterinary Medicine degree in 1960.

Q. And subsequent to graduation have you practiced veterinary medicine?

A. Yes, sir, I practiced for eight years in Hobbs from 1960 to 1968.

Q. Let me direct your attention to what has been introduced as the Applicant Exhibit Number One, Figure 5 of that package of exhibits.

A. Yes, sir.

Q. You see identified on there Section 16 of 17 South, 30 East, which is the proposed disposal area.

In relation to the disposal location, Mr. Squires, where are the Snyder Ranch boundaries?

A. Our ranch begins approximately six miles to the southeast of the location and continues on a southwesterly line for about five miles and then turns back to the northwest another three or four miles and then back -- back south to the Carlsbad-Hobbs highway.

Q. Based upon your experience as a rancher and as a doctor of veterinary medicine, Mr. Squires, let me

ask you some questions with regards to the quality of water that livestock will be willing to drink without detriment.

Based upon your experience, what is the maximum chloride content of water that livestock can accept without adverse conditions?

A. Livestock can handle water as high as 10,000 parts per million without causing -- they can survive. They won't survive very profitably but they will survive.

Q. All right, sir.

MR. RAMEY: Is this chloride content, Mr. Squires, or --

MR. KELLAHIN: He said total dissolved solids.

MR. RAMEY: And you asked chlorides and I don't think he understood the question.

A. Oh, well, I meant chlorides.

MR. RAMEY: You meant 10,000 parts per million chlorides.

A. Yes. As I testified to earlier, in some researching work done at Oklahoma State University, that they would -- they could handle salts as high as 1-1/2 to 1.7 percent, which I think would be from 15 to 17,000 parts per million.

Q. Let me ask you generally, Mr. Squires, to

summarize why you're opposed to the applicant's proposed disposal application.

A. Because we have a water well that's very valuable to our ranching operations in Section 26, 18, 30.

Q. Just a minute, let's find it here on Figure Number 5. Is that 18 South, 30 East, Section 26?

A. Yes, sir.

Q. I see two well symbols in that section.

A. Yes, sir. I don't know where the two well symbols come from unless there's -- we're only operating, producing one well at that site. There may be an old caved in well or something there that I'm not familiar with.

Q. What do you do with that water?

A. We pump water from that well into a storage tank about a half a mile to the west. The storage tank, we go downhill to five watering tubs along about a five mile pipeline.

Q. Do you recall what the quality of that water is?

A. It's very good. It's -- it tasts a lot better than the water in Roswell. It's very good, sweet water.

Q. The exhibit indicates a chloride content of about 162 parts -- milligrams per liter?

A. Yes, sir.

Q. Do you have any other sources of fresh water for the ranch in this area?

A. We have some other sources but we're a little afraid about the permanency of these sources. We have abandoned some other water wells in this area because of the high quality of the water that is available to our use through some of the potash company's pipelines, and where we're allowed to use this water, because this water is a lot better quality and we would prefer to use it.

Q. How long have you been associated with the Snyder Ranches?

A. Since 1967.

Q. During that period of time, would you describe generally what has been the activity of the oil and gas operators and the potash mine operations insofar as the disposal of salt -- produced salt waters has been?

A. Yes, sir. They -- the oil industry, of course, since the no-pit order that's been referred to earlier today, the oil industry has looked for ways to dispose of water that's suitable, and they're elimintaing a lot of these old pits that are being used in the area and they're not using as much and they're putting them in acceptable places such as disposal wells and natural salt lakes.

The potash industry, due to their economics, you know, because of the economics of the potash industry, they appear not to be putting out as much water as they have been in the past. In the last few years their lakes have receded somewhat.

Q. Let me show you what has been introduced as the Applicant's Exhibit Number Four. If you'll locate Section 26 in your township and range where your water well is, I note to the west there is a symbol indicating Duval. What is yiur knowledge of that?

A. That's a mine shaft. It's not a lake. It's not a salt lake at all. It's just a mine shaft.

Q. Are you aware of any disposal or salt water on the surface in the immediate area of your water well?

A. No, sir. We have protested any application that we found out that came up in our -- in the immediate area of this -- of our water in that area, and really, there is not too much water being disposed of in unlined pits in that area at the present time.

Most of it is being hauled off somewhere else.

Q. Is there anything else you'd like to add to your testimony, Mr. Squires?

A. Well, yes, that this is about the only

fresh water well that's really uncontaminated in this area, and certainly, you know, we sure want to protect it. We don't want to see it -- we don't want to see it be contaminated.

And quite frankly, I didn't realize that all these disposal sites in this area were still being used, and had I had the time and the energy and the money, I'd have protested every stinking one of them around these water wells because there certainly is available Rustler water in this area to use in the event the other water that's being piped there from the Ogallala is not -- is no longer available to us, we will have to go back and we'll have to use some of these water wells that have got high chloride and high total solids in them, as far as livestock water.

And just that we're very protective against the water and I hate to see it get polluted.

MR. KELLAHIN: I have nothing further of this witness.

MR. RAMEY: Any questions of Mr. Squire?

MR. PERRIN: Yes, Mr. Ramey.

CROSS EXAMINATION

BY MR. PERRIN:

Q Mr. Squires, how deep is the said well in Section 26?

A. It's approximately 210 to 230, somewhere in that area.

A. And as I understand you, you're -- you're here today because you're simply afraid that that well might be contaminated.

A. That water well is vital to our ranching operation, yes.

Q. Yes, I understand that, but you don't -- don't have any evidence of proof to offer that it will be contaminated as a result of this disposal site, do you?

A. Well, only that Mr. Reed testified that it would migrate as far as the Pecos River, and if it will go that far, why, it will go to our water well.

Q. That was through the Rustler formation, wa it not?

A. Whatever.

Q. Do you also have an interest in Laguna Gatuna, don't you, Mr. Squires?

A. Yes, sir.

Q. Corporation for Pollution Control?

A. Yes, sir.

Q. What is your position with that company?

A. I'm a principal owner.

Q You're also president of it, I think?
A Yes, uh-huh.
Q And I assume that you agree with Mr. Westall's testimony that most, if not all, of the salt water produced from those Loco Hills wells is disposed of in Laguna Gatuna right now.
A I don't know. I'm sure that some of it is, yes.
Q And you dispose a pretty good amount of water in that lake, in Laguna Gatuna every month, do you not?
A We dispose of whatever is hauled to us, yes.
Q Did that 100,000 barrel a month figure sound about right?
A Uh-huh. I was wondering where you got it.
Q I think we have a report here someplace.
MR. JENNINGS: You report every month.
A Sure do.
Q Does the oil ever get into Laguna Gatuna?
A No, sir. We -- we make every effort to keep it out.
Q I assume any prudent operator would do that same thing.
A Yes, uh-huh.

Q Now how far away in miles is that Section 26 well from the proposed disposal site? Do you have any idea?

A Yeah. I believe Mr. Jennings helped me count these last time. I believe it was nine, approximately.

Q About nine miles?

A Our ranch boundaries is -- is approximately six miles from it.

Q Now you're not trained as a hydrologist or a geologist, are you, Mr. Squires?

A No, sir.

MR. PERRIN: Nothing further.

CROSS EXAMINATION

BY MR. RAMEY:

Q Mr. Squires, I'm sure you've seen Figure 7 in Exhibit One of the applicant. This is the monitor well configuration.

A Oh, yes, sir.

Q Do you think if water leaked out the bottom of this pit and started moving horizontally towards your well, would it not be picked up by one of the monitor wells?

A Well, I would assume so, yes, sir.

Q And if we had a provision, provided appro-

val was given to this, if we had a provision to, in the event water was detected in these monitor wells, that they come back to hearing after, say, a ninety day period, or something --

A. Yes, sir, that --

Q. -- it surely wouldn't be any danger to your water well --

A. If they get it stopped before it gets in my water well, you know, but --

Q. Well, I certainly have the same interest in mind.

A. I know you do.

Q. To protect your water well. I also want maximum oil and gas recovery from this State.

MR. RAMEY: Any other questions of Mr. Squires?

MR. PERRIN: No, sir.

MR. RAMEY: He may be excused.

Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: No, sir.

MR. RAMEY: Any closing statements?

MR. PERRIN: I don't believe so, Your -- Mr. Ramey.

I would just request that the Commission take administrative notice of the transcript and its decision

in Case Number 6659. That was an Amoco case and I believe it's Order No. 6134.

MR. RAMEY: What was that case?

MR. PERRIN: It was in 18, 31, I think. It was an application by Amoco for an exception to Order R-3221, and they're still disposing of water in that.

MR. RAMEY: That's Case No. what?

MR. PERRIN: 6659. I believe it was Order No. 6132.

MR. RAMEY: Are you going to object to that, Mr. Kellahin?

MR. KELLAHIN: No, sir, there is also another case I'd like you to take administrative notice of. I'll have to get the order number for you. It's Tahoe Oil and Gas. A similar issue was presented and Mr. Reed also testified as a hydrologist, in which case the Commission denied the application for a disposal site.

I'd like to say something very briefly. It would seem like a small point to fight in terms of all the disposal things that are going on, but I think it's very important the Commission not forget that back in '67 when the no-pit rule, there was a very good reason, and I think there is a continuing good reason to use diligence to monitor these things.

Mr. Reed told us that in the immediate area in his search he found one pit disposed of, I think, 25,000 barrels of water in 1981, and his testimony is all we have on that point, and I guess that's the maximum one in this immediate area.

Mr. Westall's talked about the possibility of disposing of 365,000 barrels of water in an area where it's admitted the pond's going to leak to some extent.

I made a quick calculation and it looks like based upon Mr. Reed's testimony some 471 barrels of water would infiltrate on a daily basis. You know, who knows? We can calculate all we want, but we are introducing an impact to an area and we think it's not warranted. There is a facility elsewhere that can handle it. There's a possibility of disposal wells and all other sorts of solutions.

We don't believe the applicant has shown a sufficient economic incentive to justify the Division to approve this application and run the potential risk of further diminishing the quality of water in the area when over the years we've made an effort to improve the quality of water and we're just now seeing where the water is improving.

Mr. Squires testified the potash water disposal has diminished and the area is beginning to dry up a little bit, and as one problem is solved, Mr. Westall seeks

to introduce another one, and we would implore upon you that if you approve this application, that it be done in some fashion that it will protect the fresh water sources in the area.

We have suggested to the Examiner that it be a lined pit and that the disposal amount be limited to the evaporation formula that Mr. Reed has presented. It would appear that that would allow the operator to dispose of 1000 barrels of salt water a day. He's asked for 1500. It's not much of a trade-off if he's required to line the pits and relies on evaporation as a disposal.

We think that is, of course, the action you ought to take. Thank you.

MR. RAMEY: Thank you, Mr. Kellahin.

Is Steve still here?

MR. STEVE REED: Yes.

MR. RAMEY: Steve, would you take the stand, please?

MR. STEVE REED: Okay.

MR. RAMEY: Did you drill core holes on the proposed site?

MR. REED: That's correct.

MR. RAMEY: How were those plugged?

MR. REED: They were plugged with cement.

MR. RAMEY: Okay, thank you.

MR. PERRIN: Mr. Ramey, could I respond to one thing?

MR. RAMEY: Yes.

MR. PERRIN: Mr. Kellahin mentioned the possibility of lining the pits. There was no testimony, no questioning about that possibility today. I think the Commission is probably aware that that would be an extremely expensive proposition and we feel that the testimony that's been presented, together with the built-in protection we've tried to put into this plan to insure that fresh water supplies will not be polluted or contaminated in any way, makes the proposal feasible, and we'd ask the Commission to approve it with reasonable conditions (inaudible).

MR. RAMEY: Thank you, Mr. Perrin.

Does anyone else have anything further to offer in Case 7329?

If not, the Commission will take the case under advisement, and the hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

SALLY W. BOYD, C.S.R.
Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
26 August 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. CASE 7329

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: James T. Jennings, Esq.
JENNINGS & CHRISTY
Roswell, New Mexico

For Bogle Farms: W. Thomas Kellahin, Esq.
KELLAHIN & KELLAHIN
500 Don Gaspar
Santa Fe, New Mexico 87501

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MR. STAMETS: Call next Case 7329.

MR. PADILLA: Application of Loco HIlls Water Disposal Company for an exception to Order R-3221, Eddy County, New Mexico.

MR. JENNINGS: I'm James T. Jennings, appearing -- of Jennings and Christy, Roswell, appearing on behalf of the Loco Hills Water Disposal Company, and I will have three witnesses, Mr. Steve Reed, Mr. Ray Westall, and Mr. Jack Case.

MR. STAMETS: Other appearances this morning?

MR. KELLAHIN: I'm Tom Kellahin of Kellahin and Kellahin, Santa Fe, New Mexico, appearing on behalf of William Bogle, that's B-O-G-L-E, and Bogle Farms, Dexter, New Mexico.

MR. STAMETS: Do you want to verbally renew your motion at this time, Mr. Kellahin?

MR. KELLAHIN: If the Examiner please, My client is a rancher that owns property adjoining this proposed disposal area where produced salt water is going to be disposed of in unlined surface pits.

He became aware of this case on the 19th of August, 1981, and retained me to appear in his behalf today.

On the 20th of August we filed a motion to dismiss this application insofar as it's our contention that the applicant fails to meet the standard required of the Division in order to be an applicant before the Division. We make specific reference to Rule 1203, which requires the applicant, Loco Hills Water Disposal Company, to be a property interest owner or to be an operator or producer for this particular area.

The application indicates that Loco Hills, at least as of the date of the application, had simply made an application to the Commissioner of Public Lands for a business lease, and when I talked to Mr. Jennings on Friday he had not yet obtained that lease, and if Mr. Jennings does not have the business lease today, then we would renew our motion to dismiss this application.

MR. STAMETS: Mr. Jennings, would you respond to that, please?

MR. JENNINGS: Yes, sir. I'd first like to wonder if Rule 1203 applies to other than applicants. It would seem that this property in question is underlain by State lands upon which Mr. Bogle does not hold the lease, and he has -- I don't know what his interest would be, (inaudible) because what's sauce for the goose is sauce for the gander.

I would further point out that it's my understanding, and I'll be glad to call some of the people from the Land Office to verify this, if the Examiner is not aware of it, but it is the policy of the Commissioner of Public Lands not to issue a business lease in situations such as this until such time as the matter has been approved by the Oil Conservation Division.

So you're in an impossible position, if you sustain Mr. Bogle's contention, there isn't anything that you can do.

And I would further like to make the Examiner aware of a letter that was received from the Commissioner of Public Lands, and I will be glad to introduce it, but I would like to read it into the record.

It's a letter dated August 25th, 1981, from the Commissioner of Public Lands, addressed to Loco Hills Water Disposal Company, re the application for business lease, BL-1044. Gentlemen. I have been instructed to inform you that this office has approved your application for a business lease contingent upon approval of the OCD. Once we have assurance that the OCD has granted permission for the disposal ponds, we will continue to process your application. Signed, Benito Lopez, Director of Land Resource Division.

MR. KELLAHIN: May I respond to Mr.

Jennings?

Are you through, Mr. Jennings?

MR. JENNINGS: Yes.

MR. KELLAHIN: There are two criteria, obviously, an individual can have a sufficient interest to appear and object before the Commission, simply be an interested adversely affected party, which Mr. Bogle is in this case.

The Division definitions of waste include surface waste. He has a sufficient interest to be protected.

That is entirely different from the interest necessary in order to file an application. Obviously, Mr. Bogle can't come in here and file an application to drill a well at an unorthodox location or to create a disposal pit, as proposed here, but he does have sufficient enough standing to enter a complaint here.

Mr. Jennings' point is that he is trapped if the Commission denies him standing here because the Land Office indicates a preference on their part to have you hear the case first. That is not permitted within the rules, whatever their desires might be. If in fact that's the situation Mr. Jennings finds himself in, it's not as impossible as he may profess. What he does is persuade the Land Commissioner to issue him a business lease subject to certain

conditions and contingencies, one of which could be very easily a statement that it is issued pursuant, or subject to approval of the Oil Commission of the operation itself.

But it's our point that he fails to meet a sufficient degree of proprietary interest in this property despite the existence of Mr. Lopez' letter without actually having the business lease issued to him in hand.

We renew our motion to dismiss the application.

MR. JENNINGS: I might make an observation.

I neglected to advise the Examiner that we have a thing that we obtained on July 10th, 1981, a relinquishment of the existing grazing lease from the existing grazing lessee, and which this was approved by the Commissioner of Public Lands on the 4th day of August, 1981.

We feel like we do have a proprietary interest in the --

MR. STAMETS: Is this grazing release essentially to give your client the authority to graze cattle on this --

MR. JENNINGS: No, sir, it doesn't.

MR. STAMETS: Does anyone else have the authority to graze cattle out there?

MR. JENNINGS: No, sir. On this particular tract of land, no one has the authority to graze cattle there because the grazing lease has been relinquished, was relinquished so that we could get a business lease. It's my understanding that you can file one on top of the other, but because the Commission would have to have a release in the surface, you have to attach -- or file a relinquishment of the existing grazing lease before you can get the business lease, and that has been relinquished and we'd be glad to offer in the course of our testimony, or we'd offer it at this time, a copy of the relinquishment which was filed and approved by the Commisioner of Public Lands.

MR. KELLAHIN: May I respond to that comment?

The rule requires a property interest, not simply an interest, but a property interest, and property interest means a particular thing. It's the right to use, occupy, possess, and enjoy a particular right.

In this situation the relinquishment of a grazing lease is nothing more than the relinguishing it back to the Commissioner of Public Lands. It doesn't vest Mr. Jennings' client with anything that he can possess or use. He can't take the relinquishment and go out and dispose of water. He has got to now get permission from the Commis-

sioner of Public Lands under a business lease to do as he proposes. A relinquishment means that the grazing lessee has simply given up his right to graze this tract and referred it back to the Commissioner.

The Commissioner has not yet issued him, Mr. Jennings' client, any property right at all at this point.

MR. STAMETS: Mr. Kellahin, you certainly raised an interesting issue this morning, and in discussing this with my attorney, issues are not perfectly clear to me.

I believe under the circumstances I am going to delay taking any action on your motions and considering that all the parties are here, I'm going to proceed and listen to the case and simply take your motion under advisement and take action on it at the time any order would be issued subsequent to this hearing.

MR. KELLAHIN: May I respectfully request that if you desire to state your reasons for your decision on the record so that in the event my client should disagree and desire to appeal your decision, the record would clearly reflect upon what you reason for your decision?

MR. STAMETS: Well, Mr. Kellahin, you realize, of course, that any appeal from this hearing would be de nove before the Commission, and therefor whatever reasons I might give would be of little use to you in the courthouse,

so we'll certainly try and inform you of that for your information in any future case.

MR. KELLAHIN: Outside of the normal administrative appeal process, there is the right to petition District Court for a Writ of Mandamus or a Writ of Prohibition to have the District Court determine whether or not jurisdiction standing is appropriate in this case, and so there is a vehicle by which we could seek a District Court decision, and I'm sure the District Judge would very much appreciate the benefit of your reasoning.

MR. STAMETS: We're going to take about a five minute recess here, and go gather the troops.

(Thereupon a five minute recess was taken.)

MR. STAMETS: The hearing will please come to order.

Mr. Kellahin, on further consideration, the Examiner is going to deny your motion for dismissal at this time and proceed with the hearing.

MR. KELLAHIN: I have some more motions to make.

MR. JENNINGS: May I make one observation

before you start?

MR. KELLAHIN: Yes.

MR. JENNINGS: It's in the record, this will have to be re-advertised, you note in the application the description of the location is described as the south half southwest quarter southwest quarter of Section 16, and it actually would be the lease would cover the north half, and generally the application was for pits located in the southwest quarter southwest quarter of Section 16, but was a typographical error and that was carried forward into the advertisement, and that's all.

We'd move that the application be amended for the change.

MR. STAMETS: This will be re-advertised

MR. JENNINGS: That's all.

MR. KELLAHIN: Mr. Jennings has, perhaps, anticipated my next motion. I was moving to dismiss the application and the case based upon the fact that the application as filed with the Division does not represent the intent of the parties. The property, obviously, is misdescribed.

Rule 1203 requires a written application filed with the Commission at least ten days prior to the hearing date. There's an application filed but it's for the wrong acreage.

We contend that the application has a fatal defect. The applicant must now file a new application for the proper acreage, or at least the acreage he intends to cover in this application. The case must be re-advertised and so set over for a new date.

MR. STAMETS: We'll deny that motion, as well.

MR. KELLAHIN: My client -- I have another motion, Mr. Stamets.

My client, as I told you earlier, just learned of this case last week. Mr. William Bogle is in New York, I understand, today. He's not able to attend the hearing. We have not had an opportunity to review the hydrologist's report, which apparently has been prepared. I received it this morning about fifteen minutes to nine.

We would much prefer to have this case reset to a different date to give us sufficient time to prepare our case, and we are totally unprepared to cross examine witnesses today; to do nothing more than sit here, and if the Commission decides to continue this case, we will reserve the right at the time of rehearing to cross examine all witnesses that testify today and to put on our case at that point.

If you want to hear two cases, it's fine

with me, but it seems to me that it would be more acceptable to continue this case, give us an opportunity to get prepared and allow this application to be re-advertised appropriately for hearing.

MR. STAMETS: Go off the record, Sally.

(There followed discussion off the record.)

MR. STAMETS: Let's go back on the record, Sally.

Mr. Kellahin, we are going to proceed with this case today, and of course you are aware that it will be re-opened and apparently the re-open date -- re-advertised and re-open date will be September 23rd. We will be calling the case on that day and you will be permitted to appear and offer evidence and all the other things that go with a hearing on that date.

MR. KELLAHIN: Let me clarify what will happen with regards to the three witnesses that intend to testify today.

Will those three witnesses return on the 23rd of September to be cross examined or need I have subpoenaes issued for their presence?

MR. STAMETS: That's a good question. Mr. Jennings, do you intend to voluntarily bring these three witnesses back on the 23rd?

MR. JENNINGS: I will try my best. I'm sure we'll have Mr. Westall. I don't know about Mr. Case, whether he can get away from his business or not.

MR. STAMETS: I'm sure Mr. Case can get away from his business again.

MR. JENNINGS: Are you involved on the 23rd?

MR. CASE: Not to my knowledge.

MR. JENNINGS: We'll have them back.

MR. KELLAHIN: With that assurance, we're willing to listen to the witnesses.

MR. JENNINGS: Mr. Kellahin, would you, before we proceed, would you correct your statement about your land being adjacent to this tract?

MR. STAMETS: Well, I think if we're going to do that, let's do it on the record.

MR. JENNINGS: Okay.

MR. KELLAHIN: Mr. Stamets, I misspoke awhile ago when I said the ranch was adjacent to the location. The ranch boundary is in the section that is adjacent to the location, which is slightly different. The ranch fence does

not coincide, nor is it contiguous with the actual site, but the ranch boundary traverses the adjoining section to the west, running from the northeast corner of the section to the southwest corner of that section, with the ranch lying to the northwest of that line.

MR. JENNINGS: Shall we proceed?

MR. STAMETS: I certainly hope so, Mr. Jennings.

MR. JENNINGS: We have, as I said, three witnesses.

MR. STAMETS: I'd like to have the witnesses all stand and be sworn at this time, please.

(Witnesses sworn.)

V. STEVE REED

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q. Would you state your name, please --

A. Steve --

Q. And your occupation and place of resi-

dence?

A. My name is Steve Reed. I'm a consulting hydrogeologist with Ed. L. Reed and Associates, Incorporated, with offices in Midland and Corpus Christi, Texas.

Q. How long have you been engaged in this business, Mr. Reed?

A. Approximately six and a half years.

Q. What is your educational training?

A. I have a Masters degree in geology from Northern Arizona University.

I was employed by the US Geological Survey for approximately seven and a half years and I came to work for Ed. L. Reed and Associates, Incorporated, in 1975.

Q. Are you a hydrologist?

A. I am not a hydrologist per se. I would be more aptly described as a hydrogeologist.

Q. Are you familiar with the application which was filed here in Case Number 7329?

A. I am.

Q. By way of preparation for this hearing and for the -- for the hearing for the application, have you made any particular study?

A. I have.

Q. What period of time did your study cover?

A. We began our studies approximately March or April, I believe, of 1980.

Q. Has it been ongoing since then?

A. It has.

MR. JENNINGS: Mr. Examiner, any questions concerning Mr. -- oh, excuse me.

Q. Have you appeared before this Commission in the past and testified?

A. I have.

Q. And have your qualifications been accepted?

A. They have.

Q. In connection with matters such as this now?

A. Yes, sir.

MR. JENNINGS: Mr. Examiner, are there questions concerning Mr. Reed's qualifications?

MR. STAMETS: The witness is considered qualified.

Q. Mr. Reed, in connection with your testimony, let's first show you what has been marked Exhibit One, which is the book, and in connection with this, Mr. Examiner, I would like to point out that this has been marked Exhibit One, but it consists of a number of separate sub-headings, which are described therein, and a number of figures, which

consist of maps and such, and we thought for convenience sake that we would just use the one exhibit, but I will ask the witness in referring to any figure to identify it by the figure or the other description to which he's referring.

Mr. Reed, are you familiar with and have you made a detailed study of the proposed site, which is located in the southwest quarter southwest quarter of Section 16, Township 17 South, Range 30 East?

A. Yes, my company has investigated this locality.

Q. First would you outline just what the nature of the geology, including surface geology, in this area is?

A. In general terms the site is underlain by sands, silty sands, with a few minor clay zones, which we have assigned to the Triassic Santa Rosa formation. These materials extend from near the surface to a depth at this site of about 220 to 250 feet.

These sediments are dry and they overlie the Permian age Rustler formation, which in this area consists principally of anhydrite gypsum with some silty zones intermixed.

The regional structure is to the southeast.

That in very general terms is the geologic situation that -- at this site.

Q. Well, would you care to go into more detail?

A. We, as part of our investigation, drilled a series of test holes near this property to investigate two things, the occurrence, if any, of ground water in the area, and an examination of the geologic materials that underlie this site.

We specifically drilled six test holes in the area, which reached in depth between approximately 150 feet to one which we drilled to a depth of about 320 feet.

In drilling those holes we drilled them dry, as best we could. On occasion we added fluids to -- to the drilling -- to the hole in order to facilitate drilling, but we essentially drilled them dry and ~~buried~~ jetted them after we drilled the wells.

There are two of these wells which we -- two of these test holes which we cased with small diameter PVC and later came back to them and examined them for fluids.

Exhibit -- Exhibit Number One contains a figure which is labeled in the report No. 5, which shows the configuration of our drilled test holes. If I may, I've got an enlargement of that figure which I could place up on the

wall, and I've highlighted our test holes, as well as the water wells in the area which we have examined, and it might facilitate matters in examining this exhibit.

MR. STAMETS: Fine, Mr. Reed, that would be fine.

A On this exhibit, again it's the same -- it's an enlargement of the same one in Figure 5 of our Exhibit One, and I have highlighted in green the locations wherein we've a test hole.

The light blue square in approximately the right central portion of this map is the 20-acre tract in question.

As you can see, we drilled a test hole just south of this acreage, just to the northeast, one farther to the southeast, one approximately a section, a mile south of the property, one approximately a mile and a half southwest, and one about a half a mile to the west.

To just briefly summarize what we encountered in these wells -- in these test holes, number one, we drilled the number one just south of the acreage. We drilled to 150 feet and encountered no ground water.

Number two, which is west of the site, we drilled to 150 feet and encountered no ground water.

Number three we drilled just to the east

northeast of the site and again encountered no ground water. This one, the number three, is cased and we have found no fluid in this well -- in this test hole.

Number four, which is southeast of the property, was drilled to a depth of 200 feet, and no ground water was encountered.

Number five, drilled approximately a mile and a half southwest of the property, was drilled to 130 feet and no ground water was encountered.

Number six was drilled approximately a mile south of the property. This well was drilled to a total depth of 320 feet, which is approximately 90 feet into the Rustler formation, and again we encountered no ground water.

From -- from this test hole drilling program, we have determined that in the immediate vicinity of the property upon which we propose to place salt water disposal facilities, that the Santa Rosa formation contains no ground water. Indeed, the fluid levels are well below the top of the Rustler formation.

In addition to our test hole drilling phase, we examined data from the State Engineer's Office, and visited the site to verify these data of any and all water wells in the vicinity of this 20-acre tract.

Essentially we looked at a minimum six

mile radius, although as you can see again on this figure five, we show the wells that are considerably beyond the five mile, the five or six mile radius. The red dots on this map on the wall again, they're -- the dots are the same locations that are on the map in the Exhibit One. The red dots just merely highlight them of this for clarity in this hearing.

Our locations of various water wells in the vicinity of the 20-acre tract, the nearest water well that we could find in the area is approximately a mile and a quarter south of the 20-acre tract. This well is an abandoned water supply well. It was drilled to a depth of 506 feet. It is completed in the Rustler formation. The water level is 330 feet below the surface. Again, this level is well down into the Rustler. That fluid level is not up in the Santa Rosa formation.

And since it is Rustler water, as one can expect, the quality of this water is quite poor. There is a reported chloride concentration in this abandoned well of in excess of 10,000 milligrams per liter, as chloride.

The other wells we examined in the area, again just briefly summarizing, there are two wells approximately 5 miles west of the property. One of them has a very shallow water well, 69 feet. The other well, which we were not able to obtain a fluid level on, we do have some

recent chemical analyses on, and this is an area where there appears to be a local perched ground water in the Santa Rosa and the total dissolved solids in the water produced from that well are 2722 milligrams per liter.

We examined a well approximately four miles southwest of the property with a -- that contained reported chloride concentration in excess of 4000 parts per million. These data were reported by the Oil Conservation Commission for analysis, I believe, in 1969. This is in a water supply well that had been abandoned.

Going -- continuing in a counter-clockwise direction, in Section 10, approximately six miles, five or six miles southwest of the -- the property, is a stock windmill, which has a water level of about 160 feet below the land surface. Water produced from this well contains total dissolved solids of almost 7000 milligrams per liter.

Again we assume from the water level data that this is a perched water table in the Santa Rosa formation.

Continuing clockwise in Section 24 is a stock windmill which has a water level of 140 feet. Our recent most analysis shows water produced from this well contains total dissolved solids of 932 milligrams per liter.

I can continue on around in a counter-clockwise direction in Section 9, there's an abandoned stock

well which we could not find in the field. It was reported and we did not see that well there now.

Just to the southeast of that location in Section 22 we see two wells, which we only have water level data on and no -- no ~~Daulby~~ quality data on. The water level in one appears to be equivalent to one residing in the Rustler formation and the other one just to the southeast of that one, which has a water level of plus 3311, is again, probably a Santa Rosa well.

There are others in the area that are farther out than these that I won't go into right now, unless you would like me to later on. But I believe this is enough information to demonstrate to us very clearly that within -- within a 4-mile -- this in combination, now, with our test hole drilling, that within a 4-mile radius of our proposed disposal site, the Santa Rosa formation contains no ground water. Albeit that in excess of four to perhaps six miles of the site there are isolated, appear to be isolated perched zones of -- of water, some of which is potable, some of which is certainly not potable, in the Santa Rosa formation.

Q. Mr. -- just one question. There is shown a red -- red line on that map that starts up in the righthand corner and kind of comes down and goes over in the 17 -- Township 17 and comes on south. What -- what is that

line? Can you identify that for us?

A. That red line is the approximate eastern boundary, at least in this portion of the map, of the -- of the Bolger Ranch.

Q. Bogle.

A. Bogle. I'm sorry.

Q. Now, Mr. Reed, what is the general flow of the -- not only the surface but the underground flow of water in this area?

A. Again, as shown from -- from this figure, a large part of this figure -- at least a part of this figure is data derived from State hydrology reports in this area, and these data are supplemented by our own field investigation. We show a hydraulic gradient in the ground water system towards the southeast, in this particular area.

When one examines the hydrolic gradient on a regional basis, the hydraulic gradient south of here bends towards the south and southwest.

But in this particular area it is in the direction of southeast.

Q. Where is the potash area from this property?

A. If I might place another map on the wall, this is a -- is a map that shows from the information that

we have to date, the approximate locations of the various potash mines.

Q. If you -- it might help if you could put it over there. We might have to refer to it again.

A. And exemptions to -- to the no-pit order. The -- and this is in our Exhibit One. I believe this is as figure six in our Exhibit One. It is merely a portion of that map.

The dark blue squares are again the approximate locations within each of those sections of -- of exemptions to the no-pit order. The -- these pits have been located on this map using a list provided to us by the District Office of the Oil Conservation Division. We have taken those data and plotted them on this map.

There certainly may be some very recently granted which I do not have on this map, but these are at least reasonably recent data.

This map also shows the approximate location of the Duval Potash Mine, approximately seven or eight miles to the south, and Southwest Potash Company, which is about twelve miles south.

Again, I have placed on here to approximate eastern limits of the ranch.

As you can see on this map, there is a

number of permitted pits in the vicinity of -- of the 20-acre tract in question here today. Many of them are -- are to the south, although there are some to the west.

Q. Where is -- where is the Clayton Basin?

A. The Clayton Basin exemption, if I'm not mistaken, it comes in at about Township 19. It's essentially just south of -- of our property, approximately 20 miles.

Now, these permitted pits are -- are there principally because there is an absence of potable shallow ground water, and thus no -- there is no potable shallow ground water to -- to be jeopardized by these salt water pits.

Q. Are you through with that?

A. Yes.

Q. Would you discuss the feasibility, and not only the feasibility but the plan of operation of the facility?

A. We propose in the 20-acre tract to construct a minimum of three ponds and if at this time you'll refer to figure seven in Exhibit One, I show the boundaries of our 20-acre tract within Section 16, and in red pencil I have shown the surface contours as taken from the 15-minute quadrangle map of this area.

I have shown in green the approximate

configuration of the pits as we would propose to construct them in this -- in this tract.

We again propose the minimum of three pits with a fourth pit used primarily as a skimmer pit, removing the last bits of hydrocarbons from the water that discharges from our separator facility.

The separator facility essentially is -- is patterned after other facilities that appear to work quite well. We propose a series of three 500-barrel tanks, two 250's, to remove the majority of -- of hydrocarbons and suspended materials from the water before it is discharged into the first earthen pit. Again, the first earthen pit is a small pit and is designed to entrap the last residual material that floats on the surface of the water.

We propose three pits for a number of reasons. We feel it's operationally more sound to have more than one pit to discharge into, such that we can continue to dispose of salt water should be require; should one of the pits require maintenance. That particular pit can be dewatered into the other ones and maintenance can be performed on an individual pit.

We are proposing for these pits to maintain a maximum fluid level such that if -- there at all times is a minimum three feet of freeboard between the top

of the water and the top of the dike. This freeboard is designed specifically to handle rainfall, such that there will not be undue spillage, or any spillage.

Now, if I can take just a moment to go back and describe the shallow geologic material, I think it's important to consider these materials when examining our monitor well ring, which we have again shown on this illustration.

In our Exhibit One we show three geologic cross sections, which are a combination. These are in our Exhibit One labeled figures one, two, and three, which are a combination of data from nearby oil and gas tests. They include logs of the -- one of them includes a log of the Anadarko water supply well just south of our property. They also include our test hole data.

As can be seen from -- from these cross sections, the materials of the Santa Rosa consist principally of sand, silty sand, with thin interbedded silty clays, and minor clays. We attempted when we first gathered these various logs to correlate the clays, principally because we needed to see ir there was a barrier, a horizontal barrier, to fluid migration.

Indeed, we were unable to correlate these clays any distance at all. They are very discontinuous and

they're discontinuous over short distances.

For a detailed lithology of our test holes, I would refer you to a portion of our Exhibit One, which is labeled sample descriptions, test holes.

Again, these test holes indicated predominance of sand, sandy clay.

We believe, in examining the shallow geologic materials, that the ponds located on this 20-acre tract will be underlain by material which is less than totally impervious. In other words, these materials, these shallow materials, will not necessarily contain the introduced brine in the immediate vicinity of the pond floors. We anticipate there to be percolation down through the floors of the ponds and this percolation will continue to the Rustler. We say this and support this with the knowledge that, number one, the Santa Rosa is indeed dry in our area, which does indicate that if it does ever receive ground water, that it does drain out, and secondly, again, the discontinuous nature of the clays. We don't see any major horizontal barrier to the downward percolation. There may be short -- and indeed probably will be short horizontal paths as it migrates to the Rustler, but we believe these will be short and that, to reiterate, the primary direction of fluid migration from these ponds will be vertically down to and into the Rustler.

The Rustler, of course, contains water with -- that has dissolved mineral concentrations well in excess of 10,000 milligrams per liter.

We believe, though, that we need to demonstrate our conclusions, that our conclusions are indeed valid, of primarily vertical percolation by a series of monitor holes, which have proposed around the site. We have proposed two kinds of monitor holes, a series of shallow monitoring holes, which completely surround the site, and are drilled to an approximate depth of 60 feet.

The first clay that we see in the section that could induce horizontal migration lies at a depth in this area of between 30 and 60 feet. So we propose to complete the bulk of the monitoring holes at about 60 feet, because if we indeed experience undue horizontal migration, this is the place to complete the well. These wells will detect that horizontal migration.

But we've gone one step beyondthat. We also propose to complete two Rustler depth wells on the down-dip side of the ponds. These wells, one which is due south of the ponds, one which is to the southeast of the proposed ponds, will be completed to an approximate depth of 250 feet, and they will examine and be able to detect undue horizontal migration that might occur below the 60-foot level.

Q. You are referring to what has been marked as figure seven --

A. That is --

Q. -- the Rustler wells are marked red and the blue are the 60-foot?

A. That is correct.

Q. Okay, excuse me.

A. We have proposed a monitoring schedule for these monitor wells, this schedule being an examination four times a year over the duration of our project. The results of these -- this sampling, of course, would be, and will be, forwarded to the Oil Conservation Division.

Q. How do you propose to case these holes?

A. All these monitor holes will be cased with PVC casing with a minimum diameter of two inches. This is a diameter which allows sampling of the monitoring well. They will be perforated throughout almost their entire length with the exception of an upper few feet of -- of blank casing, which will -- which will be opposite the cemented annulus. We propose to cement the upper five or six feet of casing in the well to prohibit migration of surface waters down into our monitoring well.

Q. Mr. -- Mr. Reed, have -- has the general pattern of this plan under construction followed the plan

that was designed in the Wallach site, which is approved in Case Number 5899?

A. Well, the overall design of ponds and the -- the methods wherein the oil and -- residual oil or hydrocarbons of some sort, sediments, are separated from the water and discharged to the pit, the general configuration of the diking and the monitor wells, is -- is indeed very similar to that operation.

Q. Have you made any evaluation of the potential evaporation?

A. Yes, I have. As I have previously reported to the Oil Conservation Division, in examining the evaporation data from the Red Bluff Reservoir, one can expect to evaporate approximately 3 -- 3500 barrels per month per acre. Now this is on an annualized basis. Indeed, one has to operate at something less than 3500 barrels a month, because we wish to not have undue accumulation from year to year, which would tend to build up in the low evaporation months.

Again, equating to fresh water, we have determined that without any annual accumulation, except in the very worst evaporative years, which would then be taken care of in the following years, one can expect to evaporate 3180 barrels per month per acre.

Now I don't expect that the evaporation at Loco Hills site will be quite 3180 barrels per month per acre. The reason being that we're some distance north of the Red Bluff evaporation station; we're somewhat higher in elevation than the Red Bluff station. So I have estimated a -- what I consider a very conservative expectation of salt water evaporation of between 2000 and 2500 barrels per month per acre.

This, using the lower figure of 2000 barrels per month per acre, and assuming a 15-acre pond, we could reasonably expect to evaporate on the order of 1000 barrels per day.

This disposal rate does not take into account any infiltration which we might experience.

Q. I believe, Mr. Reed, you have referred to basically all of your figures, have you not?

A. I have pointed out most of them. I think I did not discuss the Rustler structure map, but I discussed the -- the overall structure. There is a map in the Exhibit One, labeled figure four, which is a structure map on top of the Rustler formation, showing that the Rustler dips towards -- it locally dips towards a depression just east of our proposed location.

Regionally, on a regional basis, the

Rustler, of course, dips to the southeast.

Q. As a result of your -- of your study have you reached any conclusions concerning the feasibility and other features of this site?

A. I have. In conclusion, it is our opinion, number one, that water introduced into these ponds will be eliminated primarily by evaporation and there will very likely be some infiltration, which we anticipate to travel in a vertical direction, arriving at the Rustler formation, which already contains water which is impotable.

We do not see that this operation will have any adverse affect or endanger any shallow ground water systems, because, indeed, in our area we see no potable ground water systems.

We believe this facility can be operated so as not to jeopardize fresh water supplies.

Q. Mr. Reed, in your opinion will the use of this site as a disposal facility in any way impair the correlative rights of any of the operators, including the ranch operators, in the area?

A. I don't believe so.

Q. Will -- in your opinion will the use of the disposal site located at Loco Hills be in the interest of conservation and prevent waste?

A. I would believe so, yes.

Q. Mr. Reed, assuming that the nearest disposal site is more than 30 miles distant, where -- commercial disposal site, will the installation of this facility at Loco Hills prevent the premature abandonment of many wells, including many stripper wells in the area?

MR. KELLAHIN: I'm going to object to that question. There is no foundation laid that this witness is competent to qualify as to oil or gas production.

MR. STAMETS: What was the question specifically? Could you run it back by me?

(Thereupon the reporter played back the previous question.)

MR. STAMETS: I will sustain the objection as to the specific language of that question.

Q. Mr. Reed, I'll try again. Mr. Reed, are you familiar with the general nature of the oil and gas production in southeast -- or in this area of eastern Eddy County and western Lea County?

A. I'm not really familiar with -- with the oil production, no, sir.

Q I see. Were Exhibits -- was Exhibit One prepared by you or under your direction?

A Yes, it was.

MR. JENNINGS: We would offer at this time -- offer Exhibit Number One.

MR. KELLAHIN: If the Examiner please, we would like to withhold cross examination and would object to the introduction of the exhibit until the hearing on the 23rd of September, when we'll have an opportunity to cross examine Mr. Reed.

MR. STAMETS: I think that that would probably be an appropriate course of action, and we will delay entry of the exhibits until the hearing on the 23rd.

MR. JENNINGS: That's all we have of -- let me -- we have no further questions.

MR. STAMETS: Okay.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Reed, you've testified here a number of times on various disposal sites. This is the first one that I recall that you said was going to leak, and I think that that raises a number of issues specifically in this case, our 1000, magic 1000 barrels a day for 15 acres, how much of

that is going to leak, and where is it going, and we're already short-lived creatures, where is it going ultimately? Is this going to move vertically down into the Pecos River or is it going to be permanently trapped in some depression at the top of the Rustler? Is it going into the Rustler? What's going to happen to this water?

A. Mr. Examiner, indeed it is a different situation than other disposal facilities which I have testified to which we do not anticipate leaking and are true evaporation facilities.

In this particular area we do not have the underlying impervious clays which would restrict any vertical migration. The leakage rates through these materials are -- are certainly not well established, but I believe that we can say that it will indeed migrate through the floor of-- of the ponds.

We have done various infiltration rates, studies, for other projects, which show a wide range of infiltrations from 10 gallons a minute per acre to in loose materials, 3-or-400 gallons per minute per acre.

At this facility, examining the shallow materials, I would certainly be persuaded to assign numbers that are on the lower side of that range.

We anticipate that the brine introduced

in these pits will migrate directly into the Rustler formation, into a formation which otherwise contains extremely poor quality water, and we believe that the brine introduced in these pits, once it arrives at the Rustler, will migrate along with this otherwise very poor quality water.

Q. Where does it go?

A. The ultimate discharge line, or direction of flow on these formations -- of this ground water in the Rustler, is regionally in a southwesterly direction towards the Pecos River.

Q. Mr. Reed, I believe that I have observed water from the Rustler being used as stock water in parts of Eddy County. Is it conceivable that this water which should eventually become a concentrated brine could enter the Rustler and effect this use as stock water?

A. I do not believe so, primarily because again the water that enters the Rustler will be entering a regime in this particular area that already, if it comes in contact with more potable water, it in itself and by itself will render that water impotable.

In other words, the water that is contained in the Rustler at this point is already extremely poor quality water. We, if we don't introduce any water into it at all, that water is still there, and we are -- are

degrading it somewhat, we are degrading water that is already well in excess of 10,000 milligrams per liter.

Q. Is it possible for you to make some tests of the materials in this area to determine a good estimate for the rate of infiltration?

A. Certainly. There are two ways to do this. One would be to collect core samples or Shelby tube samples and run permeabilities on those samples. We would have to run samples all the way from the surface down to the Rustler to get a good infiltration rate.

There are certainly a water balance, as one operated the facility, one could calculate evaporation versus total disposal and calculate, perhaps, more precisely the infiltration level.

Q. Is there anything reasonable that the applicant could do in this case to reduce the infiltration rate?

A. We do not propose, and feel particularly this size pond, that it would not be desireable to -- to attempt to restrict the downward migration. We base these views principally on our conclusion that there is nothing beneath us that requires protection of a liner.

Q. Mr. Reed, it seems difficult to me to see the ultimate conclusion that you have just stated without

knowing the volume of water which might be expected to go into the pits, over how long a period of time, rate of infiltration, and size of the slug of water that would be introduced into the subsurface, and the path that that water would follow.

You've certainly looked at a rather localized area here, and you haven't discussed volumes, how far that might travel.

A. It is true, we have not tried to, at this point, to assign infiltration rates. We have, though, determined that the migration will be down and into water which is certainly poorer than water which needs to be protected from -- from the -- from degradation.

This water that does migrate through the underlying materials and arrives at the Rustler will migrate along with this otherwise very poor quality water.

That will happen regardless of whether it's a minor volume or a major volume, that these two waters will be -- the native poor quality water and our introduced poor quality water, will reside in the same system.

Q. Would you categorize the expected volume which we don't have any figures on as being a major volume or a minor volume in relationship to that volume which moves through the Rustler in this area?

A. Oh, I would term it as a minor volume

in terms of the overall flow in that system.

Q If the monitor wells, say for example the shallow monitor wells, picked up water movement above the top of the Rustler, do you feel that any corrective action should be taken? What -- what process should be followed at that point?

A In the event that one of the monitor holes does indeed show presence of brine, at this point we anticipate evaluating that situation and either recommending that the facility stop, cease its operation, or to predict from this particular study, it depends, for instance, where the brine would be entering the wellbore, over a period of what time it took for the water to enter the wellbore, that we would either again recommend cessation of the operation or we would -- would demonstrate that -- that the brine is indeed in a overall vertical infiltration path, with a recommendation, if that is indicated, that the operation continue as long as they can demonstrate that -- that horizontal migration is not excessive. We would follow that, and back that up by a second series of monitoring wells if that was indicated.

Q Is there sample data available, or samples available from the original test holes that could be utilized for an estimate of rate of infiltration?

A. No. They would not lend themselves to this sort of an evaluation, no, sir.

Q. What sort of expense would be involved in obtaining evidences with respect to the infiltration rate?

A. To -- to do proper soil testing to evaluate the -- the vertical infiltration, I would assign a dollar figure between $10-and-15,000.

Q. Will there be any tendency for these ponds to seal themselved naturally? Would a build up of solids result in evaporation?

A. They will tend to seal themselves with time, somewhat.

Q. Do you expect them to ever seal themselves?

A. No, sir.

Q. Slowly?

MR. STAMETS: Are there other questions of this witness?

Mr. Simpson, our water resource specialist.

QUESTIONS BY MR. SIMPSON:

Q. Why was consideration around the site to drill only to a depth of 150 feet instead of not go to the

full depth of the Rustler to determine if there was any fresh water below?

A. Well, we initially were essentially flying blind, as it were. We did not know where or if we would encounter ground water in this particular area, and the first holes were drilled to a depth that we expected to either encounter impervious clays or encounter ground water, perched ground water. And our last test hole, indeed, we attempted to drill through the entire Rustler section -- I mean Santa Rosa section, to determine whether it was going to be dry.

Q. Which hole was that, that you attempted to drill through?

A. I believe that is test hole number six just south of project.

Q. Just south, the furthest one south?

A. Yes. the furthest one south.

Q. Okay, and that was the one where you went to the base of the Rustler, if I remember correctly?

A. No, sir, we went into the Rustler but we did not -- we went about nine feet into the Rustler.

Q. All right, you obtained no, supposedly no water?

A. There's no water in that test hole, that's right.

Q Okay.

A And in fact, of course, this is supported by the -- the water supply well, the abandoned water supply well nearby, wherein the water level, measured water level at that location is within the Rustler.

Q And it's 330 feet. Wouldn't it be to your satisfaction to drill that extra 10 feet to determine if that is true and factual results at the time? Have you done any research on the area? That's an extra ten feet of drilling to prove that this is an old abandoned well.

A I don't know at what time our field people collected data on that abandoned water supply well, whether it was before or after this test drilling; however, again, realizing that -- that we do have data showing the Rustler contains very low quality water, once we're into the Rustler and show that there is no water above us, we feel very confident in saying that there is no fresh Santa Rosa water.

Q Whether the Santa Rosa had any water or anything, we're determining here is ground water of 10,000 -- 10,000 parts per million, and I could foreseeably see that you could have in the basal part, since this -- this further south well shows chlorides of 10,000 parts per million, do you actually know where the perforations are? In other words,

you could be testing the bottom part of the Rustler instead of the top part.

A. Well, the hole is only -- the fluid levels, I believe, are 330 feet from the surface and the total depth of the well is only 506 feet.

Q. That's true.

A. So I think it's safe to assume that the Rustler is underneath us and has extremely poor quality water.

Q. That's based on your hole. The regional profile for the structure of the Rustler was given on figure seven. Or is that number four?

It shows quite a bit of dip. Did you all draw this contour for the Rustler based on information you had?

A. We did, yes.

Q. How come there's not any further testing and drilling over to the further east of your site? You have a pretty scattered area right -- of testing down further south from you. It looks like the regional or any percolation could go to the south, based on the dip structure, the structure of the Rustler.

A. Well, again, our test hole program was not designed to -- to test the dip of the Rustler. It was designed to test for Santa Rosa -- potable Santa Rosa water.

Q. Well, whether the Santa Rosa had any water or not, the Rustler could have some water to potentially protect. That's the whole thing, in my opinion.

What water is down there that we need to protect, whether it's the Santa Rosa -- the Santa Rosa is dry, but the Rustler may have something to protect, that's my point.

A. I understand. I understand your point, and that's certainly our -- also our consideration. We do not believe that the Rustler in this area contains anywhere near potable water.

Q. And is it my contention that you did -- you relied on those -- that existing well that was abandoned results, or did you personally go out and test, this water well?

A. I don't believe we tested that ourselves, no.

Q. So you have one well with questionable results, I mean unreliable results, on which we're basing everything we're going to protect or not going to protect.

A. No, I would include with that our deep test hole, which shows the predominance of anhydrite and gypsum in the top of the Rustler, and is dry to that point.

Q. The -- you mentioned that you used some drilling fluids to drill your test holes. What drilling fluids

did you use?

A. We introduced a small amount, in some of the wells, of fresh water.

Q. Of fresh water.

A. That we ran and jetted out when we got through.

Q. No drilling mud?

A. No, sir.

Q. What kind of a drill was used to drill these holes?

A. I believe it was a small Failing, if I'm not mistaken.

Q. Cable tool?

A. No, sir, a rotary rig with a --

Q. Air?

A. -- an air compressor on it, yes, sir.

Q. And you said when you -- that -- the statement about you'd run some soil tests and you'd estimate approximately $10-to-$15,000, did that include what Mr. Stamets was talking about, taking the -- you mentioned using, possibly, core samples or Shelby tube tests?

A. That's included in that figure, yes, sir.

Q. To determine the percolation?

A. Yes.

MR. SIMPSON: I don't have any other questions.

MR. STAMETS: Any other questions of this witness? Mr. Jennings?

MR. JENNINGS: Just one question, one or two questions, Mr. Reed.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q. Would you refer to what has been marked as, I believe, Exhibit Six, or figure six, which outlines the disposal route and tell just where the water goes that is disposed of?

A. Well, in the areas of -- of disposal indicated on that map, unless those pits are lined, they would also migrate down to the top of the Rustler formation. And become part of that system.

Q. Do you have any idea about the number of barrels of disposed -- allowed to be disposed of in those various pits?

A. I do not, no, sir.

Q. Is that information available?

A. I'm sure it would be.

Q. With the Oil Conservation Division?

A. I would assume so.

Q. Mr. Reed, is the area that is exempt under Order 3221, I believe, between this location and the Pecos River?

A. Hydrologically, yes.

MR. STAMETS: If there is nothing further, this witness can be excused.

A. Thank you.

MR. STAMETS: Let's see, you offered Exhibit One.

Mr. Jennings, I'm going to ask that you submit the letter from the Land Office indicating their --

MR. JENNINGS: Well, I'm not through.

MR. STAMETS: Okay, but I'm going to ask you to submit that letter and your copy of the relinquishment as exhibits today.

MR. JENNINGS: Well, I propose to use another witness.

MR. STAMETS: Okay, that will be fine.

RAY WESTALL

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q. Mr. Westall, just one minute and I'll mark the exhibits here.

Would you please state your name and place of residence and business?

A. I'm Ray Westall. I live in Loco Hills, New Mexico. I am an independent oil producer and also have a hot oil service in Loco Hills.

Q. How long have you resided in Loco Hills, Mr. Westall?

A. Off and on all my life, around 30-35 years.

Q. What is your -- are you the president of Loco Hills Water Disposal Company?

A. Yes, I am.

Q. Are you familiar with the application that has been filed here by and on behalf of Loco Hills Water Disposal Company?

A. Yes, I am.

Q. Is that generally an application to get an exception to the no-pit order?

A. Yes, it is.

Q. And I think you heard the testimony that the proposed pit is to be located in the north half southwest southwest quarter of Section 16?

A. Yes, sir.

Q. Who was the original person -- who is the holder -- was the holder of the State grazing lease on that tract?

A. It's the -- it's held by Mrs. Ward, Mrs. Ferguson, and Mrs. Morgan.

Q. Is that Charles R. Martin, Inc?

A. Right.

Q. Is Charles R. Martin their father?

A. Right.

Q. Was it -- did you obtain a relinquishment of this grazing -- their grazing lease, which is number GR-817 from Charles R. Martin, Inc.?

A. Right.

Q. Was that after considerable negotiations?

A. Right.

Q. Please refer to what has been marked Exhibit Three and tell me if that's a copy of the relinquishment?

A. Yes, it is.

Q. Does that show to have been approved by

the Commissioner of Public Lands?

A. Yes, it does.

Q. Now, Mr. Westall, have you sought and -- have you made applications to the Commissioner of Public Lands for a business lease on this land?

A. Yes, we have.

Q. And have you made inquiry from time to time to determine the status of the application?

A. Yes, we have.

Q. Let me ask -- of the record.

(Thereupon discussion was had off the record.)

Q. I hand you here what has been marked as Exhibit Four and ask you to identify that, if you would, please.

A. Yes, this is a letter we received from Mr. Lopez on this business -- on our business lease.

Q. Is that the letter that you heard me read into the record at the outset of this --

A. Right.

Q. Does that indicate that a lease will be issued if the Oil Conservation Commission grants this approval?

MR. KELLAHIN: I object to the question. The exhibit speaks for itself.

MR. STAMETS: Sounds like the question was withdrawn, so we'll sustain the objection.

MR. JENNINGS: That's true.

Q. Now, Mr. Westall, what is the general nature of the terrain in the immediate area of the site?

A. As far as -- it's just sand hills and scrub oak and mesquite.

Q. Is the site adjacent to the highway?

A. Yes, it is.

Q. Is the highway fenced?

A. No, it's not.

Q. Mr. Westall, are you familiar with the general production and number of wells and just the general oil field business in the Loco Hills area?

A. Yes, I am.

Q. As an independent operator?

A. Yes, sir.

Q. Do you have occasion to go to many well sites frequently?

A. Yes, sir.

Q. What -- just briefly explain the nature of your business, of the Hughes Hot Oil Company.

A. Well, Hughes Hot Oil Company, we service wells, we suck the BS off of pits to be disposed of, and just general oil field work as far as the maintenance of wells as far as paraffin, treating tanks, et cetera, et cetera.

Q. Are there a great number of these wells in the area?

A. Yes, sir.

Q. Do you have any idea how many wells actually within a 15-mile radius of Loco Hills?

A. I would say approximately 1500 wells in that area.

Q. Are many of these wells stripper wells?

A. Yes, sir, I would imagine a great number.

Q. How long is it -- have they had production in that area?

A. Oh, since the early '20s, I would say.

Q. Do the wells produce -- some of the wells produce water?

A. Yes, they do.

Q. Do you -- do you have any idea of what percentage of them produce water?

A. No, sir, I -- just -- almost all wells produce water. Some wells, though, the produced water is reinjected in water floods, stripper wells.

Q. What is done with this water, do you know?

A. At the present time they haul it to the Laguna Gatuna, the water disposal down in Lea County.

Q. Well, are all the operators required to dispose of the water in some manner?

A. Yes, sir, except just on your exception pits.

Q. Do you know of any commercial water disposal facilities in the immediate vicinity of Loco Hills?

A. No, sir, there's not one in the section.

Q. Where is the closest?

A. The Laguna. It's approximately 35 miles, I guess, from Loco Hills.

Q. Is a pit located in Township 20 South, Range 33 East?

A. Yes, sir.

Q. Which way is that from Loco Hills?

A. It's southeast.

Q. Do you have any knowledge of the cost of transporting oil -- or water to the Laguna disposal system?

A. Right. I have -- I have water hauled from a well that's approximately 8 miles south of Loco Hills area. It costs us around $1.35-40 cents a barrel to have it

hauled out of there and disposed of.

Q. Approximately $200 a load?

A. Right.

Q. And how far is the proposed site from your well in particular?

A. It's about 8 or 9 miles.

Q. Do you have any -- Mr. Westall, do you actually reside -- do you have your residence in Loco Hills?

A. Yes, sir, I do.

Q. Where do you obtain your water?

A. We obtain the water from Caprock Water Company. It comes from off the Caprock and is approximately 18 to 20 miles north-- east of Loco Hills. It's pipelined in.

Q. Do you -- where do the other residents of Loco Hills obtain water?

A. The same place. It's a utility.

Q. What charge -- what do they charge for water at Loco Hills?

A. They charge 10 cents a barrel.

Q. Do you have any idea about the cost of drilling a water well in the Loco Hills area?

A. There's -- there's not any fresh water wells in the vicinity of Loco HIlls, as such, even back in -- earlier, whenever they drilled cable tool holes. They did not

get any fresh water in that vicinity, according to the wells that I've checked it on.

Q. If there were available water, would it be economic to drill a well in light of the 10 cents a barrel charge?

A. Definitely. Because the water bill runs $30-to-$40.00 a month, you know, just on -- and very few people have a lawn out there at all.

Q. Mr. Westall, I hand you what has been referred to as Exhibit Two, and ask you to identify that.

A. Yes, sir, this is -- this is our proposed water disposal plant. We propose to have it where that we can run all produced water through three 500 barrel tanks, skimming all hydrocarbons off of it, and then going to further two 250 barrel tanks to take -- the skim the rest of the -- rest of the hydrocarbons that come out on it. Then we plan to go into two skim pits before we go into our major pits in order to take -- to get any of the other hydrocarbons that have been -- to keep them off the main pits, keeping all residue off the main pits.

Q. Now, referring to that diagram with the five circles, are they the tanks?

A. Right, they're the major tanks. Out here on the lefthand side we have our lines to where the

trucks hook up and pump them into the -- pump the water and hydrocarbons into our main tanks.

Q. How is that facility to the -- how is it to gauge the water that's taken from each truck?

A. Well, we'll have meters and we're going to be able to meter all the water that we put into tanks in order to keep up with how much water is disposed of.

Q. Referring to the left part of that exhibit, are the lines that are marked in red, is that where the meters will be located --

A. Right.

Q. -- input lines?

A. Yes, sir.

Q. And where is the highway?

A. It runs adjacent to it here on the west side of the stuff on the lefthand side.

Q. How far is this off of the highway?

A. This will be just approximately 100 feet off of it, where we have room to turn around.

Q. Do you plan to fence the area?

A. Yes. Our tanks, and also all the pits will have a fence around it, tank area and most of it around there will have a chain-link fence where they can't dispose directly into the pits. They'll have -- everything will have

to go through our tank and get it tested.

Q What do you -- how many hours a day do you propose to operate the facility?

A We will operate it, it will be a 24-hour a day facility and we will have a man on hand, somebody living right there at the facility.

Q Do you know if the Laguna Gatuna facility, which you spoke of earlier, operates on a 24-hour facility -- basis?

A No, they just came out with lately, they have a -- they have a letter that just came out where they just operate 12 hours a day, and if you have anything after 7:00, say, they operate 7:00 to 7:00, anything after 7:00 o'clock they -- it's an extra charge for them to come out and open up their facility so that you can dispose of fluids.

Q Is there any need for disposal facilities between 7:00 p. m. and 7:00 a. m.?

A Well, yes, sir. There's a lot of produced water that trucking outfits have to work on other projects in the day, as far as filling frac tanks, and everything else, and a lot of times the only time they get to haul this water is -- is after -- after dark.

Q How many trucking companies operate in that immediate vicinity?

A. There's four to five.

Q. How many trucks do they operate between them?

A. I would say that there's probably sixty to seventy trucks in that area.

Q. Engaged in hauling water?

A. Hauling water, right.

Q. Where are these located, the companies?

A. There's Steve Carter in Maljamar; INW in Loco Hills; we have Jim's Water Service in Riverside; then there's Broom's Water Service in Artesia, and also we get Western Oil Transportation out of (inaudible).

Q. Mr. Westall, from your experience and your living and operating in the area, is there a need for water disposal facilities in this vicinity?

A. Very much so.

Q. Is all of the water that's disposed of by various truckers put in Laguna?

A. No, sir. I know that over the years they've had many problems of them dumping it on the roads and in the barditches over the years.

Q. Is that a common practice?

A. Well, no, sir, not really, but it happens.

Q. Is INW one of the trucking companies, water trucking companies in the area?

A. They're in Loco Hills, right.

Q. Are there a number of small operators in this vicinity?

A. Yes, sir.

Q. Basically --

A. Independents.

Q. -- independents? More than major companies?

A. Probably so.

Q. Mr. Westall, in your opinion will the approval of this application prevent waste and protect correlative rights -- will prevent waste and be in the nature of an economic move for all of the operators?

A. Yes, I believe it will be.

Q. Do you have any knowledge as to whether or not this would in any way impair any fresh water in the area?

A. No, sir, there is not any in the area to impair.

Q. Do you feel that this will affect the rights of any of the offset operators or ranch operators?

A. No, sir.

Q. In your opinion will the installation of this project result in a greatly decreased cost, trucking cost, and prevent the premature abandonment of many marginal wells in the area?

A. Yes, sir, I do.

MR. JENNINGS: I believe that's all I have of this witness, but I would like to offer the exhibits Two, Three, and Four, and ask Mr. Westall, was Exhibit Number Two prepared by you, Mr. Westall?

A. Yes, it was.

MR. STAMETS: I'm going to accept these exhibits into evidence.

CROSS EXAMINATION

BY MR. STAMETS:

Q. You will be the operator of this facility?

A. Yes, sir.

Q. Would you have any objection to limiting the volume which could be disposed of in this facility to the theoretical volume which could be evaporated from the facility?

A. I don't know if it would be feasible to do such a thing. I feel like we could probably work something as such, but I don't know if we will have any more water than that or not. I don't know for sure. I really don't know if

we'll have that much water or more, you know.

Q. Okay, so under -- would you be willing? The first witness indicated the evaporation rate might to be expected to be 2000 to 2500 barrels per acre per month, and would you be willing to accept disposal limit of 2500 barrels per acre per month?

A. I believe that we could probably stay with that. I think that would work.

Q. All right.

MR. STAMETS: Are there other questions of this witness?

MR. KELLAHIN: If the Examiner please, I'd like the record to reflect that we reserve cross examination of Mr. Westall until the hearing on September 23rd.

MR. STAMETS: The record, I'm sure, reflects that.

This witness may be excused.

MR. JENNINGS: Mr. Examiner, could we take a ten minute, five minute break? I have one more witness to call?

(There followed discussion off the record.)

JACK CASE

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q. Would you state your name, please?

A. Jack Case.

Q. What business are you in, Mr. Case?

A. Oil field service, transport, hot oil or fracing truck, fuel trucks.

MR. KELLAHIN: I'm sorry, Mr. Case, I didn't hear you. What do you do for a living, sir?

A. Work transports, tractor/trailer, rig haulers, hot oil units, vacuum trucks, and pump trucks.

Q. Are you associated with IW, IW, Inc.?

A. Yes, I am.

Q. What is your capacity, Mr. Case?

A. Part owner, vice-president, and manager.

Q. Do you have charge of the day-to-day operations of the business?

A. Yes, I do.

Q. Where is this business located, Mr. Case?

A. In Loco HIlls.

Q. And where do you reside?

A. In Loco Hills.

Q. And how long have you so resided -- resided there?

A. I've worked in the field 31 years. I've lived all of that out there except about ten years I lived in Artesia; lived there, like, about 21 years.

Q. Do you haul -- as part of your business do you haul produced water?

A. Yes, I do.

Q. And do you have some idea of the number of wells in the -- let's say a 15 mile radius of Loco Hills?

A. I'd say 1000, 1500.

Q. Is it pretty heavily drilled?

A. Yes, it is, sir.

Q. Are they still drilling from time to time?

A. Still drilling.

Q. How many trucks do you have engaged in the actually hauling of -- hauling of the water that's produced in connection with production?

A. You're talking about produced water?

Q. Yes.

A. All right. We have 13 tractors and trailers and about two vacuum trucks that haul this produced water.

Q. When you are employed to dispose of water in a facility what disposition do you make of the water?

A. We haul it to this Laguna Pollution Control.

Q. Facility?

A. Yes.

Q. How far is that from Loco Hills?

A. It's about 35 miles.

Q. Is it -- what kind of roads do you have in the area?

A. Well, it's blacktop all except about two miles. Some of the blacktop is bad. 126 County Road south of Maljamar that we take down to the -- it's located on the Hobbs and Carlsbad highway, this pollution control.

The road going in is bad, about 2-mile dirt road, but that's about all we have.

Q. How long does it take a truck to go from assume Loco Hills to the location and -- and return?

A. It's three hours, the trip, unloading a load of water, and back to Loco Hills. It runs pretty close to that every trip.

Q. What is the normal charge for making that haul, Mr. Case?

A. Well, the price -- of course, we're regulated by the Corporation Commission, and it's $33.00 an hour plus 18 cents fuel charge, which runs about $38.00 an hour for a tractor and trailer.

Working by the hour, we do have some contract work that we do, like we draw up the contract by the barrel.

Q. Are there other facilities, other than Laguna Gatuna in the area?

A. No, sir. There's no other place to unload it.

Q. Is there production west of Loco Hills?

A. Yes, sir.

Q. Where is that -- is that -- is it necessary to take it to the same facility?

A. Yes. We haul anywhere from the Pecos River to Maljamar, in that area, and everything goes down there.

Q. Well, say from just west of the Pecos River, how much additional time would that take?

A. You're looking at another hour and a half travel time from over there.

Q. Is there any need, Mr. Case, for a water -- a water disposal facility during nighttime, after 7:00 p. m.?

A. Yes, sir, it would be nice. We do a lot of this at night. We have some jobs that come in during the day, rush jobs we do. All of our produced water is -- a lot of it we haul every day we can do any time of the day, and we do a lot of that at night.

Try to keep everything else caught up and then do our produced water hauling at night.

Q. Would there be substantial difference in the cost of hauling from the Loco Hills area to this proposed facility, than that charged at the Laguna Gatuna?

MR. KELLAHIN: Objection to the question I'm going to object to the word "substantial". If Mr. Jennings would like to ask this witness if he knows -- whether or not he knows if there's a cost differential, that would be fine.

MR. JENNINGS: We'll take Mr. Kellahin's advice.

A. Yes, sir, there would be a cost difference.

Q. Assuming that you have an 8-mile haul from some place within 8 miles of Loco Hills, what would be the difference in price of that haul and the haul to Laguna Gatuna, if you know?

A. Oh, here again, as I said, we're regu-

lated. We can bid on this, some of it, haul it 8 miles, everything is the same cost from 100 yards up to 8 miles, but you just do it by the hour, we've still got a 3-hour minimum. But we do, are forced to give them bids and contract this stuff, this would run like 60, 58 or 60 cents a barrel, plus whatever it costs to unload it or dispose of it.

Q. As against the other figure?

A. The three hour travel time plus the disposal fee.

Q. That would be in the nature of $1.40 or more?

A. Yes.

Q. Mr. Case, in your opinion is there a need for a facility in the Loco Hills vicinity?

A. Yes, sir, I'd -- I'd sure like to see one.

Q. Will it not affect your business in that you won't get these long hauls?

A. I figure I'll get more hauls by it being there, get a place to dispose of it.

Q. Explain your answer there.

A. Well, there's -- there's too many people, these small operators that can't afford that trip to Laguna. They'll do something else. On occasions they have plugged a

few wells because disposing of the water was more than what they could produce.

Q. In your opinion, do you feel that this will result in the saving for all operators in the Loco Hills area?

A. Yes, sir.

Q. Mr. Case, in your opinion would the installation of this facility prevent waste and prevent the premature abandoning of many wells in the Loco Hills area?

MR. KELLAHIN: I'm going to object to that question. Mr. Case has not testified in any way, nor Mr. Jennings attempted to qualify him as an expert on whether wells will be abandoned if the disposal charge is what is anticipated for this and what Laguna charges.

I think the man is able to testify as to the costs involved of trucking the water to the disposal area but I don't believe I've heard anything that qualifies this witness to determine whether a well is going to be abandoned or not.

MR. STAMETS: The objection is sustained.

Q. Mr. Case, assuming that we have a 10-barrel well, in the area that is producing a 100 barrels of water per day, what, in your opinion from your experience in the oil business and the trucking business, would it be

economic to continue to produce that well?

A. Well, a 10-barrel, you're looking at probably 100 -- $100 a day to dispose of the water. But really, at the price of oil, that's a pretty good well, 10 barrels of oil. I think probably on 10 barrels, it would.

Q. All right. Then again assume that you have a 2-barrel well?

A. No, that -- that would never pay. You could lose money on that every day.

MR. JENNINGS: I believe that's all.

MR. STAMETS: Any questions of this witness?

MR. KELLAHIN: I'm going to waive the right to recall Mr. Case. I don't believe it's necessary for him to return to the September 23rd hearing unless he desires to come to Santa Fe for a trip, or something.

MR. STAMETS: Mr. Chavez?

QUESTIONS BY MR. CHAVEZ:

Q. Mr. Case, my name is Frank Chavez. You said it would be still a 3-hour minimum charge for operators to use your facility in Loco Hills, the proposed facility, for the trucking charge?

A. Normally there is a 3-hour minimum on

everything. It's regulated by the Commission.

Q. So there would still be a 3-hour charge whether you took the water to Laguna or to your facility in Loco Hills?

A. Not necessarily.

It's like this gentleman here, which will probably do it now, he'll ask me for a bid, so I'll bid it the 8-mile, or 10, whatever it is. I'll charge 60 -- 60 cents a barrel for hauling it, which, whatever the disposal fee is. Right now I'm hauling it for about $1.40, but I'm sure he's going to wise up and I'm going to be hauling it for less than $1.00.

Q. Okay. How much of your bid work is -- how much hauling of brine water is by bid and how much is by flat rate?

A. About 50 percent. We've got lots of it that we don't haul maybe once a week or maybe once every two weeks, maybe just one load in that time, and they just pay by the hour and let it go at that.

MR. CHAVEZ: That's all I have.

MR. STAMETS: Any other questions of this witness? He may be excused, and he need not return on the 23rd unless he wants to.

If there is nothing further today, we

will continue this case until the September 23rd Examiner Hearing, where it will certainly be last on the docket.

Recess the hearing until 1:00 o'clock.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____, heard by me on _____ 19__.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
23 September 1981

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EXAMINER HEARING

IN THE MATTER OF:

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. CASE 7329

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: James T. Jennings, Esq.
JENNINGS & CHRISTY
P. O. Box 1180
Roswell, New Mexico 88201

A P P E A R A N C E S

For Bogel Farms:

W. Thomas Kellahin, Esq.
KELLAHIN & KELLAHIN
500 Don Gaspar
Santa Fe, New Mexico 87501

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MR. STAMETS: We'll call next Case 7329.

MR. PEARCE: Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico.

MR. STAMETS: This case was previously heard about a month ago and testimony was taken at that time and while we do have a readvertisement to clarify the location of the unlined pits, no other changes, we will accept additional testimony and cross examination at this time.

MR. JENNINGS: Mr. Examiner, I would just like to re-tender all of the testimony and evidence introduced at the -- and exhibits -- at the August 26, 1981, hearing.

MR. STAMETS: Those will be accepted.

MR. JENNINGS: And I would like to ask the reporter to advise what the last exhibit number was according to her records.

My records reflect it's No. 4, Number Four was the last.

THE REPORTER: I have no records with me, Mr. Examiner, Mr. Jennings. I think there is a copy of the transcript some place around, however.

MR. JENNINGS: It was Four.

MR. PEARCE: According to the index,

Mr. Jennings, that was a letter. Do you need to know more than that?

MR. JENNINGS: No. No.

With that, I would like to offer Exhibit Number Four, which is a copy of business lease No. BL No. 1044 effective July 17th, 1981, covering the north half southwest quarter of Section 16, Township 17 South, Range 30 East, issued by the Commissioner of Public Lands.

MR. STAMETS: I believe you referred to that as Exhibit Four?

MR. JENNINGS: Four.

MR. STAMETS: Well, shouldn't it be Five?

MR. JENNINGS: Five. Five, I'm sorry.

MR. STAMETS: I'll correct my copy to show that that's Exhibit Five.

MR. JENNINGS: I'll proceed, I guess, at this time. If there is anything else we'll introduce it, offer it, and then we'll have them all at once.

MR. KELLAHIN: Fine, thank you.

MR. JENNINGS: Mr. Reed.

STEVE L. REED

being recalled as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

MR. STAMETS: For the record, we'll remind that he was previously sworn and you're still under oath.

A. Yes, sir.

Q. You are the same Steve Reed that testified in this matter on -- before the Examiner on August 26, 1981?

A. I am.

Q. Mr. Reed, one of your exhibits offered at the hearing was Exhibit Number One, which consisted of a volume. Do you have any changes or amendments which you make -- wish to make at this time in connection with this exhibit, and if so, please explain these and furnish us with a copy of it, the exhibit?

A. Yes, I do. I have, in reviewing Exhibit One, which is my hydrologic report, we found that there was in plotting the data. We had mislabeled a range, or mislabeled the range numbers on our base map, and all of our data were then plotted on that erroneous base map.

So the data are correct relative to each other in the report that was previously submitted and I have included in this report that I have here today a correct base map with the data plotted correctly on the base map.

Again, to reiterate, the data --

Q. Excuse me, just a minute.

A. Yes, sir.

Q. The new exhibit is referred to as sub-number one.

A. That is correct.

Q. And would you refer to the figure that you're talking about at this time?

A. Yes. There were two figures in Exhibit Number --

Q. Give the number.

A. As Figure Number Five and Figure Number Six, for which we had plotted the data in the wrong township and the wrong range. These have been resubmitted and correctly plotted.

Q. Are there any other changes whatsoever in connection with these figures, Mr. --

A. I do not believe so, no. Basically, they're -- they're replotted on the -- on a correct base map.

MR. JENNINGS: Any objection to that

exhibit?

MR. KELLAHIN: No objection.

MR. JENNINGS: Pardon?

MR. KELLAHIN: I said there's no objection to the substitution of the corrected exhibit.

MR. JENNINGS: Thank you.

MR. STAMETS: The corrected exhibit will be admitted.

Q. Mr. Reed, have you had an occasion to review the transcript which was prepared in connection with the original hearing?

A. Yes, I have.

Q. Did you find any errors in that transcript?

A. There were a few errors which I have noted on my copy.

Q. Would you like to at this time point these out and make corrections of these?

A. I think you might first refer to, if you would, to page 19 and see if there's any errors on that page.

A. There is a misspelled word on page 19 in the fifth paragraph, the last sentence of that paragraph. I'll read it into --

MR. KELLAHIN: Excuse me, Mr. Reed, could you give us the line number? Each line of the tran-

script is numbered.

A. Yes, line number 17. The word, the incorrect word is "juried". That word should be jetted, J-E-T-T-E-D.

Q. I think you'll find -- refer to page 24 and line, maybe, 2 and 6.

A. On page 24, at line number 2, that -- the portion of that sentence reads "well which we could find in the field". That should read well which we could not find in the field.

On line number 6, the word "faultv" should read quality.

On page number 25 there are two misspellings on lines 15 and 18. The word "hydraulic" is H-Y-D-R-O-A-U-L-I-C instead of R-O-L-I-C.

MR. JENNINGS: I think it's on page 34. Did you pass that?

Refer to line 14, page 34.

A. Yes. On line number 14, page 34, the sentence reads this disposal rate does not into account, should read, this disposal rate was not taken into account.

On page 44, the sentence reads, we went 9 feet into the Rustler.

MR. PEARCE: What line?

A. I'm sorry, line 21, should read 90.

MR. STAMETS: Nine zero?

A. Nine zero feet.

That is all the corrections that I have seen on my portion of this transcript.

MR. JENNINGS: Thank you.

Q. Mr. Reed, since the last hearing have you reviewed the plans for the monitoring wells and do you have any additional thoughts or recommendations as to the monitor wells which are to be drilled?

A. Yes, I have.

Q. Would you explain those, please?

A. We proposed in our -- in our plan submitted at the last hearing to drill a ring of monitoring wells around this facility, two of which would be completed into the Rustler, into the top of the Rustler formation.

There was concern expressed in the hearing previously that we base our contention that the Rustler contains extremely poor quality water on one analysis nearby, one analysis of the ground water nearby.

We would like to propose that one of these monitoring wells which will be drilled to the top of the Rustler will at the time of the installation of that monitoring well, the hole will be drilled to a depth where

the first ground water is encountered. We anticipate that the -- in the monitoring well that the top of the Rustler formation will be encountered approximately 250 feet in depth and that the uppermost water will be encountered, perhaps, at a depth of 350 to 400.

We propose to drill the southeasternmost monitor well into the first producing zone and collect a sample of that Rustler water, have that sample analyzed for its major constituents and submit that analysis to the Oil Conservation Division.

The nearby well, which we referred to in our previous testimony, showed a chloride concentration of somewhat over 10,000 milligrams per liter. This, coupled with the other data that we have on the type of rocks in the Rustler formation, and the testing that we have done, has led us to believe that certainly the Rustler water is -- is -- has total dissolved solids, concentrations, much higher than 10,000 milligrams per liter, and we believe that the analysis of a water sample taken from one of these Rustler depth monitoring wells will verify what we have stated.

Upon the collection of the water sample from this one monitoring well, we will then plug the well back to the top of the Rustler, because we feel that in order to adequately monitor the pits, the well needs to be in the

top of the Rustler and not complete in a salt water zone within the Rustler.

Q. Have you made a further study into the amount of water currently being disposed in pits with exceptions to Rule 3221 in this area?

A. We have. We have secured data from the District office on the volumes of salt water going into various pits within the vicinity of our proposed site.

Q. Have you prepared an exhibit?

A. I have indeed prepared an exhibit, which shows --

Q. Well, let's get the exhibit first.

A. Again, perhaps, I can place a copy of this exhibit up on the wall.

Q. Is this what has been referred to as Exhibit Number Six?

A. That is correct.

Exhibit Number Six is a map that we have compiled by examining the operating data in the regional office file concerning the amount of salt water disposed in pits within the vicinity of our proposed location.

Basically, these data are total figures in barrels for salt water that has been introduced into a particular pit, which is located approximately on this map,

for the last ten years.

The exhibit shows, for instance, that within the last ten years there has been 182,220 barrels of salt water disposed on Section 20, just to the southeast of our proposed location.

In Section 21, the section just to the south of our proposed location, in the last ten years there has been 358,955 barrels of salt water disposed.

In Section 22, 235,386 barrels.

In Section 14, to the east, 34,660 -- 34,660 barrels.

There are other data that we have on the map for pits that are further removed from our proposed location in Section 16. For instance, in the vicinity of the northwest corner of Section 5 and the northeast corner of Section 6, Range 31 East, Township 18 South, we have an indication of over 114,000 barrels disposed in one instance; 7500, in excess of 7500 barrels in another area; and 49,000 barrels plus in a third.

Section 22, that same township, we have totaled 476,000 plus barrels of brine introduced into that area.

Q What -- excuse me, maybe I misunderstood you. What -- how did you identify that township?

A. That's -- as 31 -- Range 31 East, Township 18 South.

Q. Go ahead, I'm sorry.

A. In the vicinity of our proposed location in Section 16 we see in the last ten years in excess of a quarter of a million barrels of water disposed into surface pits. These pits are, again, a mile to a mile and a half from our proposed operation.

The bulk of the salt water in the immediate vicinity of our proposed site lies in a direction which one would consider hydraulically down gradient from our proposed location.

Q. Mr. Reed, there are a number of dots on this exhibit. Does each one of those represent a disposal pit?

A. Yes, they do.

Q. I see a blue line starting about the center of the exhibit in the north part and meandering down along the west side. Would you identify that line and tell me what it is?

A. Yes, sir. That's the approximate eastern limit of the Bogel Ranch in the vicinity of our Section 16.

Q. In the south part of the exhibit you

will note, in the southwest part, there's an area marked in yellow. Would you identify that and tell what that is?

A. Yes, sir. That's the northern limit of the Clayton Basin exemption.

Q. That is in Township -- basically, Township 19 South, Range 30 East?

A. That is correct.

Q. Mr. Reed, only today you had an opportunity to check with the Oil Conservation Division records in connection with the production being disposed of in the pits by Amoco from its production in the Shugart Pennsylvania Gas Pool, which is located in Section 24, 30 -- 27, 34, and 35, 18, 31, and the pits which are located in the same sections.

MR. KELLAHIN: What were the sections, Mr. Jennings?

MR. JENNINGS: 27, 34, and 35.

MR. KELLAHIN: Thank you.

A. Yes, I have. I have briefly examined those records today.

Q. Was this order -- was this injection started pursuant to an order entered in this -- by the Commission in Case Number 6659 in Order No. R-6134, dated October 10th, 1979?

A. That is correct.

Q. Okay, now if you'll tell us --

MR. KELLAHIN: Excuse me, I want to make sure I got the right one. 31 East, 18 South?

MR. JENNINGS: 18, 31.

MR. KELLAHIN: All right.

A. Yes, sir. I see in the few months that I looked at for 1981 approximately 13,000 barrels a month disposed in that immediate vicinity.

Q. Were those the most current months that you reviewed?

A. The most current months that I reviewed here briefly, I believe, was March or April of 1981.

Q. Do you have anything further that you wish to add to your testimony of August the 26th? Anything further you wish to offer today? At this time?

A. I do not at this time.

MR. JENNINGS: That's all -- all that we wish to do at this time.

Was Exhibit Six prepared by you or under your supervision?

A. It was.

MR. JENNINGS: We would offer Exhibit Number Six.

MR. STAMETS: Exhibit Six will be admitted.

Are there questions of Mr. Reed at this time?

MR. KELLAHIN: Yes, sir.

MR. STAMETS: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Reed, let's start with your Exhibit Number Six, if you please, sir.

A. Yes, sir.

Q. Am I correct in understanding that this plat represents the area that you have examined to determine whether in the last ten year period certain surface locations have been used to dispose of water in unlined surface pits?

A. That is correct.

Q. Do your records tell you, or can you tell us, -- let me ask you this.

Is this Amoco disposal pit in Sections 27, 34, 35, this area you just discussed, the records you checked in April, is that the only pit that you have checked to determine whether it's continued to be used as a disposal pit now?

A. Those are the only records that I have examined here today in the office, but our examination of the District office files go through 1980, I believe.

Q. All right, can you tell us which ones of these pits are still being used for disposal of produced salt water?

A. I do not have that data, no.

Q. So we just know that in the last ten years, that the quantities reported here have been used for disposal.

A. That is correct.

Q. And we don't know how many of them are still being used for disposal.

A. I do not have that data immediately, no.

Q. All right. Did you make an examination in this area, Mr. Reed, to determine if any Oil Commission applications have been denied for applicants seeking permission to dispose of produced water on the surface for any of these townships that are contained on this plat?

A. I have not specifically examined those data.

Q. Do you know whether or not your firm, Reed and Associates, did any work for Tahoe Oil and Cattle Company back in September and the summer of 1976 with regards

to the use of Section 2, Township 20 South, Range 30 East, as to disposal pits?

A. Perhaps we did, but I have no direct knowledge of that work, no, sir.

Q. Now, in determining the information for this disposal pits that have been used by other operators in this area, Mr. Reed, have you studied the composition of the soils underlying those pits to determine if any of them are going to leak like the Loco Hills pit's going to leak?

A. We have not examined the geology of any of these pits, no.

Q. So you don't know whether or not any of these exceptions to the general rule have been permitted simply because there's evidence in the record to demonstrate that the clays present under those pits are such that there will be no percolation into the ground?

A. Would you rephrase the question, please?

Q. No, sir. I'll repeat it, though.

My question is whether or not you know if any of these permits for excepted areas have been based upon pits that will percolate water, as the Loco Hills pit is going to do?

A. I have no direct knowledge of that, no.

Q. That would be a significant difference

between the Loco Hills pit and any other pit, would it not?

A. What would be a significant difference?

Q. Whether the pit leaks or not.

A. I would have to examine the other pits to determine their -- the local geology and hydrology in those immediate areas, to say whether they would differ or not from the pit that we propose.

Q. All right, and you have not done that?

A. No.

Q. Now, Mr. Reed, with regards to Figure Five of your Exhibit One, which is your hydrologist report, if I understood Mr. Jennings correctly, the plat has been redrawn in such a way that we now have the tier of townships to the east of the township in which the site is located? In other words, you've added this tier of townships to the east of the location. That doesn't appear on the --

A. That is essentially correct, yes.

Q. And the information other than that, the information that is on that amended Figure Five is the same information that you testified to, from, at the earlier hearing?

A. It is.

Q. Okay. In determining if there is a threat to the degradation of the quality of water in the area,

let me ask you your understanding of certain terms so that you and I'll both be talking about the same things.

A. Okay.

Q. In terms of total dissolved solids in water, what is your understanding of the State Engineer's definition of fresh water in terms of total dissolved solids?

A. The recommended limits, and I have not reviewed the State Engineer's definition for awhile, but the recommended limits for municipal consumption, I believe, about 100 milligrams per liter.

Q. Let me read something to you and have you explain it for me.

Pursuant to statute the State Engineer defines all underground water in the State of New Mexico containing 10,000 parts per million, or less, of dissolved solids as fresh water.

A. It is correct to say that -- that the number of 10,000 milligrams per liter has been assigned the maximum limitation for protectable waters.

Q. So when you're talking about fresh water are you using the same definition that the State Engineer uses for fresh water?

A. I generally do not attempt to use the words fresh water unless I define it by some term. If we

define it as being less than 10,000 milligrams per liter, I'd be glad to operate on that basis, yes.

Q. For purposes of my question, I'd like you to do that, if you please, Mr. Reed, so that when I talk to you about fresh water we're using 10,000 parts per million of total dissolved solids.

A. That will be fine.

Q. All right, sir. Now, is -- is that number any different to the chloride content of the water?

A. Yes, it is.

Q. That's a different criteria, is it not?

A. Yes, it is.

Q. All right. What do you understand to be the number of chlorides present in a given amount of water above which it's no longer fit for human consumption?

A. Again, there's a recommended limit of 250 milligrams per liter.

Q. All right. Now in terms of -- of stock water, what the cattle will drink, do you know what the chloride content is of a given quantity of water above which stock will not drink that water?

A. Oh, generally, about 3-to-5000 milligrams per liter.

Q. Forgetting chlorides for a moment, going

back to total dissolved solids, 10,000 figure, in this area, Mr. Reed, starting from the surface and going down, what areas would you find that you would first encounter water that would be less than 10,000 parts per liter?

A. In the immediate vicinity of our operation -- proposed operations?

Q. In the area that you've examined, as depicted on Figure Number Five, you've examined a bunch of wells in here, and rather than picking through here and deciding which ones are which, I want you to tell me if you found any water, starting from the surface down, that would define itself as fresh water using the definition we've agreed on.

A. In the immediate vicinity of our operations, no.

Q. Okay. Where would you be likely to encounter fresh water? You've talked about the Triassic formation.

A. Yes, I have.

Q. That is sometimes a fresh water bearing formation.

A. There are certain areas where the Triassic contains, using your definition, fresh water, yes.

Q. All right, sir. In this area at what

depth would you find the Triassic formation?

A. The Triassic formation starts near the surface of the ground.

Q. And it goes to what approximate depth in terms of feet?

A. In this immediate vicinity, again, it goes to a depth of 250 feet, approximately.

Q. Okay. That would be the base of the Triassic in this area?

A. That's correct.

Q. All right. Now, if I understood you correctly, that below the Triassic we find the Rustler formation.

A. That is correct.

Q. And sometimes the Rustler formation will bear fresh water as we've defined it.

A. That is correct.

Q. Now, in this area, in the area you've examined, have you found any Triassic water that would constitute fresh water?

A. In the immediate vicinity, no.

Q. Let me direct your attention to Figure Number Five in Exhibit One and if you'll look at Township 17 South, Range 29 East, which is the township to the west of

your location, and if you'll look in Section 22, up in the northwest corner there are two symbols for wells.

A. Yes, sir.

Q. From what I've learned from you, Mr. Reed, it would appear that both of those wells would be Triassic wells, would they not?

A. That is probably correct, and I believe I testified to these two wells previously, one for which we have an analysis for and it has a total dissolved solids concentration of 2722 milligrams per liter.

Q. All right, now under our definition, that would constitute fresh water, would it not?

A. Yes, sir.

Q. All right. Looking down in Section 35 to the south and in the same township, there is also another well symbol in there. You'll have to help me with the abbreviations, what is that?

That looks like an abandoned windmill, is that?

A. That refers to an abandoned water supply well.

Q. Water supply well, all right, sir. If we proceed down farther to the south, we encounter in Section 10 of the township to the south a stock windmill? It says

3 stock WN?

A. That is correct.

Q. All right. That appears to be Triassic fresh water as we've defined it, is it not?

A. The total dissolved solids for that -- for water from that well were 6882 milligrams per liter.

Q. And that would be defined as fresh water under the definition that we're using?

A. That is correct.

Q. Okay. Where is the Pecos River in terms of direction to this area, Mr. Reed?

A. It's to the southwest.

Q. As I understand your hydraulic gradient, water introduced at the pit is going to flow in a direction towards the Pecos River, is it not?

A. In the immediate vicinity of our proposed operation the hydraulic gradient as we have measured it is -- and supplemented that with State datum -- is in a southeasterly direction.

The hydraulic gradient six or eight miles south of our proposed locality then does indeed turn towards the southwest, yes.

Q. Am I correct then in understanding that Triassic water if it's present in this area, and we see some

instances where it is, is going to be hydraulically connected with the Pecos River to the south?

A. The drainage and discharge is in that direction, yes.

Q. All right, sir. Apart from the wells we've just talked about, are there any other Triassic wells in this area that will be in the line of flow, hydraulic gradient, that we have not already identified, that would be fresh water using our definition today?

A. There are other wells in Range 30 East, Township 18 South, from which water has been produced that could be classified as fresh under your definitions.

Q. All right. I'm not going to belabor it by going through all of them. They're on here and the Examiner can find them and read them using the well information on here.

All right, let's -- let's turn, then, to the Rustler formation, which I understand is below the Triassic.

A. That is correct.

Q. Using our same definition, are there wells that produce from the Rustler formation depicted on your exhibit?

A. There is a well in Section 21, 30 East,

17 South, which at one time produced from the Rustler formation.

Q. That's the one labeled Anadarko?

A. That is correct.

Q. All right, sir. Let's move down to the township south of that, Township 18 South, Range 30 East, and look at Section 26. There are two wells in Section 26. Are these wells deep enough to be Rustler or are they Triassic wells?

A. I see that we only have total depth data on one of those two of 215 feet. That would probably not be a Rustler well.

Q. It would be a Triassic well.

A. Yes, sir.

Q. And you don't know what the depth is of the other well in Section 26?

A. I do not have that data, no.

Q. All right, sir. At whatever depth it is it apparently fits this fresh water under our definition.

A. I have a limited analysis of that well but it has a low chloride content, yes.

Q. All right, the chloride content is below 250 milligrams per liter.

A. That is correct.

Q. All right. You'll have to refresh my memory about your testimony at the other hearing, Mr. Reed, but as I understood it, and from reading the summary, if you wouldn't mind turning over to page six, just before the conclusion page in the front of your report, now, I thought I had understood you to tell us that the clays underlying this pit area are such that there is going to be percolation of this salt water into the granite.

A. That is likely, yes.

Q. And I had understood at that time that you had not made any calculations to determine the amount of water that is going to percolate into the Granite.

A. No, sir, I have not made those calculations because I don't believe they're pertinent to -- to this question.

Q. All right. And we agree that the salt water that is going to be placed in this pit is going to exceed the definition of fresh water.

A. It will.

Q. They're highly contaminated water.

A. It exceeds the 10,000 milligrams per liter.

Q. All right, by how much, do you have any idea?

A. Probably four or five times, at least.

Q. So highly contaminated is not an unfair characterization, is it?

A. Well, the word contamination bothers me.

Q. All right. Now there is no doubt in your mind that some of the fluid in the pit is going to eventually percolate into the Triassic formation.

A. Yes, sir.

Q. And there is also no doubt in your mind that it will eventually percolate into the Rustler formation.

A. That is my opinion, yes.

Q. All right. I'm interested in the evaporation calculations and information on Exhibit -- page six of your Exhibit One, Mr. Reed.

A. Yes.

Q. Perhaps we could go through that.

You say you have previously demonstrated by using the Red Bluff evaporation figures. I had understood this Red Bluff Reservoir to be some distance from this site.

A. It is, yes.

Q. All right. Are the -- is there information from U. S. Weather Bureau or some other public source to determine what the general evaporation rate is for this particular specific area?

A. I don't have it on this specific area, no. The Red Bluff data is what I had chosen to --

Q. The Red Bluff evaporation data is data compiled from U. S. Weather Bureau or some other government agence?

A. There is a Class A evaporation pay at the Red Bluff Reservoir, yes.

Q. You'll have to help me, I don't know what that means. Who operates the pan? Who takes that information?

A. The U. S. Geological Survey.

Q. The U. S. Geological Survey. Is that the closest area in which evaporation is measured on a regular basis to come up with some reliable evaporation figures to use?

A. I do not know where all the stations are. That is a reasonably close station and it's got a good record for many years.

Q. You've not made a study or inquiry to determine whether or not this is the closest available reliable information?

A. I don't recall, no.

Q. All right.

MR. STAMETS: Why don't we break for

lunch at this time?

MR. KELLAHIN: All right, sir.

MR. STAMETS: We'll resume the hearing at 1:30.

(Thereupon the noon recess was taken.)

MR. STAMETS: The hearing will please come to order.

Mr. Kellahin, I believe you were in the process of cross examining the witness.

MR. KELLAHIN: Yes, Mr. Examiner, thank you.

Q. Mr. Reed, before the lunch hour we were looking at that portion of your report that dealt with the evaporation, and if you'll turn back to page six of that report, we will continue at that place.

A. Okay.

Q. You told me that you had used the Red Bluff evaporation figures.

A. That is correct.

Q. All right, sir. Tell me a little something about the U. S. G. S. evaporation figures. Do you know

how they are compiled and calculated? I'm trying to understand what information you had from those figures.

A. I believe these figures came from the surface water records for a station at the Red Bluff Reservoir, wherein they report the evaporation in inches on a daily basis, if I'm not mistaken, and these records in the Red Bluff area go back a number of years. I don't recall exactly how many years.

I have taken these numbers and calculated a net evaporation on a monthly basis, taking rainfall out and come up with a net figure.

Q. All right, that -- I think you've answered my question. In using these figures and trying to correlate and adjust them for the purposes of salt water disposed of in this pit, you have taken -- you've done what with rainfall amounts?

A. Well, I have assumed that -- that rainfall certainly adds to the amount of fluid, obviously, and -- in the system, and so we have backed the rainfall data out.

Q. All right, sir. And you have done this using these figures. They're daily figures for a full year? Have you used a full year's figures?

A. Oh, I believe these figures are based on a minimum of fifteen years, perhaps twenty years, at the Red

Bluff station.

Q. My point is, do you take the figures for the summer months when the evaporation is higher or the average for the winter months, or how do you come up with a reasonably accurate figure to use for evaporation?

A. I looked at it on a monthly basis for the fifteen years and came up with a monthly average of net evaporation.

Q. Okay. Now what adjustment did you make for evaporation of fresh water as opposed to salt water?

A. I have not made a direct adjustment. The data that we have to date in our files indicates that we are getting in one instance evaporation rates off of salt water that reasonably approximate those for fresh water. As far as reducing the net evaporation rates and adjusting it specifically for salt water, I have not done that.

Q. The report indicates that evaporation from brine will be lower than fresh water.

A. It will be somewhat lower.

Q. But you've not made any adjustment in the evaporation rate used for this pit?

A. No, I did not say that. I have adjusted the figure downward considerably from what the actual evaporation is at the Red Bluff Reservoir.

Q. All right. And you've reduced it because of the fact that the brine will probably evaporate slower than fresh water and because of the elevation?

A. That's correct.

Q. All right, any other reasons to adjust the figure downwards?

A. Well, it's just about 60 -- this site is about 50 miles north of the Red Bluff station, so I've adjusted it down to approximately a third.

Q. All right.

A. From the calculated figures.

Q. In terms of barrels of water per day per acre, can you tell me how many barrels of water per day per acre would be evaporated at the proposed site?

A. I have estimated, taking all these factors into consideration, that one can evaporate between 2000 and 2500 barrels per month per acre.

Q. So to get a daily figure we could just divide that by 30 or 31, whatever.

A. Yes, you could.

Q. All right.

A. This is on an annualized basis, now. This is not to say that -- that this is the figure that one can expect to evaporate in the summertime, nor is it the

figure that one can expect to evaporate in the wintertime, but it is an adjusted figure such that there will be -- not be undue accumulation during the winter months. So it's considerably less than -- than the total volume that one can expect to evaporate, even on a monthly basis.

Q. Okay. What is the surface area of the water to be contained within this pit? How many acres is that?

A. We anticipate that up to 15 acres of evaporation surface may ultimately be constructed.

Q. As best you understand it, is this to be more than one pit in order to get to the 15 acres of surface water, or is this to be a series of pits? I'm trying to understand this.

A. This would be a series of pits, yes.

Q. All right. As I understood it, you have made no calculations or tests to determine, I think the word is infiltration, how much of this water is going to go into the ground.

A. I have not because whether it infiltrates at a very minor rate or whether it infiltrates at a more rapid rate, we anticipate that the results will be essentially the same, that the water will migrate down through the Santa Rosa and arrive at the Rustler aquifer

system in which poor quality water now resides.

Q. Okay. Tell me something about the monitoring wells, Mr. Reed. What are those supposed to do?

A. In evaluating the geology in the immediate vicinity of this proposed site we see a Santa Rosa section that consists predominantly of sands and silts with a few clay zones which are basically discontinuous. We cannot trace them over a large area at all. In fact we ran them through that exercise trying to correlate clays and we cannot do so.

We believe that the percolation through the floor of the pit will go in a vertical direction and that there are no, as we see them, uniform clay zones in the Santa Rosa section that would divert the water from its vertical path into a horizontal direction. Certainly this may occur over short distances but regional sands and the soil that we're looking at here, I believe the direction of infiltration will be in a vertical sense.

However, we formed this opinion from looking at the test hole data that we have accumulated and at other logs in the area. We have recommended or proposed a monitoring well system that will test this conclusion; that in the event that we for some reason do have undue horizontal migration, our monitor wells are designed to pick

this up. It will be an early warning device that there is a clay, for instance, that is uniform throughout the area that we for some reason did not see that's diverting the water in a horizontal direction. And this is what the monitoring system is designed to do.

Q. If the monitoring wells detect the presence of contaminated water, or salt water, at that point are you suggesting that the Commission ought to shut down disposal in the unlined pit?

A. Not necessarily. There I think one has to look at all the factors to examine the location of the monitor hole, perhaps, that the salt water is migrating along a certain way; a time frame in which that migration has occurred; versus depth, versus distance. I think all these factors have to be considered in analyzing the situation.

Certainly at the outcome of that investigation should we find salt water entering one of the monitoring wells, one of the options may be to discontinue use of the surface pit, but that is not the only option.

Q. If contaminated water is down at that particular depth, there's no way to cure the problem, is there, once it's introduced into the formation?

A. There is no way that I'm aware of that we could recover that salt water; however --

Q. Can't pump it out is what I'm saying.

A. Unless it was in significantly higher volume than we would anticipate in one of these, I would say no. However, I again would point out that there is no ground water in this Santa Rosa system in our area that will be degraded by the salt water, and the Rustler water is already in a severely degraded state.

Q. Have you run any studies to determine how the underground water is generally flowing in the Rustler formation? I assume there are various tests to determine if the water is flowing like an underground stream, that sort of thing? You told me it generally migrates towards the Pecos River. Do we have water flowing -- have you measured the flow of water, is what I'm trying to ask you in a very poor way, is if we introduce water in that pit and it percolates down to a particular location, do we know in what general direction that's going to flow? You told me it's going to flow to the south and perhaps to the southeast. All right, have you measured the flow of water in these underground formations?

A. The hydraulic gradient that we depict on our Figure Five in Exhibit One is indeed based on water level measurements, yes.

Q. That's a hydrograph, isn't it, is that

what that's called? It's a hydrograph.

A. A hydrograph is a graph that shows the rising levels of a pond.

Q. That's not what I'm thinking about. I'm thinking of the movement of the water through this formation. How is that measured?

A. We measure the potentiometric surface of the top of the water.

Q. If water is introduced into the Rustler formation or the Triassic formation, have you made any calculations in terms of time to show us how long it will take for a given quantity of water to move a given distance?

A. We have not calculated the rate of flow in the Rustler formation, no. Generally ground water flows are extremely slow.

Q. There were some questions asked you at the previous hearing concerning the depth of the monitoring wells. Could you refresh our memories about the depths of the monitoring wells?

A. Some of them. Although we seek primarily,again to reiterate, primarily sands and silts in the Santa Rosa, there are indeed a few clay zones. The shallowest clay zones, that are thin, discontinuous zones, occur in the depth interval between 30 and 60 feet. That's the uppermost

clay zone that we find.

If we should have horizontal migration it's this uppermost clay zone which we would expect to divert the water in a horizontal sense. The bulk of the monitoring wells we propose to complete at a depth of 60 feet, such that it would detect this migration in a horizontal sense. They would be perforated from the total depth to within five or so feet of the surface.

Q. Monitoring wells are how deep? I'm sorry, 60 feet, you said?

A. 60 feet, yes.

There are two wells that we have which are in the down dip structural direction -- structurally down dip direction, which we propose to complete to the top of the Rustler formation.

This will detect, these two wells will detect any migration that might occur beneath the 60 foot level. Again they're strategically placed in a southeast and south direction because this is the direction that flow-- we would anticipate flow if it does occur, to follow.

Do you have any opinion with regards to how long it might take before any of these monitor wells might detect the migration of the salt water?

A. I don't anticipate that they will detect

any migration in a horizontal sense.

I don't anticipate them ever showing anything.

Q. Mr. Reed, have you been supplied with any numbers as to what the operator intends to dispose of in terms of barrels of water per day in this pit?

A. No, sir.

MR. KELLAHIN: I believe that's all the questions I have of Mr. Reed. Thank you.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Reed, would it be possible to conduct evaporation rate tests at this pit site?

A. Yes, Mr. Examiner, it is, and indeed we are doing this at the Parabo site in southeastern New Mexico. We're using salt water in a class A evaporation pan to calibrate the evaporation data. We're doing this specifically to -- to determine the exact evaporation rates that can then be compared against the fresh water evaporation rates that we have predicted, and these two figures for this particular site appear for a short term period that we have been gathering these data to correlate really quite nicely. Better than one might expect.

Q. Is that a complicated process or a fairly simple one?

A. It's not a complicated process. It involves daily maintenance and examination of the rain gauge and the class A pan.

Q. The company personnel are taking care of that or do you have people there to do that?

A. In this -- in the Parabo instance the company personnel are taking care of that operation, and I think the data are really quite good.

Q. So based on that you feel confident in the 2000 to 2500 barrel a day per acre rate that you've come up with for this site?

A. Yes, I do, with again, given the short period of time that I have been able to accumulate these data I would say so, yes.

MR. KELLAHIN: Excuse me, that was barrels per month.

MR. STAMETS: I'm sorry, I stand corrected.

Q. If the water is going to go into the Rustler, why not just drill a disposal well to the Rustler and pour it all down the hole?

A. Well, disposal wells are very expensive

to complete. They notoriously plug up and again, I don't feel as though that level is indicated to be necessary in this case. I have not evaluated the subsurface materials for subsurface disposal in this particular area.

Q. I believe you have said that there will be infiltration; you don't know the amount, but there will be; it will penetrate the Triassic and it will go into the Rustler, and that this is all right because there's no good water in the Triassic that it will contact and that the water in the Rustler is of very poor quality, greater than 10,000.

A. Yes, and probably greater than 30,000. We've got -- the one analysis that we have is 10,000 chlorides, so the total dissolved solids are obviously much higher than that.

Q. And that the Rustler itself discharges into the Pecos River.

A. Ultimately, yes.

Q. Do we have any numbers on how much water is discharged out of the Rustler into the Pecos?

A. I don't have those numbers, no. There's been an attempt in certain areas to look at the -- at the discharge, particularly of the brine aquifer into the flow of the Pecos River, but I don't have those numbers, no, sir.

Q. Are they available readily?

A. I do not know. I am not familiar with in intimate detail with those studies.

Q. The point of my question being what the effect of putting this additional water into the Rustler will be. I know we discussed this some at the last hearing but it's, nevertheless, of concern.

A. With the total flow in the Rustler system, which is quite extensive, and especially if one adds the volumes of water that are disposed, placed on the surface in one form or another in the area which we're dealing with, I cannot see that the amount of water which is planned to be disposed of on Section 16 will be a significant contribution compared with all the other contributions.

MR. STAMETS: Are there other questions of this witness?

A. If I may just reiterate one point which I'm sure the Examiner understands, but I think needs to be said again, the Clayton Basin exemption, the potash mines, and other disposal pits lie hydrologically, hydraulically between this proposed operation and the Pecos River.

MR. STAMETS: Any other questions of this witness? Mr. Jennings?

MR. JENNINGS: I have just a couple questions.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q. Mr. Reed, are there any fresh water wells as defined by Mr. Kellahin in the immediate vicinity of Section 16?

A. There are not.

Q. How many miles would you interpret to mean the immediate vicinity?

A. The nearest well is in Section 35, Township 17 South, Range 29 East. That well has a chloride concentration of 4000 parts per million.

Q. How many miles is that?

A. It's about four miles.

Q. Pursuant to Mr. Stamets' question, you talked about the Parabo project. Is that the same as the Wallach (sic) project?

A. Yes, it is.

Q. Well, in connection with the Wallach project, what evaporation figures did you use?

A. We used the Red Bluff figures.

Q. Have they proven to be accurate?

A. For the period of time which we have

been collecting these data they appear to be quite accurate.

Q. Mr. Reed, for my information, when we talk about fresh water and we talk about that in the language of furnishing it to the city for human consumption, what are the content of that water, maximum allowable?

A. Recommended limit for municipal use is 500 milligrams per liter. There are a number of municipalities that exceed that limit, but above 1000, 1500 is considered objectionable.

MR. JENNINGS: I believe that's all, other than I would at this time again offer our exhibits which we offered in the original hearing and one which is -- two, which have already been accepted in this hearing.

MR. STAMETS: Okay, all of the exhibits, being One through Six, and One-A are or have been admitted.

Any other questions of this witness? He may be excused.

A. Thank you, Mr. Examiner.

MR. STAMETS: Do you have anything further at this time, Mr. Jennings?

MR. JENNINGS: Just one further. This is all, but I will have a statement.

MR. KELLAHIN: I'd like to ask Mr. Westall some questions.

MR. STAMETS: Mr. Westall.

ROY WESTALL

being recalled as a witness and being duly sworn upon his oath, testified as follows, to-wit:

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Westall, would you refresh my memory and tell me what your relationship is with the applicant?

A. Well, I'm -- I'm president of the Loco Hills Water Disposal System.

Q. Is this a New Mexico corporation?

A. Yes, sir.

Q. I see Senator Jennings with you here today. What, if any, does Senator Jennings have in this project?

A. He has an interest in it.

Q. Is this equal to your interest?

A. No, it's not.

Q. You're the principal involved in this corporation?

A. I think that a company that they own, and his kinfolks own, they own a quarter of it and then Mr. Jennings owns a quarter of it, I believe! something like that.

Q. But you're going to be operating this disposal pit?

A. That's right.

Q. All right.

A. I'll also say that we're together on other oil ventures, also.

Q. All right. We've used,and Mr. Reed has used this 15-acre pit area, and I'd appreciate it if you would refresh at least my recollection about the surface area of the disposal pits. Tell us again how you propose to have those constructed.

A. We propose to take and go into some steel tanks to start with, perking the water through the steel tanks and removing all the hydrocarbons; going to a smaller skimming pit or two, and then going out into the bigger pits.

Q. Does the water flow through a series of three pits, is it?

A. It will go through about three sets of -- three tanks. Then it will go into two small pits, right, and then into two or three larger pits to evaporate this.

Q. Do you intend to -- I'm concerned about the evaporation problem.

A. Right.

Q. Do you intend to construct all the pits

initially as part of establishing this project?

A. Yes, sir, we'll construct all the pits. We'll make sure that no hydrocarbons get out on our main pit for evaporation problems.

Q. All right. When you talk in terms of 15 acres, have you calculated the surface area of the water that will be contained within these pits? Is that where that number came from?

A. We've looked at it. We figure that the 15 acres would evaporate a large sum of water.

Q. No, sir, my question is whether you are on a 15-acre tract and you're going to put your tanks and your pits --

A. No.

Q. -- and all the things on a 15-acre tract, or if you had calculated --

A. We're on --

Q. -- the surface area.

A. We're on a 20-acre tract.

Q. All right, so the 15 acres, then, is what you've calculated to be the surface area contained within the total sum of the pits.

A. Of the pits, right.

Q. All right. Now how deep will the water

be in these pits?

A. Probably 16 to 18 inches.

Q. Have you made a study of or any attempt to obtain a salt water disposal well to dispose of this water in some formation?

A. I've looked around and tried to purchase two or three of them and figured the cost on a salt water disposal well, and it is very prolific to maintain one, your different corrosion problems, scaling problems, keeping up problems of a well is very prolific.

Q. How much water are you talking about putting into these pits on a daily basis? Let's use days, if you don't mind.

A. I figure we'll probably handle between 1000 and 1500 barrels a day.

Q. In order to avoid this infiltration, or the percolation of water to the bottoms of these pits, Mr. Westall, have you made any study of lining these pits? I'm not talking about plastic from the hardware store. I'm talking about a rubber barrier or some impenetrable barrier to line these pits with? Have you made a study of that?

A. Again you're talking about a very large amount of money to take and line these pits and we felt like being as there was no fresh water in the area that we just

wouldn't -- wouldn't be able to do it. It would just make it infeasible.

Q. Tell me what the cost is. You say it's infeasible. What is the cost?

A. Well, I have a small pit lined on a drilling rig. It's around $2000, and it's probably about, what, a 30x50.

Q. You've got me.

A. It's about a 30x50 pit.

Q. So what would be the total cost of lining the 15 acres pit with an impenetrable barrier? If you know?

A. Probably -- probably -- I'd have no idea. It would be probably $50-to-100,000, at least.

Q. Would there be any problem if the Division entered an order limiting the amount of water to be disposed of in this pit to some formula based upon the amount of water that could be evaporated?

A. Well, I feel like that we could probably live with something as such.

Q. Now if these monitor wells detect salt water at some point, you don't have any intention of pumping the salt water back out, do you?

A. We'll go with whatever the Commission says on the pumping.

Q. Have you made any study of the economics of drilling a water -- a well to remove that kind of fluid from a formation?

A. I don't really see that a well would do any good if you had the water moving.

Q. Thank you, Mr. Westall. That's all I have right now.

MR. JENNINGS: Just a couple of questions.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q. Mr. Westall, you, I think you've testified that you reside in the Loco Hills area --

A. Right.

Q. -- and you actually engage in business there.

A. Right.

Q. As such, do you have opportunity to travel about the fields in the Shugart and the Loco Hills Field?

A. Yes.

Q. Are you familiar with the well that I think is -- you'll have to identify the operator, but we've discussed a well in Section 21, I believe, of 17, 30?

A. I believe it's in 20. That well's in the southeast --

Q. Yes, the one that indicates that there's been produced 358,955 barrels?

A. Yes, uh-huh.

Q. Are you familiar with the pit at that field location?

A. Yes, there's a pit there and it's still being used.

Q. Is it currently being used?

A. Yes, sir.

Q. Are you familiar with the well that has been -- the pit was authorized in the Amoco case, I forget the number, but which is located in Sections 27, 34, and 35, in 18, 31, where I believe your testimony was that there have been some 13,000 barrels a day being produced?

A. Yes, I --

Q. Is that still being used and is the water being produced?

A. Yes, it is, I think it is.

Q. Can you tell, is there substantial water being put in their pits?

A. Yes, sir.

MR. JENNINGS: That's all.

MR. STAMETS: Any other questions of this witness?

MR. KELLAHIN: No, sir.

MR. STAMETS: He may be excused.

MR. JENNINGS: We have nothing further.

MR. STAMETS: Mr. Kellahin, do you have a witness or two?

MR. KELLAHIN: Yes, sir.

MR. STAMETS: You may proceed. These witnesses were not sworn in the first case?

MR. KELLAHIN: That is correct.

MR. STAMETS: I'd like to have both of them stand and be sworn at this time, please.

(Witnesses sworn.)

MR. KELLAHIN: Mr. Examiner, we'd like you to take administrative notice of a previous order and transcript and exhibits. The case in which we'd like you to take notice is Case 5709, resulted in Order No. R-5278, and it was an application that was denied with regards to disposal in an unlined pit, and it is in the southern portion of Mr. Reed's map. It is located in Section 2. I believe the township is 20 South, the range is 30 East. I believe

that the testimony Mr. Reed has given you today is -- has sufficient bearing upon a similar fact situations that were in that case, and we would request that you take notice of that order and that transcript.

MR. STAMETS: We will do that.

MR. JENNINGS: Do you happen to have an extra copy of that order?

MR. KELLAHIN: You bet.

BILL BOGLE

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. For the record, Mr. Bogle, would you please state your name?

A. I'm Bill Bogle.

Q. And where do you reside, sir?

A. I live in Dexter, New Mexico.

Q. And how do you spell your last name?

A. B-O-G-L-E, B as in boy.

Q. What is your occupation or business, Mr. Bogle?

A. I'm president of Bogle Farms. We are the operators of the Turkey Track Ranch.

Q. Let me direct your attention to what has been introduced by the Applicant as Exhibit Number Six, and direct your attention to the blue line on that exhibit, as well as the exhibit that's adjacent to it.

Now what does that line depict, Mr. Bogle?

A. That's the eastern boundary of the Turkey Track Ranch right in that particular area.

Q. What is the business of Bogle Farms and the Turkey Track Ranch?

A. Oh, Bogle Farms is an agricultural operation and the business of Turkey Track is cattle raising.

Q. If you can find your way to the map, or if you can do it from where you now sit, would you identify for us those locations on the Turkey Track Ranch in which you have one title or another as sources of water?

A. Well, in Section 20, in Township -- it looks like 29 East --

Q. Just a minute. Let me give you a map closer to you and then I'm going to refer you, Mr. Bogle, to to Figure Five of the hydrologist's report, and if you can use that and locate for us these water wells.

Let me direct your attention, first of all, to Township 17 South.

A. 17 South.

Q. Range 29 East.

A. Right.

Q. And if you'll look at the -- at that township and identify any of the water wells on the ranch in that township.

A. In Section 22, in the northwest corner, I think that's double wells. Double wells, there are two wells.

Q. There are two wells. Mr. Reed has depicted on his map two wells in the northwest quarter of Section 22. They are also spotted on Figure No. 5, this plat that you're looking at.

Are those two water wells of the Turkey Track Ranch?

A. Yeah, but I don't know whether they're properly located or not.

Q. All right.

A. Let's see. According to my map they're in Section 15.

Q. All right, sir, that would be the section immediately to the north of 22.

A. Uh-huh.

Q. In what portion of Section 15?

A. Right in the southwest corner, so we're not talking about much difference there.

Q. All right, sir, somewhere in that immediate area you have two water wells.

A. That's right.

Q. All right, sir, would you tell me something about those wells?

A. Those are very old wells, about 110 feet in depth. They are good fresh water wells. We ran the chlorides on them this week and it was 50 parts per million.

Q. What do you -- what do you use those wells for, Mr. Bogle?

A. Livestock. Livestock watering, cattle.

Q. All right, sir. Are these windmills?

A. Yes, windmills.

Q. And you have stock tanks at the windmills?

A. Right.

Q. Do you know what the volume of water is that is produced from those wells?

A. Well, they're fairly prolific wells. They will pump whatever the windmill will pump without drawing down.

Q. Can humans drink that water?

A. Yes. It's not real palatable but humans can drink it.

Q. All right, sir. Now, apart from those two wells, Mr. Bogle, would you identify for us any other wells that you now have or may have once had in that township?

A. Well, on down south and east of there, where you have a red dot, that's what we used to call American Republic Well.

Q. That's in Section 35?

A. In 35, right in the north side of 35, yes.

Q. And that's what you called the American Republic?

A. The American Republic. We drilled that well about thirty years ago and used it for several years, but it has since gone bad and been abandoned.

Q. After you drilled that well, what kind -- what was the quality of the water?

A. It was not good quality water, ever, but cattle would drink it.

Q. How did it compare to the quality of water in the Section 15 or 22 wells?

A. It never was that good.

Q. All right, sir, and as best you recall, when did that well go bad?

A. I would say between ten and fifteen years ago. That's just a guess.

Q. When you said the well went bad, what do you mean?

A. It got so briney that cattle wouldn't drink it.

Q. All right, sir, let's go down to the township just to the south of that, still on the ranch, Township 18 South, Range 29 East. Do you have any water wells in that township?

A. Yes, there are several.

Q. All right, sir. Would you identify those for me?

A. Let's -- that's 18 South, 29 East.

Q. Yes, sir. Mr. Reed has a well spot in Section 10.

A. In 10. That -- that well, that particular well that is spotted in 10 is not our well. That's on a small ranch called the McGonagill Ranch. As far as I know, that is a good stock water well.

Q. All right, sir, would you look at the

same township and tell me if you have any knowledge of any other water wells in that township.

A. Well, I think we have to move up back into the same township where the double wells were.

Q. 17 South, 29 East.

A. Yeah, directly west of American Republic Well, two miles and a half we have what's called the Bishop well.

Q. In what township -- what section would that be?

A. What section? 29, Section 29.

MR. JENNINGS: What township, Mr. Bogle?

A. Same township.

MR. JENNINGS: 18, 29, or 17, 29?

A. It's in 17, 29.

Q. What section?

A. Section 29.

Q. Okay, Section 29, 17 South, 29 East, you say there's a water well in that section?

A. Yes, that's called the Bishop well.

Q. Tell me about that well, Mr. Bogle.

A. Well, that's -- again that's a well about 100 feet in depth; chloride tested this week; 230 parts per million. Fairly good stock water. Not as good

as double wells but they do drink it.

Q. Okay. Other than those wells you've just testified to, Mr. Bogle, are you aware of any other sources of stock water or water for human consumption on the ranch?

A. In that area?

Q. Yes, sir, in that area?

A. The only other sources of water in that area are pipeline water from the Ogallalah coming off the Staked Plains.

Q. What's your concern, Mr. Bogle, about Loco Hills' application before the Division today?

A. Well, my concern is that the disposition of salt water in unlined pits is quite likely going to contaminate the underground water. We're certain that it will.

Further, it will -- I'm not a hydrologist, I can't say that it will get into these wells or not, but we know from past experience that we had several wells go bad on the ranch, probably due to oil activities, and on other ranches, too.

Q. Thank you, Mr. Bogle, that concludes my examination of Mr. Bogle.

MR. STAMETS: Are there questions of this witness?

MR. JENNINGS: Yes.

CROSS EXAMINATION

BY MR. JENNINGS:

Q. Mr. Bogle, you have extensive ranching limits, I believe.

A. Yes.

Q. And you stated that you were opposed to disposal of water on the ground. Is that a general principle or just apply into this area?

A. No, that's a general principle, Mr. Jennings. I mean in unlined pits.

Q. And does it make any difference to you where it's located?

A. Well, not as -- not as long as it's on one of my ranches, no.

Q. This is not on your ranch, is it, Mr. Bogle?

A. Well, it's right adjacent to it.

Q. What -- well, from time to time the Commission grants exceptions to this no-pit rule. Do you -- is it your position that you're just generally opposed to that practice?

A. I'm generally opposed to all these ex-

ceptions, yes.

Q. It's a matter of principle to you. Is that why you're here today?

A. No, it's not a matter of principle. It's a matter of logic and reason.

Q. Now, what you say that -- I think it was stated that you own property immediately adjacent to Section 16. What kind of property do you own there?

A. Section 16, where the pit is proposed to be?

Q. Yes, sir, where the pit is, yes, sir.

A. Well, I -- I don't have the property descriptions. I may belong to the Bureau of Land Management, for all I know, but it's land that we graze adjacent to it.

Q. You mean you have a lessee's position in that general area?

A. Yes.

Q. From either the State of New Mexico or the United States?

A. Or some deeded land, but I don't have the descriptions with me.

Q. Do you know of any deeded land that you have within, say, three miles of that location?

A. I can't answer that question.

Q. Now, Mr. Bogle, you've testified about the well in Section -- Section 15, and is that some five miles distant from the --

A. Almost five miles.

Q. And there's a well in Section 10, 18, 29, and you described that as the McGonagill Well, but you said it's not on your property.

A. That's right. The McGonagill Ranch has about a three and a half section ranch, which is right in -- in our pasture there.

Q. Is that also sometimes referred to as the Mossman Well?

A. No, the Mossman Well is a different well.

Q. Well, where is the Mossman Well located?

A. The Mossman Well would be one, two, three, four, five miles east of that McGonagill Well.

Q. That's roughly in Section 9 of 18, 30, if I'm reading the map correctly.

A. I believe it's in 10.

Q. 10.

A. Yes.

Q. The water is bad in that well, is it not?

A. Pretty bad.

Q. Is that the one in the BLM map that shows "bitter"?

A. Maybe.

Q. Now, you have spoken, Mr. Bogle, about your well as being contaminated. Are there many producing oil and gas wells on your ranch?

A. A great many.

Q. And a great many in this particular area?

A. Yes.

Q. Do you know where the -- what the source of contamination that you're talking about is?

A. No, I don't think it's possible to pin it down.

Q. Could it just as well be water that is percolating upward around the casing in many situations, like it happened in Lea County?

A. That's possible.

Q. Is it just as possible due to that as it is by being put in a pit?

A. I'm -- you'll have to ask an expert that question.

Q. You have -- you have a number of pits located on your ranch where they're currently disposing of

water.

A. A great many, yes.

Q. Have you made a practice to appear and object to each one?

A. No.

Q. Just pick on your friends.

A. This is the first opportunity that I knew I had to object.

Q. Where do you generally get your water at the ranch in this area, Mr. Bogle?

A. We're talking about nearby the disposal?

Q. Yes.

A. Mostly it's from surface tanks or ponds, rainwater, and also from pipelines coming off the Caprock.

Q. Do you buy water from the Caprock Water Company or one of the water companies like that?

A. Yes, uh-huh.

Q. Generally is that the source of everyone's water in the area?

A. In that area, from there east, it is, yes, or surface water collected in ponds.

Q. Mr. Bogle, during your operations do you have any experience with -- encountered situations where somebody hauling water is taking the opportunity to shortcut

going to the disposal site and dump it on your ranch?

A. Very many times, yes.

In fact, we've found pipelines running into caves where they're dumping it.

MR. STAMETS: Is that pipeline still there?

A. We tied onto it with a jeep and wrapped it around the well site.

MR. JENNINGS: I believe that's all.

MR. STAMETS: Any other questions of this witness? He may be excused.

MR. KELLAHIN: Mr. Squires.

LARRY C. SQUIRES

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Squires, for the record would you please state your name?

A. Larry C. Squires.

Q. Are you familiar with Snyder Ranches?

A. Yes, sir, I'm the manager of Snyder

Ranches.

Q. And do you hold any professional degrees, Mr. Squires?

A. Yes, sir, I'm a doctor of veterinary medicine.

Q. When and where did you obtain your degree in veterinary medicine?

A. I graduated from Colorado State University in 1960.

Q. Subsequent to graduation have you practiced veterinary medicine?

A. Yes, sir, I practiced veterinary medicine in Hobbs for approximately eight years from 1960 to 1968.

Q. Can you identify for us, Mr. Squires, where the Snyder Ranches are with regards to the applicant's proposed disposal pit?

A. Our ranch, our nothernmost border is approximately four to five miles southeast of Loco Hills. And we run in a southwesterly direction down towards the potash mines.

Q. Can you take one of the exhibits on the wall and draw for us where the northern boundary is of the Snyder Ranches, Mr. Squires?

A. Yes, approximately I can.

Q. Let me find you something to draw with. I forgot my red pen that I use with Mr. Carr.

A. On this map or the exhibit here in Township 18, Range 30, I believe that's right here, our northern boundary runs like this to the corner of 16, and it runs across the north line of Section 16. It drops down a quarter in Section 17, comes over to the middle of Section 17, and from there it travels to this point right here kind of in a straight line. From there it goes a mile and a half west. From there to the point of 2 and 35 -- I lost my place.

Excuse me, I made a mistake, it goes across here then down to this point -- corner. There it goes two and a half miles straight south, jogs again over to the middle of Section 13, and from there it runs about several miles on south and comes back into this area.

But this is generally the line which is our northern border of what we call our Lusk and Walters Ranch and TX Ranch.

Q. All right, sir. Will you return to your seat?

MR. KELLAHIN: We tender Mr. Squires at this time as an interested rancher and as a doctor of veterinary medicine.

MR. STAMETS: He is accepted under both of those positions.

Q. Mr. Squires, let me ask you something about the quality of water in terms of what livestock will and will not drink.

Based upon your experience as a doctor of veterinary medicine, in terms of chloride content, what is your experience with regards to the quality of water that cattle will consume without substantial adverse effect?

A. Cattle can assume -- consume water as high as one and a half to 1.7 percent of total dissolved salts without becoming -- you know, without it killing them.

They can tolerate salt solutions this high. One and a half percent to 1.7 percent is considerably high as far as anybody's calling it bitter water or salt water. It's extremely salty.

Q. You've used some percentages, excuse me, Mr. Squires, you've used some percentages and earlier today Mr. Reed used the chloride contents in terms of milligrams per liter.

Can you put us on the same level and put your percentages in milligrams per liter?

A. One percent is 10,000 parts per million, so 1.5 percent would be 15,000 parts per million. This was

some research work that was done at Oklahoma State University on exactly how much salt could be tolerated by domestic livestock.

Q. When you talk in terms of what could be tolerated by domestic livestock, what does the word tolerate mean?

A. To consume it and be productive and not cause any ill dehydration effects to the animals.

This, of course, is extremely poor quality water and is at the upper limits of what they can tolerate.

Q. All right, sir. With regards to the Snyder Ranch properties, and I forgot exactly what you have defined this particular township as being, what portion of the Snyder Ranches, but in terms of Township 18 South, Range 30 East, what, if any, water wells do you have in that township?

A. Yes, sir, we have a water well in the southeast quarter of Section 26, Township 18, 30 --

Q. Just a minute, let me find it. 26?

A. Yes, sir.

Q. All right, just a minute. So we're all looking at the same place on the same map, Mr. Squires, Mr. Reed has a double red dot in Section 26. Is that what

you're referring to?

A. Yes, sir. This is known as the Walters Lake. There is a -- there is a lake there and this is what we call the Walters Lake Ranch.

This well was previously as -- we protested the brine water put in unlined pits around this particular water well about five or six years ago when Hansen Oil Company applied for an exception to use unlined pits in this area, and the Commission denied it because of the good quality of the water that existed in this well.

This well is approximately 220 to 230 feet deep. The chlorides 170 parts per million; sulphates 315; total dissolved salts -- solids 1043 parts per million.

This is an extremely good water well. It is located approximately six miles south of the proposed location of Loco Hills Water Company.

We have replaced three different water wells to the north of this with a pipeline, a pipeline approximately five to five and a half miles long because -- because the water in these other wells has been contaminated by unlined pits and by the oil field, in our opinion.

Q. All right, let me understand how you use the well in Section 26, now.

A. We have a pump.

Q. Is there a pump on that well?

A. Yes, sir, a submersible pump.

Q. All right, and what is --how much water do you pull out of that well in terms of barrels a minute?

A. We've got a two horse --

Q. Gallons a minute.

A. I would imagine around 20 gallons a minute, but we're not sure. We -- I'm not sure of that right now. We pump water up the hill into a storage tank and the storage tank is about 20 feet tall, and we gravity flow the water to three other different watering locations four and five miles away.

Q. What do these watering locations look like? You mean you have a stock tank at these places?

A. Yes, sir. We have a tub with a float and the pipeline running underground to them.

Q. All right, sir.

A. And this is not Ogallalah water from the plains. It's water that's pumped out there. It's extremely good quality.

Q. All right, sir, what is the depth of that well?

A. Approximately 215 or 20 feet deep.

Q. All right, sir. Now, apart from that

water well, Mr. Squires, what, if any, other water wells do you have in this area?

A. We have a water well in Section 32 of the same township and range, 18, 30.

Q. All right, just a minute. Section 32?

A. Yes, sir.

Q. I don't see that identified on --

A. It's not on this map here. It was a well apparently -- this well has been abandoned because this is where we have the location of our pipeline. This well has been abandoned. We are not using it.

We're not using it because of the poor quality water, though, we're using it because it's more feasible to put that pipeline water over there to it.

Now I have an analysis on this well.

Q. All right, wait just a minute, now. You're too far ahead.

A. Okay.

Q. You're not now using the well in 32.

A. No, sir.

Q. But it still exists.

A. Still exists.

Q. Hasn't been plugged and abandoned?

A. Well --

Q. You haven't plugged it, have you?

A. -- it's got a bucket over it.

Q. That's not plugging a well, Mr. Squires. Would you tell me, do you have a water analysis on the well in 32?

A. Yes, sir.

Q. All right, would you tell me what the water analysis is for that well?

A. If I can find it here. Mr. Reed made the analysis. It was Southwestern Labs of Midland by direction of Ed Reed and Associates from the samples that we sent them back in 1975.

I've got ten or fifteen wells here. It will take me a minute to find it.

Section 32, Township 18 South, Range 30, total dissolved solids were 3,326 parts per million; chlorides --

Q. Wait a minute, you're going too fast for us.

A. Okay.

Q. What are the solids?

A. Three, three, two, six.

Q. All right, and what's chlorides?

A. Chlorides, 277.

Q. Do you have any more information on that well?

A. Yes, sir, sulphates 1812.

Q. All right, sir, apart from the well in 26 and the well in 32, do you have any other wells?

A. Yeah, I had another well here that we sampled that was on the Turkey Track, Norman Well that we sampled because we wanted to drill a well just to the south of there about a half a mile, and we have the analysis on that particular well.

Q. Tell me where that well is.

A. It's located in Section 25, Township 18, Range 29.

Q. All right, just a minute. 18 South, 29 East, what's the section?

A. Section 25. The water is located about half a mile north of our north fence.

Q. All right, sir. Mr. Reed has a stock well in Section 24. Is that the same one you're talking about?

A. I don't think so, no, sir.

Q. Just a minute. I direct your attention to what Mr. Reed has marked as a stock well in Section 24 of that township. Is that the well to which you refer?

A. No, I don't believe it is.

Q. All right, sir, where do you think this other well is?

A. Approximately one mile south of this.

Q. In Section 25?

A. Yes, sir.

Q. Tell me about that well.

A. Total dissolved solids 1295 parts per million.

Q. 1295, is --

A. Yes, sir.

Q. All right, sir.

A. Chlorides 25.

Q. All right, sir.

A. Sulphates 7.7.

Q. To what, if any, use is that water being placed?

A. I assume that they're using it for live-stock watering. It's not on our ranch and I'm not --

Q. All right, sir.

A. I don't know for sure.

Q. All right. Are there any other wells in this area to which you're familiar?

A. By this area, yes. I've got a bunch of

water wells on this whole list here, which have to do with the Townships 20, 29, and 20, 30, south of there.

Q. All right, I'm looking, I'm concentrating on Township 18 South, Range 30 East.

A. No, sir, just those two wells that we've already talked about.

Q. All right. Mr. Reed has got some wells spotted, two of them in Section 22 of that township, and a third one in Section 21 of that township.

A. That's right. Those two water wells were replaced by the pipeline from our house there in Section 26. Now, I do not have a water analysis on these wells. The cattle were using, we were using these wells ten to twelve years ago. We have replaced the watering there right in the middle of Section 22 with a pipeline from the well in 26.

Q. Why have you done that?

A. Because it's more economical to pump a water well and supply it and run the pipeline and because the water there in 26 is of better quality.

Q. My question, Mr. Squires, are any of the three wells in Section 22 and 21, are any of those wells still useable for either stock or human consumption?

A. I think they'd all three be -- be useful as stock wells, if we didn't have the other well, yes, sir.

Q. And the reason you use the other well in Section 26 is why?

A. Because it is a better water well. The quality is higher, and it's cheaper for us to operate one water well and water twenty sections than to use five water wells and water the same area.

Q. I see, okay. Are there any other wells of which you have knowledge in that township?

A. No, sir.

Q. Mr. Squires, what is your position and the position of Snyder Ranches with regards to this application?

A. Our position is if they can show that there's no migration of the salt water, why, we have no -- no problem with it, but we don't feel like that they can possibly show, they've already said that the water will migrate down into the Santa Rosa and also into the Rustler formation and the Triassic, and we contend that there is certainly useable water wells in this area that a facility of this nature will contaminate and ruin.

Now, it is true that we do have Ogallalah pipelines coming from the Caprock, and we can use these, but we don't feel like they'll be there forever. It may be Rustler water is not as good quality as it is from the Ogallalah

but in lots of instances we do have to use it, and so that -- and we feel like that it's -- that this application would contaminate it.

Q. Thank you.

MR. KELLAHIN: I have no further questions for this witness.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Squires, do you have any knowledge of any water wells from the -- producing from the Rustler?

A. Yes, sir. I say yes. I'm not a geologist and I'm not sure where the water comes from. I know that we do have some water wells on south of here that are close to 250, 275 feet deep that we do use as stock wells, yes, sir.

Q. How about those wells there at the ranch buildings south of PCA Mine?

A. Those wells, I have some analyses on those wells here, and these wells were useable for stock wells; however, they got pretty bad and they corroded our tanks so bad they'd eat them up and the water tasted terrible cattle didn't like to drink the water. We saw an opportunity to get better water because we felt like the potash mines and

the oil industry had polluted the water, and under threatening Duval and PCA with a -- with a lawsuit, they built about ten miles of pipeline and supplied water to these wells, and we now have their water.

However, we are using some wells down in 19, 29, that -- which is about fifteen miles south of Loco Hills, that we consider to be what we call gyp water that cattle do very well on. The chlorides in those are 100 to 125 in this area there.

Q. That's somewhere in this strip along the far eastern side of the --

A. Yes, sir, now it would be on the west side of Nash Draw. Now all of our wells within the Nash Draw system, with the exception of one or two that we know about, are not useable.

Q. It seems as though, from memory, that one of those two wells south of the PCA Mine is a relatively deep well, 900 feet or so, is that --

A. No, sir.

Q. That's not correct. Okay.

A. No, we have that -- we have what we call a spring well right at the PCA Mine and I believe that an application by Tipperary, which we protested there and we thought because I think at the time in the hearing that Reed

and Associates did testify that that water would ultimately get into the Pecos River, and we -- we protested that hearing, too, and it was right adjacent to the PCA Mine.

And we had a spring there that we -- the cattle used to water to several years ago, which now they won't bother.

MR. STAMETS: Any other questions of this witness?

MR. JENNINGS: May I?

MR. STAMETS: Mr. Jennings.

CROSS EXAMINATION

BY MR. JENNINGS:

Q. Mr. Squires, just first off, I think you testified that your good well in Section 26, 18, 30, was five miles from -- is it from Loco Hills or the Loco Hills project, which we're talking about here in Section 16?

A. I said it was approximately six miles south of Loco Hills.

Q. Well, as a matter of fact, isn't it approximately two and a half miles west and nine miles south of Section 16?

A. Near as I count it, it's one, two, three, four, five, six miles directly southeast of the highway there

where Loco Hills is and it would be then seven and a half miles on up to the location in Section 16, is the way I count it.

Q. Well, as I count it there's one section. You go across 17 and 15, two and a half to 14 and then you go south across nine sections, it's vertically across nine sections.

MR. KELLAHIN: I'll be willing to stipulate with Mr. Jennings that the Examiner can count the sections.

MR. JENNINGS: I just wanted to make sure that we were talking about the same area.

Q. Mr. Squires, you say that you're a veternary from 1960 to 1968?

A. I was a practicing veterinarian at that time, yes, sir.

Q. And did you retire at that time or did you go into other business?

A. I did not -- I stopped public practice in 1968. I have continued to practice around, yes, but not to the public.

Q. And you say your business is Snyder Ranches?

A. Yes, sir.

Q. Do you have extensive ranch holdings?

A. Well, we have a rather large ranch, yes, sir.

Q. Well, what's the name of the ranch here in 18, 31, we're talking about?

A. We call that the Walters Camp, 18, 31, Walters Camp.

Q. Well, and this area you've designated, I guess it goes on to the east a long ways, does it not?

A. It goes quite a ways to the east, yes, sir.

Q. Approximately what percentage of that land is BLM land?

A. A high percentage of it.

Q. Well, do you know from looking at your permits?

A. A high percentage, 80.

Q. And what percent is State lease?

A. I don't know. Probably, if you would like to know what I think ownership is in that area, we own the land in Section 26 where this water well is located, and we have very little fee land out in this area, if that's what you're after.

Q. But basically that's (not understandable)

land.

A. Yes, sir, we hold Federal grazing permits, State grazing permits. We have -- own all the improvements on the Federal grazing permit and we have drilled all these water wells, in most cases.

Q. Speaking of drilling wells, you mentioned the well in Section 32 which you recently drilled and then I believe there was a well -- well, the one in Section 32, 18, 30. Do you recall exactly when you last used that well?

A. It's been over ten years ago.

Q. Was that well -- it didn't show on the records, was it permitted by the State Engineer, do you know?

A. I have no idea. The well has been there fifty years, I understand.

Q. Uh-huh. Well, as a veterinarian, as I understand your testimony, cattle can tolerate or get along on a 1 to 1.7 percent --

A. Yes, sir, the research shows this, yes, sir.

Q. Do you consider that good water for your cattle?

A. I would prefer not to use it, yes, sir. And this is why we would like to protest most of these things to keep it from happening.

Q. Do you use it?

A. No, we're not using it, any water this bad, no.

Q. Then you consider it bad water.

A. I consider it not desireable.

Q. You're a rancher, would you buy a ranch that only had that type of water?

A. No, sir, that's why I would like to keep those waters from getting contaminated to that point.

Q. Well, where do you -- other than Section 26, where do you get your -- generally get your water?

A. We get our waters -- we use approximately 14 of the 15 windmills. We have numerous water pipelines waterings from the Duval and PCA and Kermac Potash Mines that come from the Caprock --

Q. From the Caprock Water System?

A. Yes, Ogallalah waters.

Q. That's generally your water supply, isn't it?

A. We prefer to use this water because it's free, primarily, and because it's sweet water.

Q. How do you get it free?

A. They provide the pipe. This pipeline is about 14 inches in diameter and it's got about 400 pounds

pressure on it. All we have to buy is a pressure reducer and a tub and a line.

Q. How long have you been operating the Snyder Ranches?

A. Since 1968.

Q. Do you engage in any other business, Mr. Squires?

A. Yes, sir, I do.

Q. What business is that?

A. Well, businesses. I'm involved in several investments. Which one are you interested in?

Q. Well, I'm generally interested in knowing just your real purpose for being here. It's been my understanding that you're in the water disposal business, is that right?

MR. KELLAHIN: That's a characterization of the real reason he's here. He's testified why he's here, Mr. Jennings.

Why don't you ask him without embellishing the question with what real means or does not mean? I object to that question.

MR. STAMETS: Well, the Examiner automatically throws out anything like that anyway when he's considering the merits of a matter.

Q. Would you characterize that business?

A. Yes, sir, I am in -- back in 1968 some people from Midland were studying a salt lake that was located on our ranch around Halfway Bar. I found out their intention was to seek authority from the New Mexico Oil Conservation Commission to dispose of produced waters in the lake.

I felt at the time that if anybody was going to be allowed to do this, that it was going to be me, so I could control it.

And at that time I hired Mr. Reed, Ed L. Reed at the time. He studied the area. He indicated that it was a natural salt basin. The water in fact flowed into the lake and it didn't come out of the lake and it would not harm any fresh water supplies in the area.

And so I -- we had a hearing before the Commission and at that time got permission to dispose of produced waters in the lake and we after that point formed the company called Pollution Contro, Incorporated.

Q. And Does Pollution Control, Incorporated operate a water disposal system?

A. Yes, sir.

Q. And where is the water that is generally produced in Loco Hills area now disposed?

A. We get some of the water there. I'm

sure there's -- it's being hauled to a lot of areas, but I don't know absolutely for sure, but I know INW does haul some water to us, yes, sir.

Q. How far is it from Loco Hills to your disposal site?

A. 25 or 30 miles.

Q. Who -- you said -- are you the owner of Pollution Control?

A. I'm a stockholder in the company,yes, sir.

Q. What -- who are the other stockholders?

A. Steve Foster. Charles Scalinda, J. W. Neal, my wife. We -- I might clarify that for you. I had some partners in this situation that were operators of it prior to -- until about four months ago.

We were in constant problems with them because they are oil operators and they handled it with an oil operator's point of view, with no feeling for the land at all. We had constant problems with them and I bought them out about three months ago.

Q. Are you now, you and your wife the majority stockholders?

A. Yes.

Q. Roughly what percentage of stock do you own?

A. Twenty-six.

Q. Will the Loco Hills Disposal System, if allowed, be in competition with your business?

A. It's the same type of business but being 30 miles away I woudn't think it would have much affect on it.

Q. It wouldn't bother you?

A. No, sir.

Q. Well, if --

A. If they don't pollute our water, no, it won't bother me. But if it ruins our water on Section 26 it will certainly bother me.

Q. That well is a considerable distance.

A. I believe it's seven and a half, eight miles.

Q. Now, Mr. Squires, there's been a considerable amount of water disposed of in the -- in this immediate vicinity and to -- particularly to the north and I believe some to the east in Township 18 South, Range 31 East. Has that had any effect on your well in Section 26, do you know?

A. Considerable water -- would you give me that location again, please?

Q. I see you were not here this morning when --

A. No, sir, I was not.

Q. Well, there's -- I believe the map shows that in Section 21, 17, 31, there's been 358,000 barrels of water disposed of over the years.

And I believe in Section -- well in the area of Section 6, 5 and 6, of 18, 31, there has been 114,000 and then I believe there's some further testimony that in the area just to the -- about six miles to the east of you they are producing in the area of -- disposing of in the area of 13,000 barrels a day -- 13,000 barrels a month. I believe that's, for your information, that's on the Lusk Ranch, old Lusk Ranch. and that's the Greenwood well.

A. Uh-huh.

Q. Has that affected your well in Section --

A. To my knowledge it has not; however, there's certainly a possibility, I think, that if this water is going to migrate horizontally, it certainly may contaminate that well in the next five years. I don't know this. I don't think anybody in here knows this.

Q. Are there a great, great number of wells on your ranch in this area, Mr. --

A. I testified to the --

Q. No, oil wells, excuse me. Oil wells.

A. Oh, you're not talking about water wells

now.

Q. No.

A. Yeah, there's --

Q. It's very densely developed.

A. Yes, sir.

Q. Do you -- to your knowledge have there been any problems with water percolating from the wells up to a higher horizon?

A. I don't know.

Q. You don't know that?

A. No.

Q. Do you know that that's quite possible?

A. Yes, I know it's possible.

Q. And generally you know that a lot of the wells in the area produce formation water at high levels.

A. They produce some amounts, yes, I know that they do. Some of them do; some don't.

Q. Approximately -- well, I want an example so we have something to compare it to, approximately how many wells a day produce into your system?

A. Into my system?

Q. Into your -- I've forgotten the name of it --

A. Oh, oh. Laguna Gatuna? We dispose of

20 to 25 truckloads on an average per day; however, our evaporation surface is almost two sections. The lake is a rather large lake.

Q. So 25 truckloads, that's 25 times 160 or 180?

A. Well, no, they don't haul 180 barrels, that's too heavy. Or they're not supposed to, anyway. 140 barrels, I'd say.

Q. Maybe 4000 barrels a day?

A. If that's what it figures.

Q. I'm just guessing.

MR. JENNINGS: I believe that's all.

MR. STAMETS: Any other questions of this witness? He may be excused.

Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: Mr. Stamets, we'd like to take the liberty of Mr. Reed's exhibit and mark that as our Exhibit Number One and introduce it at this time.

MR. REED: All right.

MR. KELLAHIN: Thank you.

MR. STAMETS: That exhibit will be admitted.

MR. KELLAHIN: That concludes our

presentation, and we have nothing further.

MR. JENNINGS: I have one thing that I overlooked, and I would like for the Commission to take administrative recognition of the testimony offered in Case Number 6659, in which Order -- it was an Amoco case and an order was entered on October 10th, 1979. It's Order No. 6134.

MR. STAMETS: Okay, we will --

MR. KELLAHIN: Just -- may I ask what's happening?

MR. JENNINGS: I'm sorry.

MR. STAMETS: Mr. Jennings has asked that I take note of Case 6659, Order R-6134, and I believe that relates to this series of pits in 27, 34, and --

MR. KELLAHIN: That's Amoco's pits, Mr. Jennings?

MR. JENNINGS: That's right.

MR. STAMETS: Mr. Kellahin, do you have anything in the way of a closing statement?

MR. KELLAHIN: I have a few comments, if you'll bear with me.

Mr. STamets, a few years ago the Commission held a hearing and came to the decision in Order Number R-3221 that the further use of unlined disposal pits in this area is no longer a good idea.

And you can see, over the course of years there is absolutely no doubt that disposal in unlined surface pits is a great hazard to sources of fresh water in the area.

The Commission recognizes that fact and has assumed the obligation to have oil and gas operations conducted in New Mexico in such a fashion that fresh water sources, as defined by the State Engineering statute, are protected.

The Commission has exercised that obligation, I think, with diligence. There are a great many cases, Mr. Squires referred to some, I have introduced some. One in particular, the Tahoe case, I think, is important, where Mr. Reed's company had testified with regards to the use of a disposal pit, unlined, in Section 2 of, I guess, it's 20 South, 30 East, and in that case it was denied.

The evidence in that case is very much like the case here today. Mr. Reed and Mr. Westall and his people have put forth a substantial effort in order to justify the use of this area as a disposal pit.

Unfortunately, the facts simply don't bear out the use of the area for an unlined disposal pit. They've admitted a very serious problem, the pit leaks.

There is no testimony to show that the

other pits in this area experience the same kind of characteristics of soil to show that they also leak. Obviously, the area for some time has been used for surface disposal. Mr. Reed was unable to tell us today which of these, other than perhaps this Amoco project, are continuing.

But it seems to me that simply because others have done it in the past, it is no reason to justify it. In fact it mandates the denial of the application. There is no justification to continue the impairment further of water that is still potentially useable for beneficial purposes. Some of that beneficial use is occurring now and certainly there is a potential for some of these wells to be used in the future.

The benefit to the oil and gas industry in general, I think, is very minimal for the use of this site. The testimony is very clear that Laguna Gatuna is a substantial salt lake in which this stuff can be trucked.

The argument that we heard at the last hearing was that it might cost a little less to put it on the surface here. I think the economic tradeoff is just too great.

We have here what Mr. Reed has told us is a pit that will leak in an unknown amount. It will percolate down through the Triassic and into the Rustler and it

will eventually end up in the Pecos River, perhaps not now, not next year, but at some time.

I think we've got to act now with diligence to preclude this from continuing to happen. We believe that the applicant has established only that if this should be granted, it should be granted with the condition that it be lined with a rubber pad or some other pad that's impermeable, that will allow him to dispose of water by evaporation only. We believe the Examiner is fuliy competent to calculate the volume of evaporation that would take place in the 15-acre pit. Any disposal in excess of that has got to be unacceptable. In addition, it would have to be conditioned on the pit being lined. We believe that without that kind of conditioning on the application there is no other alternative but to deny the application.

MR. STAMETS: Thank you. Mr. Jennings?

MR. JENNINGS: Mr. Examiner, I don't want to belabor this matter. I'm sure after listening two days, or the better part of two days, the Examiner has heard plenty of this.

I do want to point out that we think that we have established a feasible plan, and if you'll look through the history down through the area, and there isn't any evidence of any fresh water in the area, and that's been

basis, I understand, of the testimony in many, many cases in the past in this area that exceptions have been granted. Now the exceptions have been granted; maybe they shouldn't have been granted, but they have been granted.

I think the primary one is the one for Amoco that was granted just in 1979 and it's quite evident that they are producing a substantial amount of water. And any operator that operates in the area has several pits and there's been a great deal made of the fact that there's one good well in the area that Mr. Squires has, which is some nine miles away. There's no showing that that will be contaminated and as a matter of fact, it hasn't been contaminated down through the years. There isn't any evidence of such contamination.

On behalf of the applicant we have tried to in every way follow the procedures and the practice which the Commission has suggested or recommended in the past. We firmly believe that there isn't any water under there. We've gone to great extent and will go to greater extent to monitor the wells and make sure that there's no damage to any fresh water, that might be some vertical or even horizontal.

Now it is our feeling that it would be totally impracticable and there's no -- I think Mr. Westall when he estimated $2000 for a 30x50 foot pit, then it would

take $50,000 by just a long, long, long way for 15 acres, it's quite a few thousand square feet.

It's just not feasible. This is in an area where it's been basically an oil area for years, and years, and years. There's a lot of old wells and the testimony indicated that they're producing lots of salt water. A lot of them are going to be prematurely abandoned if they have to haul the water the distance to this well, which we've heard the testimony and I won't go into that, as to the time that's consumed to go to Laguna Gatuna.

I can well see how the ranchers are concerned, that they all have to have had many pits on their ranches before, but this is not on either one of their properties. The applicant has gone to obtain the permission of another rancher in the area, who is actually ranching it, and has now obtained a State business lease, and the State is getting a whole lot more from that business lease than it does from many acres of grazing leases. They're basically lessees in the area.

We don't propose it and we don't want -- we're the last ones in the world who want to contaminate any fresh water.

But we think that we can safely do this and with that, we'll leave it to the Examiner. Thank you.

MR. STAMETS: Thank you.

We'll take the case under advisement and the hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7329, heard by me on 9-23 1981.

Richard L. Stamets, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO
26 August 1981

EXAMINER HEARING

BUREAU OF LAND MANAGEMENT
RECEIVED
AUG 25 1982
DIST. 6 N.M.
Carlsbad New Mexico

IN THE MATTER OF:

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. CASE 7329

BEFORE: Richard L. Stamets

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: James T. Jennings, Esq.
JENNINGS & CHRISTY
Roswell, New Mexico

For Bogle Farms: W. Thomas Kellahin, Esq.
KELLAHIN & KELLAHIN
500 Don Gaspar
Santa Fe, New Mexico 87501

A P P E A R A N C E S

For Bogel Farms: W. Thomas Kellahin, Esq.
KELLAHIN & KELLAHIN
500 Don Gaspar
Santa Fe, New Mexico 87501

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MR. STAMETS: We'll call next Case 7329.

MR. PEARCE: Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico.

MR. STAMETS: This case was previously heard about a month ago and testimony was taken at that time and while we do have a readvertisement to clarify the location of the unlined pits, no other changes, we will accept additional testimony and cross examination at this time.

MR. JENNINGS: Mr. Examiner, I would just like to re-tender all of the testimony and evidence introduced at the -- and exhibits -- at the August 26, 1981, hearing.

MR. STAMETS: Those will be accepted.

MR. JENNINGS: And I would like to ask the reporter to advise what the last exhibit number was according to her records.

My records reflect it's No. 4, Number Four was the last.

THE REPORTER: I have no records with me, Mr. Examiner, Mr. Jennings. I think there is a copy of the transcript some place around, however.

MR. JENNINGS: It was Four.

MR. PEARCE: According to the index,

Mr. Jennings, that was a letter. Do you need to know more than that?

MR. JENNINGS: No. No.

With that, I would like to offer Exhibit Number Four, which is a copy of business lease No. BL No. 1044 effective July 17th, 1981, covering the north half southwest quarter of Section 16, Township 17 South, Range 30 East, issued by the Commissioner of Public Lands.

MR. STAMETS: I believe you referred to that as Exhibit Four?

MR. JENNINGS: Four.

MR. STAMETS: Well, shouldn't it be Five?

MR. JENNINGS: Five. Five, I'm sorry.

MR. STAMETS: I'll correct my copy to show that that's Exhibit Five.

MR. JENNINGS: I'll proceed, I guess, at this time. If there is anything else we'll introduce it, offer it, and then we'll have them all at once.

MR. KELLAHIN: Fine, thank you.

MR. JENNINGS: Mr. Reed.

STEVE L. REED

being recalled as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

MR. STAMETS: For the record, we'll remind that he was previously sworn and you're still under oath.

A. Yes, sir.

Q. You are the same Steve Reed that testified in this matter on -- before the Examiner on August 26, 1981?

A. I am.

Q. Mr. Reed, one of your exhibits offered at the hearing was Exhibit Number One, which consisted of a volume. Do you have any changes or amendments which you make -- wish to make at this time in connection with this exhibit, and if so, please explain these and furnish us with a copy of it, the exhibit?

A. Yes, I do. I have, in reviewing Exhibit One, which is my hydrologic report, we found that there was in plotting the data. We had mislabeled a range, or mislabeled the range numbers on our base map, and all of our data were then plotted on that erroneous base map.

So the data are correct relative to each other in the report that was previously submitted and I have included in this report that I have here today a correct base map with the data plotted correctly on the base map.

Again, to reiterate, the data --

Q. Excuse me, just a minute.

A. Yes, sir.

Q. The new exhibit is referred to as sub-number one.

A. That is correct.

Q. And would you refer to the figure that you're talking about at this time?

A. Yes. There were two figures in Exhibit Number --

Q. Give the number.

A. As Figure Number Five and Figure Number Six, for which we had plotted the data in the wrong township and the wrong range. These have been resubmitted and correctly plotted.

Q. Are there any other changes whatsoever in connection with these figures, Mr. --

A. I do not believe so, no. Basically, they're -- they're replotted on the -- on a correct base map.

MR. JENNINGS: Any objection to that

exhibit?

MR. KELLAHIN: No objection.

MR. JENNINGS: Pardon?

MR. KELLAHIN: I said there's no objection to the substitution of the corrected exhibit.

MR. JENNINGS: Thank you.

MR. STAMETS: The corrected exhibit will be admitted.

Q. Mr. Reed, have you had an occasion to review the transcript which was prepared in connection with the original hearing?

A. Yes, I have.

Q. Did you find any errors in that transcript?

A. There were a few errors which I have noted on my copy.

Q. Would you like to at this time point these out and make corrections of these?

A. I think you might first refer to, if you would, to page 19 and see if there's any errors on that page.

A. There is a misspelled word on page 19 in the fifth paragraph, the last sentence of that paragraph. I'll read it into --

MR. KELLAHIN: Excuse me, Mr. Reed, could you give us the line number? Each line of the tran-

script is numbered.

A. Yes, line number 17. The word, the incorrect word is "juried". That word should be jetted, J-E-T-T-E-D.

Q. I think you'll find -- refer to page 24 and line, maybe, 2 and 6.

A. On page 24, at line number 2, that -- the portion of that sentence reads "well which we could find in the field". That should read well which we could not find in the field.

On line number 6, the word "faulty" should read quality.

On page number 25 there are two misspellings on lines 15 and 18. The word "hydraulic" is H-Y-D-R-O-A-U-L-I-C instead of R-O-L-I-C.

MR. JENNINGS: I think it's on page 34. Did you pass that?

Refer to line 14, page 34.

A. Yes. On line number 14, page 34, the sentence reads this disposal rate does not into account, should read, this disposal rate was not taken into account.

On page 44, the sentence reads, we went 9 feet into the Rustler.

MR. PEARCE: What line?

A. I'm sorry, line 21, should read 90.

MR. STAMETS: Nine zero?

A. Nine zero feet.

That is all the corrections that I have seen on my portion of this transcript.

MR. JENNINGS: Thank you.

Q. Mr. Reed, since the last hearing have you reviewed the plans for the monitoring wells and do you have any additional thoughts or recommendations as to the monitor wells which are to be drilled?

A. Yes, I have.

Q. Would you explain those, please?

A. We proposed in our -- in our plan submitted at the last hearing to drill a ring of monitoring wells around this facility, two of which would be completed into the Rustler, into the top of the Rustler formation.

There was concern expressed in the hearing previously that we base our contention that the Rustler contains extremely poor quality water on one analysis nearby, one analysis of the ground water nearby.

We would like to propose that one of these monitoring wells which will be drilled to the top of the Rustler will at the time of the installation of that monitoring well, the hole will be drilled to a depth where

the first ground water is encountered. We anticipate that the -- in the monitoring well that the top of the Rustler formation will be encountered approximately 250 feet in depth and that the uppermost water will be encountered, perhaps, at a depth of 350 to 400.

We propose to drill the southeasternmost monitor well into the first producing zone and collect a sample of that Rustler water, have that sample analyzed for its major constituents and submit that analysis to the Oil Conservation Division.

The nearby well, which we referred to in our previous testimony, showed a chloride concentration of somewhat over 10,000 milligrams per liter. This, coupled with the other data that we have on the type of rocks in the Rustler formation, and the testing that we have done, has led us to believe that certainly the Rustler water is -- is -- has total dissolved solids, concentrations, much higher than 10,000 milligrams per liter, and we believe that the analysis of a water sample taken from one of these Rustler depth monitoring wells will verify what we have stated.

Upon the collection of the water sample from this one monitoring well, we will then plug the well back to the top of the Rustler, because we feel that in order to adequately monitor the pits, the well needs to be in the

top of the Rustler and not complete in a salt water zone within the Rustler.

Q. Have you made a further study into the amount of water currently being disposed in pits with exceptions to Rule 3221 in this area?

A. We have. We have secured data from the District office on the volumes of salt water going into various pits within the vicinity of our proposed site.

Q. Have you prepared an exhibit?

A. I have indeed prepared an exhibit, which shows --

Q. Well, let's get the exhibit first.

A. Again, perhaps, I can place a copy of this exhibit up on the wall.

Q. Is this what has been referred to as Exhibit Number Six?

A. That is correct.

Exhibit Number Six is a map that we have compiled by examining the operating data in the regional office file concerning the amount of salt water disposed in pits within the vicinity of our proposed location.

Basically, these data are total figures in barrels for salt water that has been introduced into a particular pit, which is located approximately on this map,

for the last ten years.

The exhibit shows, for instance, that within the last ten years there has been 182,220 barrels of salt water disposed on Section 20, just to the southeast of our proposed location.

In Section 21, the section just to the south of our proposed location, in the last ten years there has been 358,955 barrels of salt water disposed.

In Section 22, 235,386 barrels.

In Section 14, to the east, 34,660 -- 34,660 barrels.

There are other data that we have on the map for pits that are further removed from our proposed location in Section 16. For instance, in the vicinity of the northwest corner of Section 5 and the northeast corner of Section 6, Range 31 East, Township 18 South, we have an indication of over 114,000 barrels disposed in one instance; 7500, in excess of 7500 barrels in another area; and 49,000 barrels plus in a third.

Section 22, that same township, we have totaled 476,000 plus barrels of brine introduced into that area.

Q What -- excuse me, maybe I misunderstood you. What -- how did you identify that township?

A. That's -- as 31 -- Range 31 East, Township 18 South.

Q. Go ahead, I'm sorry.

A. In the vicinity of our proposed location in Section 16 we see in the last ten years in excess of a quarter of a million barrels of water disposed into surface pits. These pits are, again, a mile to a mile and a half from our proposed operation.

The bulk of the salt water in the immediate vicinity of our proposed site lies in a direction which one would consider hydraulically down gradient from our proposed location.

Q. Mr. Reed, there are a number of dots on this exhibit. Does each one of those represent a disposal pit?

A. Yes, they do.

Q. I see a blue line starting about the center of the exhibit in the north part and meandering down along the west side. Would you identify that line and tell me what it is?

A. Yes, sir. That's the approximate eastern limit of the Bogel Ranch in the vicinity of our Section 16.

Q. In the south part of the exhibit you

will note, in the southwest part, there's an area marked in yellow. Would you identify that and tell what that is?

A Yes, sir. That's the northern limit of the Clayton Basin exemption.

Q That is in Township -- basically, Township 19 South, Range 30 East?

A That is correct.

Q Mr. Reed, only today you had an opportunity to check with the Oil Conservation Division records in connection with the production being disposed of in the pits by Amoco from its production in the Shugart-Pennsylvania Gas Pool, which is located in Section 24, 30 -- 27, 34, and 35, 18, 31, and the pits which are located in the same sections.

MR. KELLAHIN: What were the sections, Mr. Jennings?

MR. JENNINGS: 27, 34, and 35.

MR. KELLAHIN: Thank you.

A Yes, I have. I have briefly examined those records today.

Q Was this order -- was this injection started pursuant to an order entered in this -- by the Commission in Case Number 6659 in Order No. R-6134, dated October 10th, 1979?

A. That is correct.

Q. Okay, now if you'll tell us --

MR. KELLAHIN: Excuse me, I want to make sure I got the right one. 31 East, 18 South?

MR. JENNINGS: 18, 31.

MR. KELLAHIN: All right.

A. Yes, sir. I see in the few months that I looked at for 1981 approximately 13,000 barrels a month disposed in that immediate vicinity.

Q. Were those the most current months that you reviewed?

A. The most current months that I reviewed here briefly, I believe, was March or April of 1981.

Q. Do you have anything further that you wish to add to your testimony of August the 26th? Anything further you wish to offer today? At this time?

A. I do not at this time.

MR. JENNINGS: That's all -- all that we wish to do at this time.

Was Exhibit Six prepared by you or under your supervision?

A. It was.

MR. JENNINGS: We would offer Exhibit Number Six.

MR. STAMETS: Exhibit Six will be admitted.

Are there questions of Mr. Reed at this time?

MR. KELLAHIN: Yes, sir.

MR. STAMETS: Mr. Kellahin.

CROSS EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Reed, let's start with your Exhibit Number Six, if you please, sir.

A. Yes, sir.

Q. Am I correct in understanding that this plat represents the area that you have examined to determine whether in the last ten year period certain surface locations have been used to dispose of water in unlined surface pits?

A. That is correct.

Q. Do your records tell you, or can you tell us, -- let me ask you this.

Is this Amoco disposal pit in Sections 27, 34, 35, this area you just discussed, the records you checked in April, is that the only pit that you have checked to determine whether it's continued to be used as a disposal pit now?

A. Those are the only records that I have examined here today in the office, but our examination of the District office files go through 1980, I believe.

Q. All right, can you tell us which ones of these pits are still being used for disposal of produced salt water?

A. I do not have that data, no.

Q. So we just know that in the last ten years, that the quantities reported here have been used for disposal.

A. That is correct.

Q. And we don't know how many of them are still being used for disposal.

A. I do not have that data immediately, no.

Q. All right. Did you make an examination in this area, Mr. Reed, to determine if any Oil Commission applications have been denied for applicants seeking permission to dispose of produced water on the surface for any of these townships that are contained on this plat?

A. I have not specifically examined those data.

Q. Do you know whether or not your firm, Reed and Associates, did any work for Tahoe Oil and Cattle Company back in September and the summer of 1976 with regards

to the use of Section 2, Township 20 South, Range 30 East, as to disposal pits?

A. Perhaps we did, but I have no direct knowledge of that work, no, sir.

Q. Now, in determining the information for this disposal pits that have been used by other operators in this area, Mr. Reed, have you studied the composition of the soils underlying those pits to determine if any of them are going to leak like the Loco Hills pit's going to leak?

A. We have not examined the geology of any of these pits, no.

Q. So you don't know whether or not any of these exceptions to the general rule have been permitted simply because there's evidence in the record to demonstrate that the clays present under those pits are such that there will be no percolation into the ground?

A. Would you rephrase the question, please?

Q. No, sir. I'll repeat it, though.

My question is whether or not you know if any of these permits for excepted areas have been based upon pits that will percolate water, as the Loco Hills pit is going to do?

A. I have no direct knowledge of that, no.

Q. That would be a significant difference

between the Loco Hills pit and any other pit, would it not?

A. What would be a significant difference?

Q. Whether the pit leaks or not.

A. I would have to examine the other pits to determine their -- the local geology and hydrology in those immediate areas, to say whether they would differ or not from the pit that we propose.

Q. All right, and you have not done that?

A. No.

Q. Now, Mr. Reed, with regards to Figure Five of your Exhibit One, which is your hydrologist report, if I understood Mr. Jennings correctly, the plat has been redrawn in such a way that we now have the tier of townships to the east of the township in which the site is located? In other words, you've added this tier of townships to the east of the location. That doesn't appear on the --

A. That is essentially correct, yes.

Q. And the information other than that, the information that is on that amended Figure Five is the same information that you testified to, from, at the earlier hearing?

A. It is.

Q. Okay. In determining if there is a threat to the degradation of the quality of water in the area,

let me ask you your understanding of certain terms so that you and I'll both be talking about the same things.

A. Okay.

Q. In terms of total dissolved solids in water, what is your understanding of the State Engineer's definition of fresh water in terms of total dissolved solids?

A. The recommended limits, and I have not reviewed the State Engineer's definition for awhile, but the recommended limits for municipal consumption, I believe, about 100 milligrams per liter.

Q. Let me read something to you and have you explain it for me.

Pursuant to statute the State Engineer defines all underground water in the State of New Mexico containing 10,000 parts per million, or less, of dissolved solids as fresh water.

A. It is correct to say that -- that the number of 10,000 milligrams per liter has been assigned the maximum limitation for protectable waters.

Q. So when you're talking about fresh water are you using the same definition that the State Engineer uses for fresh water?

A. I generally do not attempt to use the words fresh water unless I define it by some term. If we

define it as being less than 10,000 milligrams per liter, I'd be glad to operate on that basis, yes.

Q. For purposes of my question, I'd like you to do that, if you please, Mr. Reed, so that when I talk to you about fresh water we're using 10,000 parts per million of total dissolved solids.

A. That will be fine.

Q. All right, sir. Now, is -- is that number any different to the chloride content of the water?

A. Yes, it is.

Q. That's a different criteria, is it not?

A. Yes, it is.

Q. All right. What do you understand to be the number of chlorides present in a given amount of water above which it's no longer fit for human consumption?

A. Again, there's a recommended limit of 250 milligrams per liter.

Q. All right. Now in terms of -- of stock water, what the cattle will drink, do you know what the chloride content is of a given quantity of water above which stock will not drink that water?

A. Oh, generally, about 3-to-5000 milligrams per liter.

Q. Forgetting chlorides for a moment, going

back to total dissolved solids, 10,000 figure. In this area, Mr. Reed, starting from the surface and going down, what areas would you find that you would first encounter water that would be less than 10,000 parts per liter?

A. In the immediate vicinity of our operation -- proposed operations?

Q. In the area that you've examined, as depicted on Figure Number Five, you've examined a bunch of wells in here, and rather than picking through here and deciding which ones are which, I want you to tell me if you found any water, starting from the surface down, that would define itself as fresh water using the definition we've agreed on.

A. In the immediate vicinity of our operations, no.

Q. Okay. Where would you be likely to encounter fresh water? You've talked about the Triassic formation.

A. Yes, I have.

Q. That is sometimes a fresh water bearing formation.

A. There are certain areas where the Triassic contains, using your definition, fresh water, yes.

Q. All right, sir. In this area at what

depth would you find the Triassic formation?

A. The Triassic formation starts near the surface of the ground.

Q. And it goes to what approximate depth in terms of feet?

A. In this immediate vicinity, again, it goes to a depth of 250 feet, approximately.

Q. Okay. That would be the base of the Triassic in this area?

A. That's correct.

Q. All right. Now, if I understood you correctly, that below the Triassic we find the Rustler formation.

A. That is correct.

Q. And sometimes the Rustler formation will bear fresh water as we've defined it.

A. That is correct.

Q. Now, in this area, in the area you've examined, have you found any Triassic water that would constitute fresh water?

A. In the immediate vicinity, no.

Q. Let me direct your attention to Figure Number Five in Exhibit One and if you'll look at Township 17 South, Range 29 East, which is the township to the west of

your location, and if you'll look in Section 22, up in the northwest corner there are two symbols for wells.

A. Yes, sir.

Q. From what I've learned from you, Mr. Reed, it would appear that both of those wells would be Triassic wells, would they not?

A. That is probably correct, and I believe I testified to these two wells previously, one for which we have an analysis for and it has a total dissolved solids concentration of 2722 milligrams per liter.

Q. All right, now under our definition, that would constitute fresh water, would it not?

A. Yes, sir.

Q. All right. Looking down in Section 35 to the south and in the same township, there is also another well symbol in there. You'll have to help me with the abbreviations, what is that?

That looks like an abandoned windmill, is that?

A. That refers to an abandoned water supply well.

Q. Water supply well, all right, sir. If we proceed down farther to the south, we encounter in Section 10 of the township to the south a stock windmill? It says

3 stock WN?

A. That is correct.

Q. All right. That appears to be Triassic fresh water as we've defined it, is it not?

A. The total dissolved solids for that -- for water from that well were 6882 milligrams per liter.

Q. And that would be defined as fresh water under the definition that we're using?

A. That is correct.

Q. Okay. Where is the Pecos River in terms of direction to this area, Mr. Reed?

A. It's to the southwest.

Q. As I understand your hydraulic gradient, water introduced at the pit is going to flow in a direction towards the Pecos River, is it not?

A. In the immediate vicinity of our proposed operation the hydraulic gradient as we have measured it is -- and supplemented that with State datum -- is in a southeasterly direction.

The hydraulic gradient six or eight miles south of our proposed locality then does indeed turn towards the southwest, yes.

Q. Am I correct then in understanding that Triassic water if it's present in this area, and we see some

instances where it is, is going to be hydraulically connected with the Pecos River to the south?

A. The drainage and discharge is in that direction, yes.

Q. All right, sir. Apart from the wells we've just talked about, are there any other Triassic wells in this area that will be in the line of flow, hydraulic gradient, that we have not already identified, that would be fresh water using our definition today?

A. There are other wells in Range 30 East, Township 18 South, from which water has been produced that could be classified as fresh under your definitions.

Q. All right. I'm not going to belabor it by going through all of them. They're on here and the Examiner can find them and read them using the well information on here.

All right, let's -- let's turn, then, to the Rustler formation, which I understand is below the Triassic.

A. That is correct.

Q. Using our same definition, are there wells that produce from the Rustler formation depicted on your exhibit?

A. There is a well in Section 21, 30 East,

17 South, which at one time produced from the Rustler formation.

Q That's the one labeled Anadarko?

A. That is correct.

Q All right, sir. Let's move down to the township south of that, Township 18 South, Range 30 East, and look at Section 26. There are two wells in Section 26. Are these wells deep enough to be Rustler or are they Triassic wells?

A. I see that we only have total depth data on one of these two of 215 feet. That would probably not be a Rustler well.

Q It would be a Triassic well.

A. Yes, sir.

Q And you don't know what the depth is of the other well in Section 26?

A. I do not have that data, no.

Q All right, sir. At whatever depth it is, it apparently fits this fresh water under our definition.

A. I have a limited analysis of that well but it has a low chloride content, yes.

Q All right, the chloride content is below 250 milligrams per liter.

A. That is correct.

Q All right. You'll have to refresh my memory about your testimony at the other hearing, Mr. Reed, but as I understood it, and from reading the summary, if you wouldn't mind turning over to page six, just before the conclusion page in the front of your report, now, I thought I had understood you to tell us that the clays underlying this pit area are such that there is going to be percolation of this salt water into the granite.

A That is likely, yes.

Q And I had understood at that time that you had not made any calculations to determine the amount of water that is going to percolate into the Granite.

A No, sir, I have not made those calculations because I don't believe they're pertinent to -- to this question.

Q All right. And we agree that the salt water that is going to be placed in this pit is going to exceed the definition of fresh water.

A It will.

Q They're highly contaminated water.

A It exceeds the 10,000 milligrams per liter.

Q All right, by how much, do you have any idea?

A. Probably four or five times, at least.

Q. So highly contaminated is not an unfair characterization, is it?

A. Well, the word contamination bothers me.

Q. All right. Now there is no doubt in your mind that some of the fluid in the pit is going to eventually percolate into the Triassic formation.

A. Yes, sir.

Q. And there is also no doubt in your mind that it will eventually percolate into the Rustler formation.

A. That is my opinion, yes.

Q. All right. I'm interested in the evaporation calculations and information on Exhibit -- page six of your Exhibit One, Mr. Reed.

A. Yes.

Q. Perhaps we could go through that.

You say you have previously demonstrated by using the Red Bluff evaporation figures. I had understood this Red Bluff Reservoir to be some distance from this site.

A. It is, yes.

Q. All right. Are the -- is there information from U. S. Weather Bureau or some other public source to determine what the general evaporation rate is for this particular specific area?

A. I don't have it on this specific area, no. The Red Bluff data is what I had chosen to --

Q. The Red Bluff evaporation data is data compiled from U. S. Weather Bureau or some other government agence?

A. There is a Class A evaporation pay at the Red Bluff Reservoir, yes.

Q. You'll have to help me, I don't know what that means. Who operates the pan? Who takes that information?

A. The U. S. Geological Survey.

Q. The U. S. Geological Survey. Is that the closest area in which evaporation is measured on a regular basis to come up with some reliable evaporation figures to use?

A. I do not know where all the stations are. That is a reasonably close station and it's got a good record for many years.

Q. You've not made a study or inquiry to determine whether or not this is the closest available reliable information?

A. I don't recall, no.

Q. All right.

MR. STAMETS: Why don't we break for

lunch at this time?

MR. KELLAHIN: All right, sir.

MR. STAMETS: We'll resume the hearing at 1:30.

(Thereupon the noon recess was taken.)

MR. STAMETS: The hearing will please come to order.

Mr. Kellahin, I believe you were in the process of cross examining the witness.

MR. KELLAHIN: Yes, Mr. Examiner, thank you.

Q. Mr. Reed, before the lunch hour we were looking at that portion of your report that dealt with the evaporation, and if you'll turn back to page six of that report, we will continue at that place.

A. Okay.

Q. You told me that you had used the Red Bluff evaporation figures.

A. That is correct.

Q. All right, sir. Tell me a little something about the U. S. G. S. evaporation figures. Do you know

how they are compiled and calculated? I'm trying to understand what information you had from those figures.

A. I believe these figures came from the surface water records for a station at the Red Bluff Reservoir, wherein they report the evaporation in inches on a daily basis, if I'm not mistaken, and these records in the Red Bluff area go back a number of years. I don't recall exactly how many years.

I have taken these numbers and calculated a net evaporation on a monthly basis, taking rainfall out and come up with a net figure.

Q. All right, that -- I think you've answered my question. In using these figures and trying to correlate and adjust them for the purposes of salt water disposed of in this pit, you have taken -- you've done what with rainfall amounts?

A. Well, I have assumed that -- that rainfall certainly adds to the amount of fluid, obviously, and -- in the system, and so we have backed the rainfall data out.

Q. All right, sir. And you have done this using these figures. They're daily figures for a full year? Have you used a full year's figures?

A. Oh, I believe these figures are based on a minimum of fifteen years, perhaps twenty years, at the Red

Bluff station.

Q. My point is, do you take the figures for the summer months when the evaporation is higher or the average for the winter months, or how do you come up with a reasonably accurate figure to use for evaporation?

A. I looked at it on a monthly basis for the fifteen years and came up with a monthly average of net evaporation.

Q. Okay. Now what adjustment did you make for evaporation of fresh water as opposed to salt water?

A. I have not made a direct adjustment. The data that we have to date in our files indicates that we are getting in one instance evaporation rates off of salt water that reasonably approximate those for fresh water. As far as reducing the net evaporation rates and adjusting it specifically for salt water, I have not done that.

Q. The report indicates that evaporation from brine will be lower than fresh water.

A. It will be somewhat lower.

Q. But you've not made any adjustment in the evaporation rate used for this pit?

A. No, I did not say that. I have adjusted the figure downward considerably from what the actual evaporation is at the Red Bluff Reservoir.

Q. All right. And you've reduced it because of the fact that the brine will probably evaporate slower than fresh water and because of the elevation?

A. That's correct.

Q. All right, any other reasons to adjust the figure downwards?

A. Well, it's just about 60 -- this site is about 50 miles north of the Red Bluff station, so I've adjusted it down to approximately a third.

Q. All right.

A. From the calculated figures.

Q. In terms of barrels of water per day per acre, can you tell me how many barrels of water per day per acre would be evaporated at the proposed site?

A. I have estimated, taking all these factors into consideration, that one can evaporate between 2000 and 2500 barrels per month per acre.

Q. So to get a daily figure we could just divide that by 30 or 31, whatever.

A. Yes, you could.

Q. All right.

A. This is on an annualized basis, now. This is not to say that -- that this is the figure that one can expect to evaporate in the summertime, nor is it the

figure that one can expect to evaporate in the wintertime, but it is an adjusted figure such that there will be -- not be undue accumulation during the winter months. So it's considerably less than -- than the total volume that one can expect to evaporate, even on a monthly basis.

Q. Okay. What is the surface area of the water to be contained within this pit? How many acres is that?

A. We anticipate that up to 15 acres of evaporation surface may ultimately be constructed.

Q. As best you understand it, is this to be more than one pit in order to get to the 15 acres of surface water, or is this to be a series of pits? I'm trying to understand this.

A. This would be a series of pits, yes.

Q. All right. As I understood it, you have made no calculations or tests to determine, I think the word is infiltration, how much of this water is going to go into the ground.

A. I have not because whether it infiltrates at a very minor rate or whether it infiltrates at a more rapid rate, we anticipate that the results will be essentially the same, that the water will migrate down through the Santa Rosa and arrive at the Rustler aquifer

system in which poor quality water now resides.

Q. Okay. Tell me something about the monitoring wells, Mr. Reed. What are those supposed to do?

A. In evaluating the geology in the immediate vicinity of this proposed site we see a Santa Rosa section that consists predominantly of sands and silts with a few clay zones which are basically discontinuous. We cannot trace them over a large area at all. In fact we ran them through that exercise trying to correlate clays and we cannot do so.

We believe that the percolation through the floor of the pit will go in a vertical direction and that there are no, as we see them, uniform clay zones in the Santa Rosa section that would divert the water from its vertical path into a horizontal direction. Certainly this may occur over short distances but regional sands and the soil that we're looking at here, I believe the direction of infiltration will be in a vertical sense.

However, we formed this opinion from looking at the test hole data that we have accumulated and at other logs in the area. We have recommended or proposed a monitoring well system that will test this conclusion; that in the event that we for some reason do have undue horizontal migration, our monitor wells are designed to pick

this up. It will be an early warning device that there is a clay, for instance, that is uniform throughout the area that we for some reason did not see that's diverting the water in a horizontal direction. And this is what the monitoring system is designed to do.

Q. If the monitoring wells detect the presence of contaminated water, or salt water, at that point are you suggesting that the Commission ought to shut down disposal in the unlined pit?

A. Not necessarily. There I think one has to look at all the factors to examine the location of the monitor hole, perhaps, that the salt water is migrating along a certain way; a time frame in which that migration has occurred; versus depth, versus distance. I think all these factors have to be considered in analyzing the situation.

Certainly at the outcome of that investigation should we find salt water entering one of the monitoring wells, one of the options may be to discontinue use of the surface pit, but that is not the only option.

Q. If contaminated water is down at that particular depth, there's no way to cure the problem, is there, once it's introduced into the formation?

A. There is no way that I'm aware of that we could recover that salt water; however --

Q. Can't pump it out is what I'm saying.

A. Unless it was in significantly higher volume than we would anticipate in one of these, I would say no. However, I again would point out that there is no ground water in this Santa Rosa system in our area that will be degraded by the salt water, and the Rustler water is already in a severely degraded state.

Q. Have you run any studies to determine how the underground water is generally flowing in the Rustler formation? I assume there are various tests to determine if the water is flowing like an underground stream, that sort of thing? You told me it generally migrates towards the Pecos River. Do we have water flowing -- have you measured the flow of water, is what I'm trying to ask you in a very poor way, is if we introduce water in that pit and it percolates down to a particular location, do we know in what general direction that's going to flow? You told me it's going to flow to the south and perhaps to the southeast. All right, have you measured the flow of water in these underground formations?

A. The hydraulic gradient that we depict on our Figure Five in Exhibit One is indeed based on water level measurements, yes.

Q. That's a hydrograph, isn't it, is that

what that's called? It's a hydrograph.

A. A hydrograph is a graph that shows the rising levels of a pond.

Q. That's not what I'm thinking about. I'm thinking of the movement of the water through this formation. How is that measured?

A. We measure the potentiometric surface of the top of the water.

Q. If water is introduced into the Rustler formation or the Triassic formation, have you made any calculations in terms of time to show us how long it will take for a given quantity of water to move a given distance?

A. We have not calculated the rate of flow in the Rustler formation, no. Generally ground water flows are extremely slow.

Q. There were some questions asked you at the previous hearing concerning the depth of the monitoring wells. Could you refresh our memories about the depths of the monitoring wells?

A. Some of them. Although we seek primarily, again to reiterate, primarily sands and silts in the Santa Rosa, there are indeed a few clay zones. The shallowest clay zones, that are thin, discontinuous zones, occur in the depth interval between 30 and 60 feet. That's the uppermost

clay zone that we find.

If we should have horizontal migration it's this uppermost clay zone which we would expect to divert the water in a horizontal sense. The bulk of the monitoring wells we propose to complete at a depth of 60 feet, such that it would detect this migration in a horizontal sense. They would be perforated from the total depth to within five or so feet of the surface.

Q. Monitoring wells are how deep? I'm sorry, 60 feet, you said?

A. 60 feet, yes.

There are two wells that we have which are in the down dip structural direction -- structurally down dip direction, which we propose to complete to the top of the Rustler formation.

This will detect, these two wells will detect any migration that might occur beneath the 60 foot level. Again they're strategically placed in a southeast and south direction because this is the direction that flow-- we would anticipate flow if it does occur, to follow.

Do you have any opinion with regards to how long it might take before any of these monitor wells might detect the migration of the salt water?

A. I don't anticipate that they will detect

any migration in a horizontal sense.

I don't anticipate them ever showing anything.

Q. Mr. Reed, have you been supplied with any numbers as to what the operator intends to dispose of in terms of barrels of water per day in this pit?

A. No, sir.

MR. KELLAHIN: I believe that's all the questions I have of Mr. Reed. Thank you.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Reed, would it be possible to conduct evaporation rate tests at this pit site?

A. Yes, Mr. Examiner, it is, and indeed we are doing this at the Parabo site in southeastern New Mexico. We're using salt water in a class A evaporation pan to calibrate the evaporation data. We're doing this specifically to -- to determine the exact evaporation rates that can then be compared against the fresh water evaporation rates that we have predicted, and these two figures for this particular site appear for a short term period that we have been gathering these data to correlate really quite nicely. Better than one might expect.

Q. Is that a complicated process or a fairly simple one?

A. It's not a complicated process. It involves daily maintenance and examination of the rain gauge and the class A pan.

Q. The company personnel are taking care of that or do you have people there to do that?

A. In this -- in the Parabo instance the company personnel are taking care of that operation, and I think the data are really quite good.

Q. So based on that you feel confident in the 2000 to 2500 barrel a day per acre rate that you've come up with for this site?

A. Yes, I do, with again, given the short period of time that I have been able to accumulate these data, I would say so, yes.

MR. KELLAHIN: Excuse me, that was barrels per month.

MR. STAMETS: I'm sorry, I stand corrected.

Q. If the water is going to go into the Rustler, why not just drill a disposal well to the Rustler and pour it all down the hole?

A. Well, disposal wells are very expensive

to complete. They notoriously plug up and again, I don't feel as though that level is indicated to be necessary in this case. I have not evaluated the subsurface materials for subsurface disposal in this particular area.

Q. I believe you have said that there will be infiltration; you don't know the amount, but there will be; it will penetrate the Triassic and it will go into the Rustler, and that this is all right because there's no good water in the Triassic that it will contact and that the water in the Rustler is of very poor quality, greater than 10,000.

A. Yes, and probably greater than 30,000. We've got -- the one analysis that we have is 10,000 chlorides, so the total dissolved solids are obviously much higher than that.

Q. And that the Rustler itself discharges into the Pecos River.

A. Ultimately, yes.

Q. Do we have any numbers on how much water is discharged out of the Rustler into the Pecos?

A. I don't have those numbers, no. There's been an attempt in certain areas to look at the -- at the discharge, particularly of the brine aquifer into the flow of the Pecos River, but I don't have those numbers, no, sir.

Q. Are they available readily?

A. I do not know. I am not familiar with in intimate detail with those studies.

Q. The point of my question being what the effect of putting this additional water into the Rustler will be. I know we discussed this some at the last hearing but it's, nevertheless, of concern.

A. With the total flow in the Rustler system, which is quite extensive, and especially if one adds the volumes of water that are disposed, placed on the surface in one form or another in the area which we're dealing with, I cannot see that the amount of water which is planned to be disposed of on Section 16 will be a significant contribution compared with all the other contributions.

MR. STAMETS: Are there other questions of this witness?

A. If I may just reiterate one point which I'm sure the Examiner understands, but I think needs to be said again, the Clayton Basin exemption, the potash mines, and other disposal pits lie hydrologically, hydraulically between this proposed operation and the Pecos River.

MR. STAMETS: Any other questions of this witness? Mr. Jennings?

MR. JENNINGS: I have just a couple questions.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q. Mr. Reed, are there any fresh water wells as defined by Mr. Kellahin in the immediate vicinity of Section 16?

A. There are not.

Q. How many miles would you interpret to mean the immediate vicinity?

A. The nearest well is in Section 35, Township 17 South, Range 29 East. That well has a chloride concentration of 4000 parts per million.

Q. How many miles is that?

A. It's about four miles.

Q. Pursuant to Mr. Stamets' question, you talked about the Parabo project. Is that the same as the Wallach (sic) project?

A. Yes, it is.

Q. Well, in connection with the Wallach project, what evaporation figures did you use?

A. We used the Red Bluff figures.

Q. Have they proven to be accurate?

A. For the period of time which we have

been collecting these data they appear to be quite accurate.

Q. Mr. Reed, for my information, when we talk about fresh water and we talk about that in the language of furnishing it to the city for human consumption, what are the content of that water, maximum allowable?

A. Recommended limit for municipal use is 500 milligrams per liter. There are a number of municipalities that exceed that limit, but above 1000, 1500 is considered objectionable.

MR. JENNINGS: I believe that's all, other than I would at this time again offer our exhibits which we offered in the original hearing and one which is -- two, which have already been accepted in this hearing.

MR. STAMETS: Okay, all of the exhibits, being One through Six, and One-A are or have been admitted.

Any other questions of this witness? He may be excused.

A. Thank you, Mr. Examiner.

MR. STAMETS: Do you have anything further at this time, Mr. Jennings?

MR. JENNINGS: Just one further. This is all, but I will have a statement.

MR. KELLAHIN: I'd like to ask Mr. Westall some questions.

MR. STAMETS: Mr. Westall.

ROY WESTALL

being recalled as a witness and being duly sworn upon his oath, testified as follows, to-wit:

CROSS EXAMINATION

BY MR. KELLAHIN:

Q Mr. Westall, would you refresh my memory and tell me what your relationship is with the applicant?

A Well, I'm -- I'm president of the Loco Hills Water Disposal System.

Q Is this a New Mexico corporation?

A Yes, sir.

Q I see Senator Jennings with you here today. What, if any, does Senator Jennings have in this project?

A He has an interest in it.

Q Is this equal to your interest?

A No, it's not.

Q You're the principal involved in this corporation?

A I think that a company that they own, and his kinfolks own, they own a quarter of it and then Mr. Jennings owns a quarter of it, I believe, something like that.

Q. But you're going to be operating this disposal pit?

A. That's right.

Q. All right.

A. I'll also say that we're together on other oil ventures, also.

Q. All right. We've used,and Mr. Reed has used this 15-acre pit area, and I'd appreciate it if you would refresh at least my recollection about the surface area of the disposal pits. Tell us again how you propose to have those constructed.

A. We propose to take and go into some steel tanks to start with, perking the water through the steel tanks and removing all the hydrocarbons; going to a smaller skimming pit or two, and then going out into the bigger pits.

Q. Does the water flow through a series of three pits, is it?

A. It will go through about three sets of -- three tanks. Then it will go into two small pits, right, and then into two or three larger pits to evaporate this.

Q. Do you intend to -- I'm concerned about the evaporation problem.

A. Right.

Q. Do you intend to construct all the pits

initially as part of establishing this project?

A. Yes, sir, we'll construct all the pits. We'll make sure that no hydrocarbons get out on our main pit for evaporation problems.

Q. All right. When you talk in terms of 15 acres, have you calculated the surface area of the water that will be contained within these pits? Is that where that number came from?

A. We've looked at it. We figure that the 15 acres would evaporate a large sum of water.

Q. No, sir, my question is whether you are on a 15-acre tract and you're going to put your tanks and your pits --

A. No.

Q. -- and all the things on a 15-acre tract, or if you had calculated --

A. We're on --

Q. -- the surface area.

A. We're on a 20-acre tract.

Q. All right, so the 15 acres, then, is what you've calculated to be the surface area contained within the total sum of the pits.

A. Of the pits, right.

Q. All right. Now how deep will the water

be in these pits?

A. Probably 16 to 18 inches.

Q. Have you made a study of or any attempt to obtain a salt water disposal well to dispose of this water in some formation?

A. I've looked around and tried to purchase two or three of them and figured the cost on a salt water disposal well, and it is very prolific to maintain one, your different corrosion problems, scaling problems, keeping up problems of a well is very prolific.

Q. How much water are you talking about putting into these pits on a daily basis? Let's use days, if you don't mind.

A. I figure we'll probably handle between 1000 and 1500 barrels a day.

Q. In order to avoid this infiltration, or the percolation of water to the bottoms of these pits, Mr. Westall, have you made any study of lining these pits? I'm not talking about plastic from the hardware store. I'm talking about a rubber barrier or some impenetrable barrier to line these pits with? Have you made a study of that?

A. Again you're talking about a very large amount of money to take and line these pits and we felt like being as there was no fresh water in the area that we just

wouldn't -- wouldn't be able to do it. It would just make it infeasible.

Q. Tell me what the cost is. You say it's infeasible. What is the cost?

A. Well, I have a small pit lined on a drilling rig. It's around $2000, and it's probably about, what, a 30x50.

Q. You've got me.

A. It's about a 30x50 pit.

Q. So what would be the total cost of lining the 15 acres pit with an impenetrable barrier? If you know?

A. Probably -- probably -- I'd have no idea. It would be probably $50-to-100,000, at least.

Q. Would there be any problem if the Division entered an order limiting the amount of water to be disposed of in this pit to some formula based upon the amount of water that could be evaporated?

A. Well, I feel like that we could probably live with something as such.

Q. Now if these monitor wells detect salt water at some point, you don't have any intention of pumping the salt water back out, do you?

A. We'll go with whatever the Commission says on the pumping.

Q Have you made any study of the economics of drilling a water -- a well to remove that kind of fluid from a formation?

A I don't really see that a well would do any good if you had the water moving.

Q Thank you, Mr. Westall. That's all I have right now.

MR. JENNINGS: Just a couple of questions.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q Mr. Westall, you, I think you've testified that you reside in the Loco Hills area --

A Right.

Q -- and you actually engage in business there.

A Right.

Q As such, do you have opportunity to travel about the fields in the Shugart and the Loco Hills Field?

A Yes.

Q Are you familiar with the well that I think is -- you'll have to identify the operator, but we've discussed a well in Section 21, I believe, of 17, 30?

A. I believe it's in 20. That well's in the southeast --

Q. Yes, the one that indicates that there's been produced 358,955 barrels?

A. Yes, uh-huh.

Q. Are you familiar with the pit at that field location?

A. Yes, there's a pit there and it's still being used.

Q. Is it currently being used?

A. Yes, sir.

Q. Are you familiar with the well that has been -- the pit was authorized in the Amoco case, I forget the number, but which is located in Sections 27, 34, and 35, in 18, 31, where I believe your testimony was that there have been some 13,000 barrels a day being produced?

A. Yes, I --

Q. Is that still being used and is the water being produced?

A. Yes, it is, I think it is.

Q. Can you tell, is there substantial water being put in their pits?

A. Yes, sir.

MR. JENNINGS: That's all.

MR. STAMETS: Any other questions of this witness?

MR. KELLAHIN: No, sir.

MR. STAMETS: He may be excused.

MR. JENNINGS: We have nothing further.

MR. STAMETS: Mr. Kellahin, do you have a witness or two?

MR. KELLAHIN: Yes, sir.

MR. STAMETS: You may proceed. These witnesses were not sworn in the first case?

MR. KELLAHIN: That is correct.

MR. STAMETS: I'd like to have both of them stand and be sworn at this time, please.

(Witnesses sworn.)

MR. KELLAHIN: Mr. Examiner, we'd like you to take administrative notice of a previous order and transcript and exhibits. The case in which we'd like you to take notice is Case 5709, resulted in Order No. R-5278, and it was an application that was denied with regards to disposal in an unlined pit, and it is in the southern portion of Mr. Reed's map. It is located in Section 2. I believe the township is 20 South, the range is 30 East. I believe

that the testimony Mr. Reed has given you today is -- has sufficient bearing upon a similar fact situations that were in that case, and we would request that you take notice of that order and that transcript.

MR. STAMETS: We will do that.

MR. JENNINGS: Do you happen to have an extra copy of that order?

MR. KELLAHIN: You bet.

BILL BOGLE

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q For the record, Mr. Bogle, would you please state your name?

A. I'm Bill Bogle.

Q. And where do you reside, sir?

A. I live in Dexter, New Mexico.

Q. And how do you spell your last name?

A. B-O-G-L-E, B as in boy.

Q. What is your occupation or business, Mr. Bogle?

A. I'm president of Bogle Farms. We are the operators of the Turkey Track Ranch.

Q. Let me direct your attention to what has been introduced by the Applicant as Exhibit Number Six, and direct your attention to the blue line on that exhibit, as well as the exhibit that's adjacent to it.

Now what does that line depict, Mr. Bogle?

A. That's the eastern boundary of the Turkey Track Ranch right in that particular area.

Q. What is the business of Bogle Farms and the Turkey Track Ranch?

A. Oh, Bogle Farms is an agricultural operation and the business of Turkey Track is cattle raising.

Q. If you can find your way to the map, or if you can do it from where you now sit, would you identify for us those locations on the Turkey Track Ranch in which you have one title or another as sources of water?

A. Well, in Section 20, in Township -- it looks like 29 East --

Q. Just a minute. Let me give you a map closer to you and then I'm going to refer you, Mr. Bogle, to to Figure Five of the hydrologist's report, and if you can use that and locate for us these water wells.

Let me direct your attention, first of all, to Township 17 South.

A. 17 South.

Q. Range 29 East.

A. Right.

Q. And if you'll look at the -- at that township and identify any of the water wells on the ranch in that township.

A. In Section 22, in the northwest corner, I think that's double wells. Double wells, there are two wells.

Q. There are two wells. Mr. Reed has depicted on his map two wells in the northwest quarter of Section 22. They are also spotted on Figure No. 5, this plat that you're looking at.

Are those two water wells of the Turkey Track Ranch?

A. Yeah, but I don't know whether they're properly located or not.

Q. All right.

A. Let's see. According to my map they're in Section 15.

Q. All right, sir, that would be the section immediately to the north of 22.

A. Uh-huh.

Q. In what portion of Section 15?

A. Right in the southwest corner, so we're not talking about much difference there.

Q. All right, sir, somewhere in that immediate area you have two water wells.

A. That's right.

Q. All right, sir, would you tell me something about those wells?

A. Those are very old wells, about 110 feet in depth. They are good fresh water wells. We ran the chlorides on them this week and it was 50 parts per million.

Q. What do you -- what do you use those wells for, Mr. Bogle?

A. Livestock. Livestock watering, cattle.

Q. All right, sir. Are these windmills?

A. Yes, windmills.

Q. And you have stock tanks at the windmills?

A. Right.

Q. Do you know what the volume of water is that is produced from those wells?

A. Well, they're fairly prolific wells. They will pump whatever the windmill will pump without drawing down.

Q Can humans drink that water?

A Yes. It's not real palatable but humans can drink it.

Q All right, sir. Now, apart from those two wells, Mr. Bogle, would you identify for us any other wells that you now have or may have once had in that township?

A Well, on down south and east of there, where you have a red dot, that's what we used to call American Republic Well.

Q That's in Section 35?

A In 35, right in the north side of 35, yes.

Q And that's what you called the American Republic?

A The American Republic. We drilled that well about thirty years ago and used it for several years, but it has since gone bad and been abandoned.

Q After you drilled that well, what kind -- what was the quality of the water?

A It was not good quality water, ever, but cattle would drink it.

Q How did it compare to the quality of water in the Section 15 or 22 wells?

A. It never was that good.

Q. All right, sir, and as best you recall, when did that well go bad?

A. I would say between ten and fifteen years ago. That's just a guess.

Q. When you said the well went bad, what do you mean?

A. It got so briney that cattle wouldn't drink it.

Q. All right, sir, let's go down to the township just to the south of that, still on the ranch, Township 18 South, Range 29 East. Do you have any water wells in that township?

A. Yes, there are several.

Q. All right, sir. Would you identify those for me?

A. Let's -- that's 18 South, 29 East.

Q. Yes, sir. Mr. Reed has a well spot in Section 10.

A. In 10. That -- that well, that particular well that is spotted in 10 is not our well. That's on a small ranch called the McGonagill Ranch. As far as I know, that is a good stock water well.

Q. All right, sir, would you look at the

same township and tell me if you have any knowledge of any other water wells in that township.

A. Well, I think we have to move up back into the same township where the double wells were.

Q. 17 South, 29 East.

A. Yeah, directly west of American Republic Well, two miles and a half we have what's called the Bishop well.

Q. In what township -- what section would that be?

A. What section? 29, Section 29.

MR. JENNINGS: What township, Mr. Bogle?

A. Same township.

MR. JENNINGS: 18, 29, or 17, 29?

A. It's in 17, 29.

Q. What section?

A. Section 29.

Q. Okay, Section 29, 17 South, 29 East, you say there's a water well in that section?

A. Yes, that's called the Bishop well.

Q. Tell me about that well, Mr. Bogle.

A. Well, that's -- again that's a well about 100 feet in depth; chloride tested this week; 230 parts per million. Fairly good stock water. Not as good

as double wells but they do drink it.

Q. Okay. Other than those wells you've just testified to, Mr. Bogle, are you aware of any other sources of stock water or water for human consumption on the ranch?

A. In that area?

Q. Yes, sir, in that area?

A. The only other sources of water in that area are pipeline water from the Ogallalah coming off the Staked Plains.

Q. What's your concern, Mr. Bogle, about Loco Hills' application before the Division today?

A. Well, my concern is that the disposition of salt water in unlined pits is quite likely going to contaminate the underground water. We're certain that it will.

Further, it will -- I'm not a hydrologist, I can't say that it will get into these wells or not, but we know from past experience that we had several wells go bad on the ranch, probably due to oil activities, and on other ranches, too.

Q. Thank you, Mr. Bogle, that concludes my examination of Mr. Bogle.

MR. STAMETS: Are there questions of this witness?

MR. JENNINGS: Yes.

CROSS EXAMINATION

BY MR. JENNINGS:

Q. Mr. Bogle, you have extensive ranching limits, I believe.

A. Yes.

Q. And you stated that you were opposed to disposal of water on the ground. Is that a general principle or just apply into this area?

A. No, that's a general principle, Mr. Jennings. I mean in unlined pits.

Q. And does it make any difference to you where it's located?

A. Well, not as -- not as long as it's on one of my ranches, no.

Q. This is not on your ranch, is it, Mr. Bogle?

A. Well, it's right adjacent to it.

Q. What -- well, from time to time the Commission grants exceptions to this no-pit rule. Do you -- is it your position that you're just generally opposed to that practice?

A. I'm generally opposed to all these ex-

ceptions, yes.

Q. It's a matter of principle to you. Is that why you're here today?

A. No, it's not a matter of principle. It's a matter of logic and reason.

Q. Now, what you say that -- I think it was stated that you own property immediately adjacent to Section 16. What kind of property do you own there?

A. Section 16, where the pit is proposed to be?

Q. Yes, sir, where the pit is, yes, sir.

A. Well, I -- I don't have the property descriptions. I may belong to the Bureau of Land Management, for all I know, but it's land that we graze adjacent to it.

Q. You mean you have a lessee's position in that general area?

A. Yes.

Q. From either the State of New Mexico or the United States?

A. Or some deeded land, but I don't have the descriptions with me.

Q. Do you know of any deeded land that you have within, say, three miles of that location?

A. I can't answer that question.

Q. Now, Mr. Bogle, you've testified about the well in Section -- Section 15, and is that some five miles distant from the --

A. Almost five miles.

Q. And there's a well in Section 10, 18, 29, and you described that as the McGonagill Well, but you said it's not on your property.

A. That's right. The McGonagill Ranch has about a three and a half section ranch, which is right in -- in our pasture there.

Q. Is that also sometimes referred to as the Mossman Well?

A. No, the Mossman Well is a different well.

Q. Well, where is the Mossman Well located?

A. The Mossman Well would be one, two, three, four, five miles east of that McGonagill Well.

Q. That's roughly in Section 9 of 18, 30, if I'm reading the map correctly.

A. I believe it's in 10.

Q. 10.

A. Yes.

Q. The water is bad in that well, is it not?

A. Pretty bad.

Q. Is that the one in the BLM map that shows "bitter"?

A. Maybe.

Q. Now, you have spoken, Mr. Bogle, about your well as being contaminated. Are there many producing oil and gas wells on your ranch?

A. A great many.

Q. And a great many in this particular area?

A. Yes.

Q. Do you know where the -- what the source of contamination that you're talking about is?

A. No, I don't think it's possible to pin it down.

Q. Could it just as well be water that is percolating upward around the casing in many situations, like it happened in Lea County?

A. That's possible.

Q. Is it just as possible due to that as it is by being put in a pit?

A. I'm -- you'll have to ask an expert that question.

Q. You have -- you have a number of pits located on your ranch where they're currently disposing of

water.

A. A great many, yes.

Q. Have you made a practice to appear and object to each one?

A. No.

Q. Just pick on your friends.

A. This is the first opportunity that I knew I had to object.

Q. Where do you generally get your water at the ranch in this area, Mr. Bogle?

A. We're talking about nearby the disposal?

Q. Yes.

A. Mostly it's from surface tanks or ponds, rainwater, and also from pipelines coming off the Caprock.

Q. Do you buy water from the Caprock Water Company or one of the water companies like that?

A. Yes, uh-huh.

Q. Generally is that the source of everyone's water in the area?

A. In that area, from there east, it is, yes, or surface water collected in ponds.

Q. Mr. Bogle, during your operations do you have any experience with -- encountered situations where somebody hauling water is taking the opportunity to shortcut

going to the disposal site and dump it on your ranch?

A. Very many times, yes.

In fact, we've found pipelines running into caves where they're dumping it.

MR. STAMETS: Is that pipeline still there?

A. We tied onto it with a jeep and wrapped it around the well site.

MR. JENNINGS: I believe that's all.

MR. STAMETS: Any other questions of this witness? He may be excused.

MR. KELLAHIN: Mr. Squires.

LARRY C. SQUIRES

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. KELLAHIN:

Q. Mr. Squires, for the record would you please state your name?

A. Larry C. Squires.

Q. Are you familiar with Snyder Ranches?

A. Yes, sir, I'm the manager of Snyder

Ranches.

Q. And do you hold any professional degrees, Mr. Squires?

A. Yes, sir, I'm a doctor of veterinary medicine.

Q. When and where did you obtain your degree in veterinary medicine?

A. I graduated from Colorado State University in 1960.

Q. Subsequent to graduation have you practiced veterinary medicine?

A. Yes, sir, I practiced veterinary medicine in Hobbs for approximately eight years from 1960 to 1968.

Q. Can you identify for us, Mr. Squires, where the Snyder Ranches are with regards to the applicant's proposed disposal pit?

A. Our ranch, our nothernmost border is approximately four to five miles southeast of Loco Hills. And we run in a southwesterly direction down towards the potash mines.

Q. Can you take one of the exhibits on the wall and draw for us where the northern boundary is of the Snyder Ranches, Mr. Squires?

A. Yes, approximately I can.

Q. Let me find you something to draw with. I forgot my red pen that I use with Mr. Carr.

A. On this map or the exhibit here in Township 18, Range 30, I believe that's right here, our northern boundary runs like this to the corner of 16, and it runs across the north line of Section 16. It drops down a quarter in Section 17, comes over to the middle of Section 17, and from there it travels to this point right here kind of in a straight line. From there it goes a mile and a half west. From there to the point of 2 and 35 -- I lost my place.

Excuse me, I made a mistake, it goes across here then down to this point -- corner. There it goes two and a half miles straight south, jogs again over to the middle of Section 13, and from there it runs about several miles on south and comes back into this area.

But this is generally the line which is our northern border of what we call our Lusk and Walters Ranch and TX Ranch.

Q. All right, sir. Will you return to your seat?

MR. KELLAHIN: We tender Mr. Squires at this time as an interested rancher and as a doctor of veterinary medicine.

MR. STAMETS: He is accepted under both of those positions.

Q Mr. Squires, let me ask you something about the quality of water in terms of what livestock will and will not drink.

Based upon your experience as a doctor of veterinary medicine, in terms of chloride content, what is your experience with regards to the quality of water that cattle will consume without substantial adverse effect?

A Cattle can assume -- consume water as high as one and a half to 1.7 percent of total dissolved salts without becoming -- you know, without it killing them.

They can tolerate salt solutions this high. One and a half percent to 1.7 percent is considerably high as far as anybody's calling it bitter water or salt water. It's extremely salty.

Q You've used some percentages, excuse me, Mr. Squires, you've used some percentages and earlier today Mr. Reed used the chloride contents in terms of milligrams per liter.

Can you put us on the same level and put your percentages in milligrams per liter?

A One percent is 10,000 parts per million, so 1.5 percent would be 15,000 parts per million. This was

some research work that was done at Oklahoma State University on exactly how much salt could be tolerated by domestic livestock.

Q. When you talk in terms of what could be tolerated by domestic livestock, what does the word tolerate mean?

A. To consume it and be productive and not cause any ill dehydration effects to the animals.

This, of course, is extremely poor quality water and is at the upper limits of what they can tolerate.

Q. All right, sir. With regards to the Snyder Ranch properties, and I forgot exactly what you have defined this particular township as being, what portion of the Snyder Ranches, but in terms of Township 18 South, Range 30 East, what, if any, water wells do you have in that township?

A. Yes, sir, we have a water well in the southeast quarter of Section 26, Township 18, 30 --

Q. Just a minute, let me find it. 26?

A. Yes, sir.

Q. All right, just a minute. So we're all looking at the same place on the same map, Mr. Squires, Mr. Reed has a double red dot in Section 26. Is that what

you're referring to?

A. Yes, sir. This is known as the Walters Lake. There is a -- there is a lake there and this is what we call the Walters Lake Ranch.

This well was previously as -- we protested the brine water put in unlined pits around this particular water well about five or six years ago when Hansen Oil Company applied for an exception to use unlined pits in this area, and the Commission denied it because of the good quality of the water that existed in this well.

This well is approximately 220 to 230 feet deep. The chlorides 170 parts per million; sulphates 315; total dissolved salts -- solids 1043 parts per million.

This is an extremely good water well. It is located approximately six miles south of the proposed location of Loco Hills Water Company.

We have replaced three different water wells to the north of this with a pipeline, a pipeline approximately five to five and a half miles long because -- because the water in these other wells has been contaminated by unlined pits and by the oil field, in our opinion.

Q. All right, let me understand how you use the well in Section 26, now.

A. We have a pump.

Q. Is there a pump on that well?

A. Yes, sir, a submersible pump.

Q. All right, and what is --how much water do you pull out of that well in terms of barrels a minute?

A. We've got a two horse --

Q. Gallons a minute.

A. I would imagine around 20 gallons a minute, but we're not sure. We -- I'm not sure of that right now. We pump water up the hill into a storage tank and the storage tank is about 20 feet tall, and we gravity flow the water to three other different watering locations four and five miles away.

Q. What do these watering locations look like? You mean you have a stock tank at these places?

A. Yes, sir. We have a tub with a float and the pipeline running underground to them.

Q. All right, sir.

A. And this is not Ogallalah water from the plains. It's water that's pumped out there. It's extremely good quality.

Q. All right, sir, what is the depth of that well?

A. Approximately 215 or 20 feet deep.

Q. All right, sir. Now, apart from that

water well, Mr. Squires, what, if any, other water wells do you have in this area?

A. We have a water well in Section 32 of the same township and range, 18, 30.

Q. All right, just a minute. Section 32?

A. Yes, sir.

Q. I don't see that identified on --

A. It's not on this map here. It was a well apparently -- this well has been abandoned because this is where we have the location of our pipeline. This well has been abandoned. We are not using it.

We're not using it because of the poor quality water, though, we're using it because it's more feasible to put that pipeline water over there to it.

Now I have an analysis on this well.

Q. All right, wait just a minute, now. You're too far ahead.

A. Okay.

Q. You're not now using the well in 32.

A. No, sir.

Q. But it still exists.

A. Still exists.

Q. Hasn't been plugged and abandoned?

A. Well --

Q. You haven't plugged it, have you?

A. -- it's got a bucket over it.

Q. That's not plugging a well, Mr. Squires. Would you tell me, do you have a water analysis on the well in 32?

A. Yes, sir.

Q. All right, would you tell me what the water analysis is for that well?

A. If I can find it here. Mr. Reed made the analysis. It was Southwestern Labs of Midland by direction of Ed Reed and Associates from the samples that we sent them back in 1975.

I've got ten or fifteen wells here. It will take me a minute to find it.

Section 32, Township 18 South, Range 30, total dissolved solids were 3,326 parts per million; chlorides --

Q. Wait a minute, you're going too fast for us.

A. Okay.

Q. What are the solids?

A. Three, three, two, six.

Q. All right, and what's chlorides?

A. Chlorides, 277.

Q. Do you have any more information on that well?

A. Yes, sir, sulphates 1812.

Q. All right, sir, apart from the well in 26 and the well in 32, do you have any other wells?

A. Yeah, I had another well here that we sampled that was on the Turkey Track, Norman Well that we sampled because we wanted to drill a well just to the south of there about a half a mile, and we have the analysis on that particular well.

Q. Tell me where that well is.

A. It's located in Section 25, Township 18, Range 29.

Q. All right, just a minute. 18 South, 29 East, what's the section?

A. Section 25. The water is located about half a mile north of our north fence.

Q. All right, sir. Mr. Reed has a stock well in Section 24. Is that the same one you're talking about?

A. I don't think so, no, sir.

Q. Just a minute. I direct your attention to what Mr. Reed has marked as a stock well in Section 24 of that township. Is that the well to which you refer?

A. No, I don't believe it is.

Q. All right, sir, where do you think this other well is?

A. Approximately one mile south of this.

Q. In Section 25?

A. Yes, sir.

Q. Tell me about that well.

A. Total dissolved solids 1295 parts per million.

Q. 1295, is --

A. Yes, sir.

Q. All right, sir.

A. Chlorides 25.

Q. All right, sir.

A. Sulphates 7.7.

Q. To what, if any, use is that water being placed?

A. I assume that they're using it for livestock watering. It's not on our ranch and I'm not --

Q. All right, sir.

A. I don't know for sure.

Q. All right. Are there any other wells in this area to which you're familiar?

A. By this area, yes. I've got a bunch of

water wells on this whole list here, which have to do with the Townships 20, 29, and 20, 30, south of there.

Q. All right, I'm looking, I'm concentrating on Township 18 South, Range 30 East.

A. No, sir, just those two wells that we've already talked about.

Q. All right. Mr. Reed has got some wells spotted, two of them in Section 22 of that township, and a third one in Section 21 of that township.

A. That's right. Those two water wells were replaced by the pipeline from our house there in Section 26. Now, I do not have a water analysis on these wells. The cattle were using, we were using these wells ten to twelve years ago. We have replaced the watering there right in the middle of Section 22 with a pipeline from the well in 26.

Q. Why have you done that?

A. Because it's more economical to pump a water well and supply it and run the pipeline and because the water there in 26 is of better quality.

Q. My question, Mr. Squires, are any of the three wells in Section 22 and 21, are any of those wells still useable for either stock or human consumption?

A. I think they'd all three be — be useful as stock wells, if we didn't have the other well, yes, sir.

Q And the reason you use the other well in Section 26 is why?

A Because it is a better water well. The quality is higher, and it's cheaper for us to operate one water well and water twenty sections than to use five water wells and water the same area.

Q I see, okay. Are there any other wells of which you have knowledge in that township?

A No, sir.

Q Mr. Squires, what is your position and the position of Snyder Ranches with regards to this application?

A Our position is if they can show that there's no migration of the salt water, why, we have no -- no problem with it, but we don't feel like that they can possibly show, they've already said that the water will migrate down into the Santa Rosa and also into the Rustler formation and the Triassic, and we contend that there is certainly useable water wells in this area that a facility of this nature will contaminate and ruin.

Now, it is true that we do have Ogallalah pipelines coming from the Caprock, and we can use these, but we don't feel like they'll be there forever. It may be Rustler water is not as good quality as it is from the Ogallalah

but in lots of instances we do have to use it, and so that -- and we feel like that it's -- that this application would contaminate it.

Q Thank you.

MR. KELLAHIN: I have no further questions for this witness.

CROSS EXAMINATION

BY MR. STAMETS:

Q Mr. Squires, do you have any knowledge of any water wells from the -- producing from the Rustler?

A Yes, sir. I say yes. I'm not a geologist and I'm not sure where the water comes from. I know that we do have some water wells on south of here that are close to 250, 275 feet deep that we do use as stock wells, yes, sir.

Q How about those wells there at the ranch buildings south of PCA Mine?

A Those wells, I have some analyses on those wells here, and these wells were useable for stock wells; however, they got pretty bad and they corroded our tanks so bad they'd eat them up and the water tasted terrible; cattle didn't like to drink the water. We saw an opportunity to get better water because we felt like the potash mines and

the oil industry had polluted the water, and under threatening Duval and PCA with a -- with a lawsuit, they built about ten miles of pipeline and supplied water to these wells, and we now have their water.

However, we are using some wells down in 19, 29, that -- which is about fifteen miles south of Loco Hills, that we consider to be what we call gyp water that cattle do very well on. The chlorides in those are 100 to 125 in this area there.

Q. That's somewhere in this strip along the far eastern side of the --

A. Yes, sir, now it would be on the west side of Nash Draw. Now all of our wells within the Nash Draw system, with the exception of one or two that we know about, are not useable.

Q. It seems as though, from memory, that one of those two wells south of the PCA Mine is a relatively deep well, 900 feet or so, is that --

A. No, sir.

Q. That's not correct. Okay.

A. No, we have that -- we have what we call a spring well right at the PCA Mine and I believe that an application by Tipperary, which we protested there and we thought because I think at the time in the hearing that Reed

and Associates did testify that that water would ultimately get into the Pecos River, and we -- we protested that hearing, too, and it was right adjacent to the PCA Mine.

And we had a spring there that we -- the cattle used to water to several years ago, which now they won't bother.

MR. STAMETS: Any other questions of this witness?

MR. JENNINGS: May I?

MR. STAMETS: Mr. Jennings.

CROSS EXAMINATION

BY MR. JENNINGS:

Q. Mr. Squires, just first off, I think you testified that your good well in Section 26, 18, 30, was five miles from -- is it from Loco Hills or the Loco Hills project which we're talking about here in Section 16?

A. I said it was approximately six miles south of Loco Hills.

Q. Well, as a matter of fact, isn't it approximately two and a half miles west and nine miles south of Section 16?

A. Near as I count it, it's one, two, three, four, five, six miles directly southeast of the highway there

where Loco Hills is and it would be then seven and a half miles on up to the location in Section 16, is the way I count it.

Q. Well, as I count it there's one section. You go across 17 and 15, two and a half to 14 and then you go south across nine sections, it's vertically across nine sections.

MR. KELLAHIN: I'll be willing to stipulate with Mr. Jennings that the Examiner can count the sections.

MR. JENNINGS: I just wanted to make sure that we were talking about the same area.

Q. Mr. Squires, you say that you're a veterinary from 1960 to 1968?

A. I was a practicing veterinarian at that time, yes, sir.

Q. And did you retire at that time or did you go into other business?

A. I did not -- I stopped public practice in 1968. I have continued to practice around, yes, but not to the public.

Q. And you say your business is Snyder Ranches?

A. Yes, sir.

Q Do you have extensive ranch holdings?

A Well, we have a rather large ranch, yes, sir.

Q Well, what's the name of the ranch here in 18, 31, we're talking about?

A We call that the Walters Camp, 18, 31, Walters Camp.

Q Well, and this area you've designated, I guess it goes on to the east a long ways, does it not?

A It goes quite a ways to the east, yes, sir.

Q Approximately what percentage of that land is BLM land?

A A high percentage of it.

Q Well, do you know from looking at your permits?

A A high percentage, 80.

Q And what percent is State lease?

A I don't know. Probably, if you would like to know what I think ownership is in that area, we own the land in Section 26 where this water well is located, and we have very little fee land out in this area, if that's what you're after.

Q But basically that's (not understandable)

land.

A. Yes, sir, we hold Federal grazing permits, State grazing permits. We have -- own all the improvements on the Federal grazing permit and we have drilled all these water wells, in most cases.

Q. Speaking of drilling wells, you mentioned the well in Section 32 which you recently drilled and then I believe there was a well -- well, the one in Section 32, 18, 30. Do you recall exactly when you last used that well?

A. It's been over ten years ago.

Q. Was that well -- it didn't show on the records, was it permitted by the State Engineer, do you know?

A. I have no idea. The well has been there fifty years, I understand.

Q. Uh-huh. Well, as a veterinarian, as I understand your testimony, cattle can tolerate or get along on a 1 to 1.7 percent --

A. Yes, sir, the research shows this, yes, sir.

Q. Do you consider that good water for your cattle?

A. I would prefer not to use it, yes, sir. And this is why we would like to protest most of these things to keep it from happening.

Q. Do you use it?

A. No, we're not using it, any water this bad, no.

Q. Then you consider it bad water.

A. I consider it not desireable.

Q. You're a rancher, would you buy a ranch that only had that type of water?

A. No, sir, that's why I would like to keep those waters from getting contaminated to that point.

Q. Well, where do you -- other than Section 26, where do you get your -- generally get your water?

A. We get our waters -- we use approximately 14 of the 15 windmills. We have numerous water pipelines waterings from the Duval and PCA and Kermac Potash Mines that come from the Caprock --

Q. From the Caprock Water System?

A. Yes, Ogallalah waters.

Q. That's generally your water supply, isn't it?

A. We prefer to use this water because it's free, primarily, and because it's sweet water.

Q. How do you get it free?

A. They provide the pipe. This pipeline is about 14 inches in diameter and it's got about 400 pounds

pressure on it. All we have to buy is a pressure reducer and a tub and a line.

Q How long have you been operating the Snyder Ranches?

A Since 1968.

Q Do you engage in any other business, Mr. Squires?

A Yes, sir, I do.

Q What business is that?

A Well, businesses. I'm involved in several investments. Which one are you interested in?

Q Well, I'm generally interested in knowing just your real purpose for being here. It's been my understanding that you're in the water disposal business, is that right?

MR. KELLAHIN: That's a characterization of the real reason he's here. He's testified why he's here, Mr. Jennings.

Why don't you ask him without embellishing the question with what real means or does not mean? I object to that question.

MR. STAMETS: Well, the Examiner automatically throws out anything like that anyway when he's considering the merits of a matter.

Q Would you characterize that business?

A Yes, sir, I am in -- back in 1968 some people from Midland were studying a salt lake that was located on our ranch around Halfway Bar. I found out their intention was to seek authority from the New Mexico Oil Conservation Commission to dispose of produced waters in the lake.

I felt at the time that if anybody was going to be allowed to do this, that it was going to be me, so I could control it.

And at that time I hired Mr. Reed, Ed L. Reed at the time. He studied the area. He indicated that it was a natural salt basin. The water in fact flowed into the lake and it didn't come out of the lake and it would not harm any fresh water supplies in the area.

And so I -- we had a hearing before the Commission and at that time got permission to dispose of produced waters in the lake and we after that point formed the company called Pollution Contro, Incorporated.

Q And Does Pollution Control, Incorporated operate a water disposal system?

A Yes, sir.

Q And where is the water that is generally produced in Loco Hills area now disposed?

A We get some of the water there. I'm

sure there's -- it's being hauled to a lot of areas, but I don't know absolutely for sure, but I know INW does haul some water to us, yes, sir.

Q. How far is it from Loco Hills to your disposal site?

A. 25 or 30 miles.

Q. Who -- you said -- are you the owner of Pollution Control?

A. I'm a stockholder in the company, yes, sir.

Q. What -- who are the other stockholders?

A. Steve Foster, Charles Scalinda, J. W. Neal, my wife. We -- I might clarify that for you. I had some partners in this situation that were operators of it prior to -- until about four months ago.

We were in constant problems with them because they are oil operators and they handled it with an oil operator's point of view, with no feeling for the land at all. We had constant problems with them and I bought them out about three months ago.

Q. Are you now, you and your wife the majority stockholders?

A. Yes.

Q. Roughly what percentage of stock do you own?

A. Twenty-six.

Q. Will the Loco Hills Disposal System, if allowed, be in competition with your business?

A. It's the same type of business but being 30 miles away I woudn't think it would have much affect on it.

Q. It wouldn't bother you?

A. No, sir.

Q. Well, if --

A. If they don't pollute our water, no, it won't bother me. But if it ruins our water on Section 26 it will certainly bother me.

Q. That well is a considerable distance.

A. I believe it's seven and a half, eight miles.

Q. Now, Mr. Squires, there's been a considerable amount of water disposed of in the -- in this immediate vicinity and to -- particularly to the north and I believe some to the east in Township 18 South, Range 31 East. Has that had any effect on your well in Section 26, do you know?

A. Considerable water -- would you give me that location again, please?

Q. I see you were not here this morning when --

A. No, sir, I was not.

Q. Well, there's -- I believe the map shows that in Section 21, 17, 31, there's been 358,000 barrels of water disposed of over the years.

And I believe in Section -- well in the area of Section 6, 5 and 6, of 18, 31, there has been 114,000 and then I believe there's some further testimony that in the area just to the -- about six miles to the east of you they are producing in the area of -- disposing of in the area of 13,000 barrels a day -- 13,000 barrels a month. I believe that's, for your information, that's on the Lusk Ranch, old Lusk Ranch, and that's the Greenwood well.

A. Uh-huh.

Q. Has that affected your well in Section --

A. To my knowledge it has not; however, there's certainly a possibility, I think, that if this water is going to migrate horizontally, it certainly may contaminate that well in the next five years. I don't know this. I don't think anybody in here knows this.

Q. Are there a great, great number of wells on your ranch in this area, Mr. --

A. I testified to the --

Q. No, oil wells, excuse me. Oil wells.

A. Oh, you're not talking about water wells

now.

Q. No.

A. Yeah, there's --

Q. It's very densely developed.

A. Yes, sir.

Q. Do you -- to your knowledge have there been any problems with water percolating from the wells up to a higher horizon?

A. I don't know.

Q. You don't know that?

A. No.

Q. Do you know that that's quite possible?

A. Yes, I know it's possible.

Q. And generally you know that a lot of the wells in the area produce formation water at high levels.

A. They produce some amounts, yes, I know that they do. Some of them do; some don't.

Q. Approximately -- well, I want an example so we have something to compare it to, approximately how many wells a day produce into your system?

A. Into my system?

Q. Into your -- I've forgotten the name of it --

A. Oh, oh. Laguna Gatuna? We dispose of

20 to 25 truckloads on an average per day; however, our evaporation surface is almost two sections. The lake is a rather large lake.

Q So 25 truckloads, that's 25 times 160 or 180?

A Well, no, they don't haul 180 barrels, that's too heavy. Or they're not supposed to, anyway. 140 barrels, I'd say.

Q Maybe 4000 barrels a day?

A If that's what it figures.

Q I'm just guessing.

MR. JENNINGS: I believe that's all.

MR. STAMETS: Any other questions of this witness? He may be excused.

Do you have anything further, Mr. Kellahin?

MR. KELLAHIN: Mr. Stamets, we'd like to take the liberty of Mr. Reed's exhibit and mark that as our Exhibit Number One and introduce it at this time.

MR. REED: All right.

MR. KELLAHIN: Thank you.

MR. STAMETS: That exhibit will be admitted.

MR. KELLAHIN: That concludes our

presentation, and we have nothing further.

MR. JENNINGS: I have one thing that I overlooked, and I would like for the Commission to take administrative recognition of the testimony offered in Case Number 6659, in which Order -- it was an Amoco case and an order was entered on October 10th, 1979. It's Order No. 6134.

MR. STAMETS: Okay, we will --

MR. KELLAHIN: Just -- may I ask what's happening?

MR. JENNINGS: I'm sorry.

MR. STAMETS: Mr. Jennings has asked that I take note of Case 6659, Order R-6134, and I believe that relates to this series of pits in 27, 34, and --

MR. KELLAHIN: That's Amoco's pits, Mr. Jennings?

MR. JENNINGS: That's right.

MR. STAMETS: Mr. Kellahin, do you have anything in the way of a closing statement?

MR. KELLAHIN: I have a few comments, if you'll bear with me.

Mr. STamets, a few years ago the Commission held a hearing and came to the decision in Order Number R-3221 that the further use of unlined disposal pits in this area is no longer a good idea.

And you can see, over the course of years there is absolutely no doubt that disposal in unlined surface pits is a great hazard to sources of fresh water in the area.

The Commission recognizes that fact and has assumed the obligation to have oil and gas operations conducted in New Mexico in such a fashion that fresh water sources, as defined by the State Engineering statute, are protected.

The Commission has exercised that obligation, I think, with diligence. There are a great many cases, Mr. Squires referred to some, I have introduced some. One in particular, the Tahoe case, I think, is important, where Mr. Reed's company had testified with regards to the use of a disposal pit, unlined, in Section 2 of, I guess, it's 20 South, 30 East, and in that case it was denied.

The evidence in that case is very much like the case here today. Mr. Reed and Mr. Westall and his people have put forth a substantial effort in order to justify the use of this area as a disposal pit.

Unfortunately, the facts simply don't bear out the use of the area for an unlined disposal pit. They've admitted a very serious problem, the pit leaks.

There is no testimony to show that the

other pits in this area experience the same kind of characteristics of soil to show that they also leak. Obviously, the area for some time has been used for surface disposal. Mr. Reed was unable to tell us today which of these, other than perhaps this Amoco project, are continuing.

But it seems to me that simply because others have done it in the past, it is no reason to justify it. In fact it mandates the denial of the application. There is no justification to continue the impairment further of water that is still potentially useable for beneficial purposes. Some of that beneficial use is occurring now and certainly there is a potential for some of these wells to be used in the future.

The benefit to the oil and gas industry in general, I think, is very minimal for the use of this site. The testimony is very clear that Laguna Gatuna is a substantial salt lake in which this stuff can be trucked.

The argument that we heard at the last hearing was that it might cost a little less to put it on the surface here. I think the economic tradeoff is just too great.

We have here what Mr. Reed has told us is a pit that will leak in an unknown amount. It will percolate down through the Triassic and into the Rustler and it

will eventually end up in the Pecos River, perhaps not now, not next year, but at some time.

I think we've got to act now with diligence to preclude this from continuing to happen. We believe that the applicant has established only that if this should be granted, it should be granted with the condition that it be lined with a rubber pad or some other pad that's impermeable, that will allow him to dispose of water by evaporation only. We believe the Examiner is fully competent to calculate the volume of evaporation that would take place in the 15-acre pit. Any disposal in excess of that has got to be unacceptable. In addition, it would have to be conditioned on the pit being lined. We believe that without that kind of conditioning on the application there is no other alternative but to deny the application.

MR. STAMETS: Thank you. Mr. Jennings?

MR. JENNINGS: Mr. Examiner, I don't want to belabor this matter. I'm sure after listening two days, or the better part of two days, the Examiner has heard plenty of this.

I do want to point out that we think that we have established a feasible plan, and if you'll look through the history down through the area, and there isn't any evidence of any fresh water in the area, and that's been

basis, I understand, of the testimony in many, many cases in the past in this area that exceptions have been granted. Now the exceptions have been granted; maybe they shouldn't have been granted, but they have been granted.

I think the primary one is the one for Amoco that was granted just in 1979 and it's quite evident that they are producing a substantial amount of water. And any operator that operates in the area has several pits and there's been a great deal made of the fact that there's one good well in the area that Mr. Squires has, which is some nine miles away. There's no showing that that will be contaminated and as a matter of fact, it hasn't been contaminated down through the years. There isn't any evidence of such contamination.

On behalf of the applicant we have tried to in every way follow the procedures and the practice which the Commission has suggested or recommended in the past. We firmly believe that there isn't any water under there. We've gone to great extent and will go to greater extent to monitor the wells and make sure that there's no damage to any fresh water, that might be some vertical or even horizontal.

Now it is our feeling that it would be totally impracticable and there's no -- I think Mr. Westall when he estimated $2000 for a 30x50 foot pit, then it would

take $50,000 by just a long, long, long way for 15 acres, it's quite a few thousand square feet.

It's just not feasible. This is in an area where it's been basically an oil area for years, and years, and years. There's a lot of old wells and the testimony indicated that they're producing lots of salt water. A lot of them are going to be prematurely abandoned if they have to haul the water the distance to this well, which we've heard the testimony and I won't go into that, as to the time that's consumed to go to Laguna Gatuna.

I can well see how the ranchers are concerned, that they all have to have had many pits on their ranches before, but this is not on either one of their properties. The applicant has gone to obtain the permission of another rancher in the area, who is actually ranching it, and has now obtained a State business lease, and the State is getting a whole lot more from that business lease than it does from many acres of grazing leases. They're basically lessees in the area.

We don't propose it and we don't want -- we're the last ones in the world who want to contaminate any fresh water.

But we think that we can safely do this and with that, we'll leave it to the Examiner. Thank you.

MR. STAMETS: Thank you.

We'll take the case under advisement and the hearing is adjourned.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

_____

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. _____, heard by me on _____ 19____.

_____, Examiner
Oil Conservation Division

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION
STATE LAND OFFICE BLDG.
SANTA FE, NEW MEXICO

23 September 1981

EXAMINER HEARING

IN THE MATTER OF:

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. CASE **7329**

BEFORE: **Richard L. Stamets**

TRANSCRIPT OF HEARING

A P P E A R A N C E S

For the Oil Conservation Division: W. Perry Pearce, Esq.
Legal Counsel to the Division
State Land Office Bldg.
Santa Fe, New Mexico 87501

For the Applicant: **James T. Jennings, Esq.**
JENNINGS & CHRISTY
P. O. Box 1180
Roswell, New Mexico 88201

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MR. STAMETS: Call next Case 7329.

MR. PADILLA: Application of Loco HIlls Water Disposal Company for an exception to Order R-3221, Eddy County, New Mexico.

MR. JENNINGS: I'm James T. Jennings, appearing -- of Jennings and Christy, Roswell, appearing on behalf of the Loco Hills Water Disposal Company, and I will have three witnesses, Mr. Steve Reed, Mr. Ray Westall, and Mr. Jack Case.

MR. STAMETS: Other appearances this morning?

MR. KELLAHIN: I'm Tom Kellahin of Kellahin and Kellahin, Santa Fe, New Mexico, appearing on behalf of William Bogle, that's B-O-G-L-E, and Bogle Farms, Dexter, New Mexico.

MR. STAMETS: Do you want to verbally renew your motion at this time, Mr. Kellahin?

MR. KELLAHIN: If the Examiner please. My client is a rancher that owns property adjoining this proposed disposal area where produced salt water is going to be disposed of in unlined surface pits.

He became aware of this case on the 19th of August, 1981, and retained me to appear in his behalf today.

On the 20th of August we filed a motion to dismiss this application insofar as it's our contention that the applicant fails to meet the standard required of the Division in order to be an applicant before the Division. We make specific reference to Rule 1203, which requires the applicant, Loco Hills Water Disposal Company, to be a property interest owner or to be an operator or producer for this particular area.

The application indicates that Loco Hills, at least as of the date of the application, had simply made an application to the Commissioner of Public Lands for a business lease, and when I talked to Mr. Jennings on Friday he had not yet obtained that lease, and if Mr. Jennings does not have the business lease today, then we would renew our motion to dismiss this application.

MR. STAMETS: Mr. Jennings, would you respond to that, please?

MR. JENNINGS: Yes, sir. I'd first like to wonder if Rule 1203 applies to other than applicants. It would seem that this property in question is underlain by State lands upon which Mr. Bogle does not hold the lease, and he has -- I don't know what his interest would be, (inaudible) because what's sauce for the goose is sauce for the gander.

I would further point out that it's my understanding, and I'll be glad to call some of the people from the Land Office to verify this, if the Examiner is not aware of it, but it is the policy of the Commissioner of Public Lands not to issue a business lease in situations such as this until such time as the matter has been approved by the Oil Conservation Division.

So you're in an impossible position, if you sustain Mr. Bogle's contention, there isn't anything that you can do.

And I would further like to make the Examiner aware of a letter that was received from the Commissioner of Public Lands, and I will be glad to introduce it, but I would like to read it into the record.

It's a letter dated August 25th, 1981, from the Commissioner of Public Lands, addressed to Loco Hills Water Disposal Company, re the application for business lease BL-1044. Gentlemen. I have been instructed to inform you that this office has approved your application for a business lease contingent upon approval of the OCD. Once we have assurance that the OCD has granted permission for the disposal ponds, we will continue to process your application. Signed, Benito Lopez, Director of Land Resource Division.

MR. KELLAHIN: May I respond to Mr.

Jennings?

Are you through, Mr. Jennings?

MR. JENNINGS: Yes.

MR. KELLAHIN: There are two criteria, obviously, an individual can have a sufficient interest to appear and object before the Commission, simply be an interested adversely affected party, which Mr. Bogle is in this case.

The Division definitions of waste include surface waste. He has a sufficient interest to be protected.

That is entirely different from the interest necessary in order to file an application. Obviously, Mr. Bogle can't come in here and file an application to drill a well at an unorthodox location or to create a disposal pit, as proposed here, but he does have sufficient enough standing to enter a complaint here.

Mr. Jennings' point is that he is trapped if the Commission denies him standing here because the Land Office indicates a preference on their part to have you hear the case first. That is not permitted within the rules, whatever their desires might be. If in fact that's the situation Mr. Jennings finds himself in, it's not as impossible as he may profess. What he does is persuade the Land Commissioner to issue him a business lease subject to certain

conditions and contingencies, one of which could be very easily a statement that it is issued pursuant, or subject to approval of the Oil Commission of the operation itself.

But it's our point that he fails to meet a sufficient degree of proprietary interest in this property despite the existence of Mr. Lopez' letter without actually having the business lease issued to him in hand.

We renew our motion to dismiss the application.

MR. JENNINGS: I might make an observation.

I neglected to advise the Examiner that we have a thing that we obtained on July 10th, 1981, a relinquishment of the existing grazing lease from the existing grazing lessee, and which this was approved by the Commissioner of Public Lands on the 4th day of August, 1981.

We feel like we do have a proprietary interest in the --

MR. STAMETS: Is this grazing release essentially to give your client the authority to graze cattle on this --

MR. JENNINGS: No, sir, it doesn't.

MR. STAMETS: Does anyone else have the authority to graze cattle out there?

MR. JENNINGS: No, sir. On this particular tract of land, no one has the authority to graze cattle there because the grazing lease has been relinquished, was relinquished so that we could get a business lease. It's my understanding that you can file one on top of the other, but because the Commission would have to have a release in the surface, you have to attach -- or file a relinquishment of the existing grazing lease before you can get the business lease, and that has been relinquished and we'd be glad to offer in the course of our testimony, or we'd offer it at this time, a copy of the relinquishment which was filed and approved by the Commisioner of Public Lands.

MR. KELLAHIN: May I respond to that comment?

The rule requires a property interest, not simply an interest, but a property interest, and property interest means a particular thing. It's the right to use, occupy, possess, and enjoy a particular right.

In this situation the relinquishment of a grazing lease is nothing more than the relinguishing it back to the Commissioner of Public Lands. It doesn't vest Mr. Jennings' client with anything that he can possess or use. He can't take the relinquishment and go out and dispose of water. He has got to now get permission from the Commis-

sioner of Public Lands under a business lease to do as he proposes. A relinquishment means that the grazing lessee has simply given up his right to graze this tract and referred it back to the Commissioner.

The Commissioner has not yet issued him, Mr. Jennings' client, any property right at all at this point.

MR. STAMETS: Mr. Kellahin, you certainly raised an interesting issue this morning, and in discussing this with my attorney, issues are not perfectly clear to me.

I believe under the circumstances I am going to delay taking any action on your motions and considering that all the parties are here, I'm going to proceed and listen to the case and simply take your motion under advisement and take action on it at the time any order would be issued subsequent to this hearing.

MR. KELLAHIN: May I respectfully request that if you desire to state your reasons for your decision on the record so that in the event my client should disagree and desire to appeal your decision, the record would clearly reflect upon what you reason for your decision?

MR. STAMETS: Well, Mr. Kellahin, you realize, of course, that any appeal from this hearing would be de nove before the Commission, and therefor whatever reasons I might give would be of little use to you in the courthouse,

so we'll certainly try and inform you of that for your information in any future case.

MR. KELLAHIN: Outside of the normal administrative appeal process, there is the right to petition District Court for a Writ of Mandamus or a Writ of Prohibition to have the District Court determine whether or not jurisdiction standing is appropriate in this case, and so there is a vehicle by which we could seek a District Court decision, and I'm sure the District Judge would very much appreciate the benefit of your reasoning.

MR. STAMETS: We're going to take about a five minute recess here, and go gather the troops.

(Thereupon a five minute recess was taken.)

MR. STAMETS: The hearing will please come to order.

Mr. Kellahin, on further consideration, the Examiner is going to deny your motion for dismissal at this time and proceed with the hearing.

MR. KELLAHIN: I have some more motions to make.

MR. JENNINGS: May I make one observation

before you start?

MR. KELLAHIN: Yes.

MR. JENNINGS: It's in the record, this will have to be re-advertised, you note in the application the description of the location is described as the south half southwest quarter southwest quarter of Section 16, and it actually would be the lease would cover the north half, and generally the application was for pits located in the southwest quarter southwest quarter of Section 16, but was a typographical error and that was carried forward into the advertisement, and that's all.

We'd move that the application be amended for the change.

MR. STAMETS: This will be re-advertised.

MR. JENNINGS: That's all.

MR. KELLAHIN: Mr. Jennings has, perhaps, anticipated my next motion. I was moving to dismiss the application and the case based upon the fact that the application as filed with the Division does not represent the intent of the parties. The property, obviously,is misdescribed.

Rule 1203 requires a written application filed with the Commission at least ten days prior to the hearing date. There's an application filed but it's for the wrong acreage.

We contend that the application has a fatal defect. The applicant must now file a new application for the proper acreage, or at least the acreage he intends to cover in this application. The case must be re-advertised and so set over for a new date.

MR. STAMETS: We'll deny that motion, as well.

MR. KELLAHIN: My client -- I have another motion, Mr. Stamets.

My client, as I told you earlier, just learned of this case last week. Mr. William Bogle is in New York, I understand, today. He's not able to attend the hearing. We have not had an opportunity to review the hydrologist's report, which apparently has been prepared. I received it this morning about fifteen minutes to nine.

We would much prefer to have this case reset to a different date to give us sufficient time to prepare our case, and we are totally unprepared to cross examine witnesses today; to do nothing more than sit here, and if the Commission decides to continue this case, we will reserve the right at the time of rehearing to cross examine all witnesses that testify today and to put on our case at that point.

If you want to hear two cases, it's fine

with me, but it seems to me that it would be more acceptable to continue this case, give us an opportunity to get prepared and allow this application to be re-advertised appropriately for hearing.

MR. STAMETS: Go off the record, Sally.

(There followed discussion off the record.)

MR. STAMETS: Let's go back on the record, Sally.

Mr. Kellahin, we are going to proceed with this case today, and of course you are aware that it will be re-opened and apparently the re-open date -- re-advertised and re-open date will be September 23rd. We will be calling the case on that day and you will be permitted to appear and offer evidence and all the other things that go with a hearing on that date.

MR. KELLAHIN: Let me clarify what will happen with regards to the three witnesses that intend to testify today.

Will those three witnesses return on the 23rd of September to be cross examined or need I have subpoenaes issued for their presence?

MR. STAMETS: That's a good question. Mr. Jennings, do you intend to voluntarily bring these three witnesses back on the 23rd?

MR. JENNINGS: I will try my best. I'm sure we'll have Mr. Westall. I don't know about Mr. Case, whether he can get away from his business or not.

MR. STAMETS: I'm sure Mr. Case can get away from his business again.

MR. JENNINGS: Are you involved on the 23rd?

MR. CASE: Not to my knowledge.

MR. JENNINGS: We'll have them back.

MR. KELLAHIN: With that assurance, we're willing to listen to the witnesses.

MR. JENNINGS: Mr. Kellahin, would you, before we proceed, would you correct your statement about your land being adjacent to this tract?

MR. STAMETS: Well, I think if we're going to do that, let's do it on the record.

MR. JENNINGS: Okay.

MR. KELLAHIN: Mr. Stamets, I misspoke awhile ago when I said the ranch was adjacent to the location. The ranch boundary is in the section that is adjacent to the location, which is slightly different. The ranch fence does

not coincide, nor is it contiguous with the actual site, but the ranch boundary traverses the adjoining section to the west, running from the northeast corner of the section to the southwest corner of that section, with the ranch lying to the northwest of that line.

MR. JENNINGS: Shall we proceed?

MR. STAMETS: I certainly hope so, Mr. Jennings.

MR. JENNINGS: We have, as I said, three witnesses.

MR. STAMETS: I'd like to have the witnesses all stand and be sworn at this time, please.

(Witnesses sworn.)

V. STEVE REED

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q. Would you state your name, please --

A. Steve --

Q. And your occupation and place of resi-

dence?

A. My name is Steve Reed. I'm a consulting hydrogeologist with Ed. L. Reed and Associates, Incorporated, with offices in Midland and Corpus Christi, Texas.

Q. How long have you been engaged in this business, Mr. Reed?

A. Approximately six and a half years.

Q. What is your educational training?

A. I have a Masters degree in geology from Northern Arizona University.

I was employed by the US Geological Survey for approximately seven and a half years and I came to work for Ed. L. Reed and Associates, Incorporated, in 1975.

Q. Are you a hydrologist?

A. I am not a hydrologist per se. I would be more aptly described as a hydrogeologist.

Q. Are you familiar with the application which was filed here in Case Number 7329?

A. I am.

Q. By way of preparation for this hearing and for the -- for the hearing for the application, have you made any particular study?

A. I have.

Q. What period of time did your study cover?

A. We began our studies approximately March or April, I believe, of 1980.

Q. Has it been ongoing since then?

A. It has.

MR. JENNINGS: Mr. Examiner, any questions concerning Mr. -- oh, excuse me.

Q. Have you appeared before this Commission in the past and testified?

A. I have.

Q. And have your qualifications been accepted?

A. They have.

Q. In connection with matters such as this now?

A. Yes, sir.

MR. JENNINGS: Mr. Examiner, are there questions concerning Mr. Reed's qualifications?

MR. STAMETS: The witness is considered qualified.

Q. Mr. Reed, in connection with your testimony, let's first show you what has been marked Exhibit One, which is the book, and in connection with this, Mr. Examiner, I would like to point out that this has been marked Exhibit One, but it consists of a number of separate sub-headings, which are described therein, and a number of figures, which

consist of maps and such, and we thought for convenience sake that we would just use the one exhibit, but I will ask the witness in referring to any figure to identify it by the figure or the other description to which he's referring.

Mr. Reed, are you familiar with and have you made a detailed study of the proposed site, which is located in the southwest quarter southwest quarter of Section 16, Township 17 South, Range 30 East?

A. Yes, my company has investigated this locality.

Q. First would you outline just what the nature of the geology, including surface geology, in this area is?

A. In general terms the site is underlain by sands, silty sands, with a few minor clay zones, which we have assigned to the Triassic Santa Rosa formation. These materials extend from near the surface to a depth at this site of about 220 to 250 feet.

These sediments are dry and they overlie the Permian age Rustler formation, which in this area consists principally of anhydrite gypsum with some silty zones intermixed.

The regional structure is to the southeast.

That in very general terms is the geologic situation that -- at this site.

Q. Well, would you care to go into more detail?

A. We, as part of our investigation, drilled a series of test holes near this property to investigate two things, the occurrence, if any, of ground water in the area, and an examination of the geologic materials that underlie this site.

We specifically drilled six test holes in the area, which reached in depth between approximately 150 feet to one which we drilled to a depth of about 320 feet.

In drilling those holes we drilled them dry, as best we could. On occasion we added fluids to -- to the drilling -- to the hole in order to facilitate drilling, but we essentially drilled them dry and juried them after we drilled the wells.

There are two of these wells which we -- two of these test holes which we cased with small diameter PVC and later came back to them and examined them for fluids.

Exhibit -- Exhibit Number One contains a figure which is labeled in the report No. 5, which shows the configuration of our drilled test holes. If I may, I've got an enlargement of that figure which I could place up on the

wall, and I've highlighted our test holes, as well as the water wells in the area which we have examined, and it might facilitate matters in examining this exhibit.

MR. STAMETS: Fine, Mr. Reed, that would be fine.

A. On this exhibit, again it's the same -- it's an enlargement of the same one in Figure 5 of our Exhibit One, and I have highlighted in green the locations wherein we've a test hole.

The light blue square in approximately the right central portion of this map is the 20-acre tract in question.

As you can see, we drilled a test hole just south of this acreage, just to the northeast, one farther to the southeast, one approximately a section, a mile south of the property, one approximately a mile and a half southwest, and one about a half a mile to the west.

To just briefly summarize what we encountered in these wells -- in these test holes, number one, we drilled the number one just south of the acreage. We drilled to 150 feet and encountered no ground water.

Number two, which is west of the site, we drilled to 150 feet and encountered no ground water.

Number three we drilled just to the east

northeast of the site and again encountered no ground water. This one, the number three, is cased and we have found no fluid in this well -- in this test hole.

Number four, which is southeast of the property, was drilled to a depth of 200 feet, and no ground water was encountered.

Number five, drilled approximately a mile and a half southwest of the property, was drilled to 130 feet and no ground water was encountered.

Number six was drilled approximately a mile south of the property. This well was drilled to a total depth of 320 feet, which is approximately 90 feet into the Rustler formation, and again we encountered no ground water.

From -- from this test hole drilling program, we have determined that in the immediate vicinity of the property upon which we propose to place salt water disposal facilities, that the Santa Rosa formation contains no ground water. Indeed, the fluid levels are well below the top of the Rustler formation.

In addition to our test hole drilling phase, we examined data from the State Engineer's Office, and visited the site to verify these data of any and all water wells in the vicinity of this 20-acre tract.

Essentially we looked at a minimum six

mile radius, although as you can see again on this figure five, we show the wells that are considerably beyond the five mile, the five or six mile radius. The red dots on this map on the wall again, they're -- the dots are the same locations that are on the map in the Exhibit One. The red dots just merely highlight them of this for clarity in this hearing.

Our locations of various water wells in the vicinity of the 20-acre tract, the nearest water well that we could find in the area is approximately a mile and a quarter south of the 20-acre tract. This well is an abandoned water supply well. It was drilled to a depth of 506 feet. It is completed in the Rustler formation. The water level is 330 feet below the surface. Again, this level is well down into the Rustler. That fluid level is not up in the Santa Rosa formation.

And since it is Rustler water, as one can expect, the quality of this water is quite poor. There is a reported chloride concentration in this abandoned well of in excess of 10,000 milligrams per liter, as chloride.

The other wells we examined in the area, again just briefly summarizing, there are two wells approximately 5 miles west of the property. One of them has a very shallow water well, 69 feet. The other well, which we were not able to obtain a fluid level on, we do have some

recent chemical analyses on, and this is an area where there appears to be a local perched ground water in the Santa Rosa and the total dissolved solids in the water produced from that well are 2722 milligrams per liter.

We examined a well approximately four miles southwest of the property with a -- that contained reported chloride concentration in excess of 4000 parts per million. These data were reported by the Oil Conservation Commission for analysis, I believe, in 1969. This is in a water supply well that had been abandoned.

Going -- continuing in a counter-clockwise direction, in Section 10, approximately six miles, five or six miles southwest of the -- the property, is a stock windmill, which has a water level of about 160 feet below the land surface. Water produced from this well contains total dissolved solids of almost 7000 milligrams per liter.

Again we assume from the water level data that this is a perched water table in the Santa Rosa formation.

Continuing clockwise in Section 24 is a stock windmill which has a water level of 140 feet. Our recent most analysis shows water produced from this well contains total dissolved solids of 932 milligrams per liter.

I can continue on around in a counter-clockwise direction in Section 9, there's an abandoned stock

well which we could find in the field. It was reported and we did not see that well there now.

Just to the southeast of that location in Section 22 we see two wells, which we only have water level data on and no -- no faulty data on. The water level in one appears to be equivalent to one residing in the Rustler formation and the other one just to the southeast of that one, which has a water level of plus 3311, is again, probably a Santa Rosa well.

There are others in the area that are farther out than these that I won't go into right now, unless you would like me to later on. But I believe this is enough information to demonstrate to us very clearly that within -- within a 4-mile -- this in combination, now, with our test hole drilling, that within a 4-mile radius of our proposed disposal site, the Santa Rosa formation contains no ground water. Albeit that in excess of four to perhaps six miles of the site there are isolated, appear to be isolated perched zones of -- of water, some of which is potable, some of which is certainly not potable, in the Santa Rosa formation.

Q. Mr. -- just one question. There is shown a red -- red line on that map that starts up in the righthand corner and kind of comes down and goes over in the 17 -- Township 17 and comes on south. What -- what is that

line? Can you identify that for us?

A. That red line is the approximate eastern boundary, at least in this portion of the map, of the -- of the Bolger Ranch.

Q. Bogle.

A. Bogle, I'm sorry.

Q. Now, Mr. Reed, what is the general flow of the -- not only the surface but the underground flow of water in this area?

A. Again, as shown from -- from this figure a large part of this figure -- at least a part of this figure is data derived from State hydrology reports in this area, and these data are supplemented by our own field investigation. We show a hydrolic gradient in the ground water system towards the southeast, in this particular area.

When one examines the hydrolic gradient on a regional basis, the hydrolic gradient south of here bends towards the south and southwest.

But in this particular area it is in the direction of southeast.

Q. Where is the potash area from this property?

A. If I might place another map on the wall, this is a -- is a map that shows from the information that

we have to date, the approximate locations of the various potash mines.

Q. If you -- it might help if you could put it over there. We might have to refer to it again.

A. And exemptions to -- to the no-pit order. The -- and this is in our Exhibit One. I believe this is as figure six in our Exhibit One. It is merely a portion of that map.

The dark blue squares are again the approximate locations within each of those sections of -- of exemptions to the no-pit order. The -- these pits have been located on this map using a list provided to us by the District Office of the Oil Conservation Division. We have taken those data and plotted them on this map.

There certainly may be some very recently granted which I do not have on this map, but these are at least reasonably recent data.

This map also shows the approximate location of the Duval Potash Mine, approximately seven or eight miles to the south, and Southwest Potash Company, which is about twelve miles south.

Again, I have placed on here to approximate eastern limits of the ranch.

As you can see on this map, there is a

number of permitted pits in the vicinity of -- of the 20-acre tract in question here today. Many of them are -- are to the south, although there are some to the west.

Q. Where is -- where is the Clayton Basin?

A. The Clayton Basin exemption, if I'm not mistaken, it comes in at about Township 19. It's essentially just south of -- of our property, approximately 20 miles.

Now, these permitted pits are -- are there principally because there is an absence of potable shallow ground water, and thus no -- there is no potable shallow ground water to -- to be jeopardized by these salt water pits.

Q. Are you through with that?

A. Yes.

Q. Would you discuss the feasibility, and not only the feasibility but the plan of operation of the facility?

A. We propose in the 20-acre tract to construct a minimum of three ponds and if at this time you'll refer to figure seven in Exhibit One, I show the boundaries of our 20-acre tract within Section 16, and in red pencil I have shown the surface contours as taken from the 15-minute quadrangle map of this area.

I have shown in green the approximate

configuration of the pits as we would propose to construct them in this -- in this tract.

We again propose the minimum of three pits with a fourth pit used primarily as a skimmer pit, removing the last bits of hydrocarbons from the water that discharges from our separator facility.

The separator facility essentially is -- is patterned after other facilities that appear to work quite well. We propose a series of three 500-barrel tanks, two 250's, to remove the majority of -- of hydrocarbons and suspended materials from the water before it is discharged into the first earthen pit. Again, the first earthen pit is a small pit and is designed to entrap the last residual material that floats on the surface of the water.

We propose three pits for a number of reasons. We feel it's operationally more sound to have more than one pit to discharge into, such that we can continue to dispose of salt water should be require; should one of the pits require maintenance. That particular pit can be dewatered into the other ones and maintenance can be performed on an individual pit.

We are proposing for these pits to maintain a maximum fluid level such that if -- there at all times is a minimum three feet of freeboard between the top

of the water and the top of the dike. This freeboard is designed specifically to handle rainfall, such that there will not be undue spillage, or any spillage.

Now, if I can take just a moment to go back and describe the shallow geologic material, I think it's important to consider these materials when examining our monitor well ring, which we have again shown on this illustration.

In our Exhibit One we show three geologic cross sections, which are a combination. These are in our Exhibit One labeled figures one, two, and three, which are a combination of data from nearby oil and gas tests. They include logs of the -- one of them includes a log of the Anadarko water supply well just south of our property. They also include our test hole data.

As can be seen from -- from these cross sections, the materials of the Santa Rosa consist principally of sand, silty sand, with thin interbedded silty clays, and minor clays. We attempted when we first gathered these various logs to correlate the clays, principally because we needed to see if there was a barrier, a horizontal barrier, to fluid migration.

Indeed, we were unable to correlate these clays any distance at all. They are very discontinuous and

they're discontinuous over short distances.

For a detailed lithology of our test holes, I would refer you to a portion of our Exhibit One, which is labeled sample descriptions, test holes.

Again, these test holes indicated predominance of sand, sandy clay.

We believe, in examining the shallow geologic materials, that the ponds located on this 20-acre tract will be underlain by material which is less than totally impervious. In other words, these materials, these shallow materials, will not necessarily contain the introduced brine in the immediate vicinity of the pond floors. We anticipate there to be percolation down through the floors of the ponds and this percolation will continue to the Rustler. We say this and support this with the knowledge that, number one, the Santa Rosa is indeed dry in our area, which does indicate that if it does ever receive ground water, that it does drain out, and secondly, again, the discontinuous nature of the clays. We don't see any major horizontal barrier to the downward percolation. There may be short -- and indeed probably will be short horizontal paths as it migrates to the Rustler, but we believe these will be short and that, to reiterate, the primary direction of fluid migration from these ponds will be vertically down to and into the Rustler.

The Rustler, of course, contains water with -- that has dissolved mineral concentrations well in excess of 10,000 milligrams per liter.

We believe, though, that we need to demonstrate our conclusions, that our conclusions are indeed valid, of primarily vertical percolation by a series of monitor holes, which have proposed around the site. We have proposed two kinds of monitor holes, a series of shallow monitoring holes, which completely surround the site, and are drilled to an approximate depth of 60 feet.

The first clay that we see in the section that could induce horizontal migration lies at a depth in this area of between 30 and 60 feet. So we propose to complete the bulk of the monitoring holes at about 60 feet, because if we indeed experience undue horizontal migration, this is the place to complete the well. These wells will detect that horizontal migration.

But we've gone one step beyondthat. We also propose to complete two Rustler depth wells on the down-dip side of the ponds. These wells, one which is due south of the ponds, one which is to the southeast of the proposed ponds, will be completed to an approximate depth of 250 feet, and they will examine and be able to detect undue horizontal migration that might occur below the 60-foot level.

Q. You are referring to what has been marked as figure seven --

A. That is --

Q. -- the Rustler wells are marked red and the blue are the 60-foot?

A. That is correct.

Q. Okay, excuse me.

A. We have proposed a monitoring schedule for these monitor wells, this schedule being an examination four times a year over the duration of our project. The results of these -- this sampling, of course, would be, and will be, forwarded to the Oil Conservation Division.

Q. How do you propose to case these holes?

A. All these monitor holes will be cased with PVC casing with a minimum diameter of two inches. This is a diameter which allows sampling of the monitoring well. They will be perforated throughout almost their entire length with the exception of an upper few feet of -- of blank casing, which will -- which will be opposite the cemented annulus. We propose to cement the upper five or six feet of casing in the well to prohibit migration of surface waters down into our monitoring well.

Q. Mr. -- Mr. Reed, have -- has the general pattern of this plan under construction followed the plan

that was designed in the Wallach site, which is approved in Case Number 5899?

A. Well, the overall design of ponds and the -- the methods wherein the oil and -- residual oil or hydrocarbons of some sort, sediments, are separated from the water and discharged to the pit, the general configuration of the diking and the monitor wells, is -- is indeed very similar to that operation.

Q. Have you made any evaluation of the potential evaporation?

A. Yes, I have. As I have previously reported to the Oil Conservation Division, in examining the evaporation data from the Red Bluff Reservoir, one can expect to evaporate approximately 3 -- 3500 barrels per month per acre. Now this is on an annualized basis. Indeed, one has to operate at something less than 3500 barrels a month, because we wish to not have undue accumulation from year to year, which would tend to build up in the low evaporation months.

Again, equating to fresh water, we have determined that without any annual accumulation, except in the very worst evaporative years, which would then be taken care of in the following years, one can expect to evaporate 3180 barrels per month per acre.

Now I don't expect that the evaporation at Loco Hills site will be quite 3180 barrels per month per acre. The reason being that we're some distance north of the Red Bluff evaporation station; we're somewhat higher in elevation than the Red Bluff station. So I have estimated a -- what I consider a very conservative expectation of salt water evaporation of between 2000 and 2500 barrels per month per acre.

This, using the lower figure of 2000 barrels per month per acre, and assuming a 15-acre pond, we could reasonably expect to evaporate on the order of 1000 barrels per day.

This disposal rate does not into account any infiltration which we might experience.

Q. I believe, Mr. Reed, you have referred to basically all of your figures, have you not?

A. I have pointed out most of them. I think I did not discuss the Rustler structure map, but I discussed the -- the overall structure. There is a map in the Exhibit One, labeled figure four, which is a structure map on top of the Rustler formation, showing that the Rustler dips towards -- it locally dips towards a depression just east of our proposed location.

Regionally, on a regional basis, the

Rustler, of course, dips to the southeast.

Q. As a result of your -- of your study have you reached any conclusions concerning the feasibility and other features of this site?

A. I have. In conclusion, it is our opinion, number one, that water introduced into these ponds will be eliminated primarily by evaporation and there will very likely be some infiltration, which we anticipate to travel in a vertical direction, arriving at the Rustler formation, which already contains water which is impotable.

We do not see that this operation will have any adverse affect or endanger any shallow ground water systems, because, indeed, in our area we see no potable ground water systems.

We believe this facility can be operated so as not to jeopardize fresh water supplies.

Q. Mr. Reed, in your opinion will the use of this site as a disposal facility in any way impair the correlative rights of any of the operators, including the ranch operators, in the area?

A. I don't believe so.

Q. Will -- in your opinion will the use of the disposal site located at Loco Hills be in the interest of conservation and prevent waste?

A. I would believe so, yes.

Q. Mr. Reed, assuming that the nearest disposal site is more than 30 miles distant, where -- commercial disposal site, will the installation of this facility at Loco Hills prevent the premature abandonment of many wells, including many stripper wells in the area?

MR. KELLAHIN: I'm going to object to that question. There is no foundation laid that this witness is competent to qualify as to oil or gas production.

MR. STAMETS: What was the question specifically? Could you run it back by me?

(Thereupon the reporter played back the previous question.)

MR. STAMETS: I will sustain the objection as to the specific language of that question.

Q. Mr. Reed, I'll try again. Mr. Reed, are you familiar with the general nature of the oil and gas production in southeast -- or in this area of eastern Eddy County and western Lea County?

A. I'm not really familiar with -- with the oil production, no, sir.

Q. I see. Were Exhibits -- was Exhibit One prepared by you or under your direction?

A. Yes, it was.

MR. JENNINGS: We would offer at this time -- offer Exhibit Number One.

MR. KELLAHIN: If the Examiner please, we would like to withhold cross examination and would object to the introduction of the exhibit until the hearing on the 23rd of September, when we'll have an opportunity to cross examine Mr. Reed.

MR. STAMETS: I think that that would probably be an appropriate course of action, and we will delay entry of the exhibits until the hearing on the 23rd.

MR. JENNINGS: That's all we have of -- let me -- we have no further questions.

MR. STAMETS: Okay.

CROSS EXAMINATION

BY MR. STAMETS:

Q. Mr. Reed, you've testified here a number of times on various disposal sites. This is the first one that I recall that you said was going to leak, and I think that that raises a number of issues specifically in this case, our 1000, magic 1000 barrels a day for 15 acres, how much of

that is going to leak, and where is it going, and we're already short-lived creatures, where is it going ultimately? Is this going to move vertically down into the Pecos River or is it going to be permanently trapped in some depression at the top of the Rustler? Is it going into the Rustler? What's going to happen to this water?

A Mr. Examiner, indeed it is a different situation than other disposal facilities which I have testified to which we do not anticipate leaking and are true evaporation facilities.

In this particular area we do not have the underlying impervious clays which would restrict any vertical migration. The leakage rates through these materials are -- are certainly not well established, but I believe that we can say that it will indeed migrate through the floor of-- of the ponds.

We have done various infiltration rates, studies, for other projects, which show a wide range of infiltrations from 10 gallons a minute per acre to in loose materials, 3-or-400 gallons per minute per acre.

At this facility, examining the shallow materials, I would certainly be persuaded to assign numbers that are on the lower side of that range.

We anticipate that the brine introduced

in these pits will migrate directly into the Rustler formation, into a formation which otherwise contains extremely poor quality water, and we believe that the brine introduced in these pits, once it arrives at the Rustler, will migrate along with this otherwise very poor quality water.

Q. Where does it go?

A. The ultimate discharge line, or direction of flow on these formations -- of this ground water in the Rustler, is regionally in a southwesterly direction towards the Pecos River.

Q. Mr. Reed, I believe that I have observed water from the Rustler being used as stock water in parts of Eddy County. Is it conceivable that this water which should eventually become a concentrated brine could enter the Rustler and effect this use as stock water?

A. I do not believe so, primarily because again the water that enters the Rustler will be entering a regime in this particular area that already, if it comes in contact with more potable water, it in itself and by itself will render that water impotable.

In other words, the water that is contained in the Rustler at this point is already extremely poor quality water. We, if we don't introduce any water into it at all, that water is still there, and we are -- are

degrading it somewhat, we are degrading water that is already well in excess of 10,000 milligrams per liter.

Q. Is it possible for you to make some tests of the materials in this area to determine a good estimate for the rate of infiltration?

A. Certainly. There are two ways to do this. One would be to collect core samples or Shelby tube samples and run permeabilities on those samples. We would have to run samples all the way from the surface down to the Rustler to get a good infiltration rate.

There are certainly a water balance, as one operated the facility, one could calculate evaporation versus total disposal and calculate, perhaps, more precisely the infiltration level.

Q. Is there anything reasonable that the applicant could do in this case to reduce the infiltration rate?

A. We do not propose, and feel particularly this size pond, that it would not be desireable to -- to attempt to restrict the downward migration. We base these views principally on our conclusion that there is nothing beneath us that requires protection of a liner.

Q. Mr. Reed, it seems difficult to me to see the ultimate conclusion that you have just stated without

knowing the volume of water which might be expected to go into the pits, over how long a period of time, rate of infiltration, and size of the slug of water that would be introduced into the subsurface, and the path that that water would follow.

You've certainly looked at a rather localized area here, and you haven't discussed volumes, how far that might travel.

A. It is true, we have not tried to, at this point, to assign infiltration rates. We have, though, determined that the migration will be down and into water which is certainly poorer than water which needs to be protected from -- from the -- from degradation.

This water that does migrate through the underlying materials and arrives at the Rustler will migrate along with this otherwise very poor quality water.

That will happen regardless of whether it's a minor volume or a major volume, that these two waters will be -- the native poor quality water and our introduced poor quality water, will reside in the same system.

Q. Would you categorize the expected volume which we don't have any figures on as being a major volume or a minor volume in relationship to that volume which moves through the Rustler in this area?

A. Oh, I would term it as a minor volume

in terms of the overall flow in that system.

Q. If the monitor wells, say for example the shallow monitor wells, picked up water movement above the top of the Rustler, do you feel that any corrective action should be taken? What -- what process should be followed at that point?

A. In the event that one of the monitor holes does indeed show presence of brine, at this point we anticipate evaluating that situation and either recommending that the facility stop, cease its operation, or to predict from this particular study, it depends, for instance, where the brine would be entering the wellbore, over a period of what time it took for the water to enter the wellbore, that we would either again recommend cessation of the operation or we would -- would demonstrate that -- that the brine is indeed in a overall vertical infiltration path, with a recommendation, if that is indicated, that the operation continue as long as they can demonstrate that -- that horizontal migration is not excessive. We would follow that, and back that up by a second series of monitoring wells if that was indicated.

Q. Is there sample data available, or samples available from the original test holes that could be utilized for an estimate of rate of infiltration?

A. No. They would not lend themselves to this sort of an evaluation, no, sir.

Q. What sort of expense would be involved in obtaining evidences with respect to the infiltration rate?

A. To -- to do proper soil testing to evaluate the -- the vertical infiltration, I would assign a dollar figure between $10-and-15,000.

Q. Will there be any tendency for these ponds to seal themselved naturally? Would a build up of solids result in evaporation?

A. They will tend to seal themselves with time, somewhat.

Q. Do you expect them to ever seal themselves?

A. No, sir.

Q. Slowly?

MR. STAMETS: Are there other questions of this witness?

Mr. Simpson, our water resource specialist.

QUESTIONS BY MR. SIMPSON:

Q. Why was consideration around the site to drill only to a depth of 150 feet instead of not go to the

full depth of the Rustler to determine if there was any fresh water below?

A. Well, we initially were essentially flying blind, as it were. We did not know where or if we would encounter ground water in this particular area, and the first holes were drilled to a depth that we expected to either encounter impervious clays or encounter ground water, perched ground water. And our last test hole, indeed, we attempted to drill through the entire Rustler section -- I mean Santa Rosa section, to determine whether it was going to be dry.

Q. Which hole was that, that you attempted to drill through?

A. I believe that is test hole number six just south of project.

Q. Just south, the furthest one south?

A. Yes. the furthest one south.

Q. Okay, and that was the one where you went to the base of the Rustler, if I remember correctly?

A. No, sir, we went into the Rustler but we did not -- we went about nine feet into the Rustler.

Q. All right, you obtained no, supposedly no water?

A. There's no water in that test hole, that's right.

Q. Okay.

A. And in fact, of course, this is supported by the -- the water supply well, the abandoned water supply well nearby, wherein the water level, measured water level at that location is within the Rustler.

Q. And it's 330 feet. Wouldn't it be to your satisfaction to drill that extra 10 feet to determine if that is true and factual results at the time? Have you done any research on the area? That's an extra ten feet of drilling to prove that this is an old abandoned well.

A. I don't know at what time our field people collected data on that abandoned water supply well, whether it was before or after this test drilling; however, again, realizing that -- that we do have data showing the Rustler contains very low quality water, once we're into the Rustler and show that there is no water above us, we feel very confident in saying that there is no fresh Santa Rosa water.

Q. Whether the Santa Rosa had any water or anything, we're determining here is ground water of 10,000 -- 10,000 parts per million, and I could foreseeably see that you could have in the basal part, since this -- this further south well shows chlorides of 10,000 parts per million, do you actually know where the perforations are? In other words,

you could be testing the bottom part of the Rustler instead of the top part.

A. Well, the hole is only -- the fluid levels, I believe, are 330 feet from the surface and the total depth of the well is only 506 feet.

Q. That's true.

A. So I think it's safe to assume that the Rustler is underneath us and has extremely poor quality water.

Q. That's based on your hole. The regional profile for the structure of the Rustler was given on figure seven. Or is that number four?

It shows quite a bit of dip. Did you all draw this contour for the Rustler based on information you had?

A. We did, yes.

Q. How come there's not any further testing and drilling over to the further east of your site? You have a pretty scattered area right -- of testing down further south from you. It looks like the regional or any percolation could go to the south, based on the dip structure, the structure of the Rustler.

A. Well, again, our test hole program was not designed to -- to test the dip of the Rustler. It was designed to test for Santa Rosa -- potable Santa Rosa water.

Q. Well, whether the Santa Rosa had any water or not, the Rustler could have some water to potentially protect. That's the whole thing, in my opinion.

What water is down there that we need to protect, whether it's the Santa Rosa -- the Santa Rosa is dry, but the Rustler may have something to protect, that's my point.

A. I understand. I understand your point, and that's certainly our -- also our consideration. We do not believe that the Rustler in this area contains anywhere near potable water.

Q. And is it my contention that you did -- you relied on those -- that existing well that was abandoned results, or did you personally go out and test, this water well?

A. I don't believe we tested that ourselves, no.

Q. So you have one well with questionable results, I mean unreliable results, on which we're basing everything we're going to protect or not going to protect.

A. No, I would include with that our deep test hole, which shows the predominance of anhydrite and gypsum in the top of the Rustler, and is dry to that point.

Q. The -- you mentioned that you used some drilling fluids to drill your test holes. What drilling fluids

did you use?

A. We introduced a small amount, in some of the wells, of fresh water.

Q. Of fresh water.

A. That we ran and jetted out when we got through.

Q. No drilling mud?

A. No, sir.

Q. What kind of a drill was used to drill these holes?

A. I believe it was a small Failing, if I'm not mistaken.

Q. Cable tool?

A. No, sir, a rotary rig with a --

Q. Air?

A. -- an air compressor on it, yes, sir.

Q. And you said when you -- that -- the statement about you'd run some soil tests and you'd estimate approximately $10-to-$15,000, did that include what Mr. Stamets was talking about, taking the -- you mentioned using, possibly, core samples or Shelby tube tests?

A. That's included in that figure, yes, sir.

Q. To determine the percolation?

A. Yes.

MR. SIMPSON: I don't have any other questions.

MR. STAMETS: Any other questions of this witness? Mr. Jennings?

MR. JENNINGS: Just one question, one or two questions, Mr. Reed.

REDIRECT EXAMINATION

BY MR. JENNINGS:

Q. Would you refer to what has been marked as, I believe, Exhibit Six, or figure six, which outlines the disposal route and tell just where the water goes that is disposed of?

A. Well, in the areas of -- of disposal indicated on that map, unless those pits are lined, they would also migrate down to the top of the Rustler formation. And become part of that system.

Q. Do you have any idea about the number of barrels of disposed -- allowed to be disposed of in those various pits?

A. I do not, no, sir.

Q. Is that information available?

A. I'm sure it would be.

Q. With the Oil Conservation Division?

A. I would assume so.

Q. Mr. Reed, is the area that is exempt under Order 3221, I believe, between this location and the Pecos River?

A. Hydrologically, yes.

MR. STAMETS: If there is nothing further, this witness can be excused.

A. Thank you.

MR. STAMETS: Let's see, you offered Exhibit One.

Mr. Jennings, I'm going to ask that you submit the letter from the Land Office indicating their --

MR. JENNINGS: Well, I'm not through.

MR. STAMETS: Okay, but I'm going to ask you to submit that letter and your copy of the relinquishment as exhibits today.

MR. JENNINGS: Well, I propose to use another witness.

MR. STAMETS: Okay, that will be fine.

RAY WESTALL

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q. Mr. Westall, just one minute and I'll mark the exhibits here.

Would you please state your name and place of residence and business?

A. I'm Ray Westall. I live in Loco Hills, New Mexico. I am an independent oil producer and also have a hot oil service in Loco Hills.

Q. How long have you resided in Loco Hills, Mr. Westall?

A. Off and on all my life, around 30-35 years.

Q. What is your -- are you the president of Loco Hills Water Disposal Company?

A. Yes, I am.

Q. Are you familiar with the application that has been filed here by and on behalf of Loco Hills Water Disposal Company?

A. Yes, I am.

Q. Is that generally an application to get an exception to the no-pit order?

A. Yes, it is.

Q. And I think you heard the testimony that the proposed pit is to be located in the north half southwest southwest quarter of Section 16?

A. Yes, sir.

Q. Who was the original person -- who is the holder -- was the holder of the State grazing lease on that tract?

A. It's the -- it's held by Mrs. Ward, Mrs. Ferguson, and Mrs. Morgan.

Q. Is that Charles R. Martin, Inc?

A. Right.

Q. Is Charles R. Martin their father?

A. Right.

Q. Was it -- did you obtain a relinquishment of this grazing -- their grazing lease, which is number GR-817 from Charles R. Martin, Inc.?

A. Right.

Q. Was that after considerable negotiations?

A. Right.

Q. Please refer to what has been marked Exhibit Three and tell me if that's a copy of the relinquishment?

A. Yes, it is.

Q. Does that show to have been approved by

the Commissioner of Public Lands?

A. Yes, it does.

Q. Now, Mr. Westall, have you sought and -- have you made applications to the Commissioner of Public Lands for a business lease on this land?

A. Yes, we have.

Q. And have you made inquiry from time to time to determine the status of the application?

A. Yes, we have.

Q. Let me ask -- of the record.

(Thereupon discussion was had off the record.)

Q. I hand you here what has been marked as Exhibit Four and ask you to identify that, if you would, please.

A. Yes, this is a letter we received from Mr. Lopez on this business -- on our business lease.

Q. Is that the letter that you heard me read into the record at the outset of this --

A. Right.

Q. Does that indicate that a lease will be issued if the Oil Conservation Commission grants this approval?

MR. KELLAHIN: I object to the question. The exhibit speaks for itself.

MR. STAMETS: Sounds like the question was withdrawn, so we'll sustain the objection.

MR. JENNINGS: That's true.

Q. Now, Mr. Westall, what is the general nature of the terrain in the immediate area of the site?

A. As far as -- it's just sand hills and scrub oak and mesquite.

Q. Is the site adjacent to the highway?

A. Yes, it is.

Q. Is the highway fenced?

A. No, it's not.

Q. Mr. Westall, are you familiar with the general production and number of wells and just the general oil field business in the Loco Hills area?

A. Yes, I am.

Q. As an independent operator?

A. Yes, sir.

Q. Do you have occasion to go to many well sites frequently?

A. Yes, sir.

Q. What -- just briefly explain the nature of your business, of the Hughes Hot Oil Company.

A. Well, Hughes Hot Oil Company, we service wells, we suck the BS off of pits to be disposed of, and just general oil field work as far as the maintenance of wells as far as paraffin, treating tanks, et cetera, et cetera.

Q. Are there a great number of these wells in the area?

A. Yes, sir.

Q. Do you have any idea how many wells actually within a 15-mile radius of Loco Hills?

A. I would say approximately 1500 wells in that area.

Q. Are many of these wells stripper wells?

A. Yes, sir, I would imagine a great number.

Q. How long is it -- have they had production in that area?

A. Oh, since the early '20s, I would say.

Q. Do the wells produce -- some of the wells produce water?

A. Yes, they do.

Q. Do you -- do you have any idea of what percentage of them produce water?

A. No, sir, I -- just -- almost all wells produce water. Some wells, though, the produced water is reinjected in water floods, stripper wells.

Q. What is done with this water, do you know?

A. At the present time they haul it to the Laguna Gatuna, the water disposal down in Lea County.

Q. Well, are all the operators required to dispose of the water in some manner?

A. Yes, sir, except just on your exception pits.

Q. Do you know of any commercial water disposal facilities in the immediate vicinity of Loco Hills?

A. No, sir, there's not one in the section.

Q. Where is the closest?

A. The Laguna. It's approximately 35 miles, I guess, from Loco Hills.

Q. Is a pit located in Township 20 South, Range 33 East?

A. Yes, sir.

Q. Which way is that from Loco Hills?

A. It's southeast.

Q. Do you have any knowledge of the cost of transporting oil -- or water to the Laguna disposal system?

A. Right. I have -- I have water hauled from a well that's approximately 8 miles south of Loco Hills area. It costs us around $1.35-40 cents a barrel to have it

hauled out of there and disposed of.

Q. Approximately $200 a load?

A. Right.

Q. And how far is the proposed site from your well in particular?

A. It's about 8 or 9 miles.

Q. Do you have any -- Mr. Westall, do you actually reside -- do you have your residence in Loco Hills?

A. Yes, sir, I do.

Q. Where do you obtain your water?

A. We obtain the water from Caprock Water Company. It comes from off the Caprock and is approximately 18 to 20 miles north-- east of Loco Hills. It's pipelined in.

Q. Do you -- where do the other residents of Loco Hills obtain water?

A. The same place. It's a utility.

Q. What charge -- what do they charge for water at Loco Hills?

A. They charge 10 cents a barrel.

Q. Do you have any idea about the cost of drilling a water well in the Loco Hills area?

A. There's -- there's not any fresh water wells in the vicinity of Loco HIlls, as such, even back in -- earlier, whenever they drilled cable tool holes. They did not

get any fresh water in that vicinity, according to the wells that I've checked it on.

Q. If there were available water, would it be economic to drill a well in light of the 10 cents a barrel charge?

A. Definitely. Because the water bill runs $30-to-$40.00 a month, you know, just on -- and very few people have a lawn out there at all.

Q. Mr. Westall, I hand you what has been referred to as Exhibit Two, and ask you to identify that.

A. Yes, sir, this is -- this is our proposed water disposal plant. We propose to have it where that we can run all produced water through three 500 barrel tanks, skimming all hydrocarbons off of it, and then going to further two 250 barrel tanks to take -- the skim the rest of the -- rest of the hydrocarbons that come out on it. Then we plan to go into two skim pits before we go into our major pits in order to take -- to get any of the other hydrocarbons that have been -- to keep them off the main pits, keeping all residue off the main pits.

Q. Now, referring to that diagram with the five circles, are they the tanks?

A. Right, they're the major tanks. Out here on the lefthand side we have our lines to where the

trucks hook up and pump them into the -- pump the water and hydrocarbons into our main tanks.

Q. How is that facility to the -- how is it to gauge the water that's taken from each truck?

A. Well, we'll have meters and we're going to be able to meter all the water that we put into tanks in order to keep up with how much water is disposed of.

Q. Referring to the left part of that exhibit, are the lines that are marked in red, is that where the meters will be located --

A. Right.

Q. -- input lines?

A. Yes, sir.

Q. And where is the highway?

A. It runs adjacent to it here on the west side of the stuff on the lefthand side.

Q. How far is this off of the highway?

A. This will be just approximately 100 feet off of it, where we have room to turn around.

Q. Do you plan to fence the area?

A. Yes. Our tanks, and also all the pits will have a fence around it, tank area and most of it around there will have a chain-link fence where they can't dispose directly into the pits. They'll have -- everything will have

to go through our tank and get it tested.

Q. What do you -- how many hours a day do you propose to operate the facility?

A. We will operate it, it will be a 24-hour a day facility and we will have a man on hand, somebody living right there at the facility.

Q. Do you know if the Laguna Gatuna facility, which you spoke of earlier, operates on a 24-hour facility -- basis?

A. No, they just came out with lately, they have a -- they have a letter that just came out where they just operate 12 hours a day, and if you have anything after 7:00, say, they operate 7:00 to 7:00, anything after 7:00 o'clock they -- it's an extra charge for them to come out and open up their facility so that you can dispose of fluids.

Q. Is there any need for disposal facilities between 7:00 p. m. and 7:00 a. m.?

A. Well, yes, sir. There's a lot of produced water that trucking outfits have to work on other projects in the day, as far as filling frac tanks, and everything else, and a lot of times the only time they get to haul this water is -- is after -- after dark.

Q. How many trucking companies operate in that immediate vicinity?

A. There's four to five.

Q. How many trucks do they operate between them?

A. I would say that there's probably sixty to seventy trucks in that area.

Q. Engaged in hauling water?

A. Hauling water, right.

Q. Where are these located, the companies?

A. There's Steve Carter in Maljamar; TNW in Loco Hills; we have Jim's Water Service in Riverside; then there's Broom's Water Service in Artesia, and also we get Western Oil Transportation out of (inaudible).

Q. Mr. Westall, from your experience and your living and operating in the area, is there a need for water disposal facilities in this vicinity?

A. Very much so.

Q. Is all of the water that's disposed of by various truckers put in Laguna?

A. No, sir. I know that over the years they've had many problems of them dumping it on the roads and in the barditches over the years.

Q. Is that a common practice?

A. Well, no, sir, not really, but it happens.

Q. Is INW one of the trucking companies, water trucking companies in the area?

A. They're in Loco Hills, right.

Q. Are there a number of small operators in this vicinity?

A. Yes, sir.

Q. Basically --

A. Independents.

Q. -- independents? More than major companies?

A. Probably so.

Q. Mr. Westall, in your opinion will the approval of this application prevent waste and protect correlative rights -- will prevent waste and be in the nature of an economic move for all of the operators?

A. Yes, I believe it will be.

Q. Do you have any knowledge as to whether or not this would in any way impair any fresh water in the area?

A. No, sir, there is not any in the area to impair.

Q. Do you feel that this will affect the rights of any of the offset operators or ranch operators?

A. No, sir.

Q. In your opinion will the installation of this project result in a greatly decreased cost, trucking cost, and prevent the premature abandonment of many marginal wells in the area?

A. Yes, sir, I do.

MR. JENNINGS: I believe that's all I have of this witness, but I would like to offer the exhibits Two, Three, and Four, and ask Mr. Westall, was Exhibit Number Two prepared by you, Mr. Westall?

A. Yes, it was.

MR. STAMETS: I'm going to accept these exhibits into evidence.

CROSS EXAMINATION

BY MR. STAMETS:

Q. You will be the operator of this facility?

A. Yes, sir.

Q. Would you have any objection to limiting the volume which could be disposed of in this facility to the theoretical volume which could be evaporated from the facility?

A. I don't know if it would be feasible to do such a thing. I feel like we could probably work something as such, but I don't know if we will have any more water than that or not. I don't know for sure. I really don't know if

we'll have that much water or more, you know.

Q. Okay, so under -- would you be willing? The first witness indicated the evaporation rate might to be expected to be 2000 to 2500 barrels per acre per month, and would you be willing to accept disposal limit of 2500 barrels per acre per month?

A. I believe that we could probably stay with that. I think that would work.

Q. All right.

MR. STAMETS: Are there other questions of this witness?

MR. KELLAHIN: If the Examiner please, I'd like the record to reflect that we reserve cross examination of Mr. Westall until the hearing on September 23rd.

MR. STAMETS: The record, I'm sure, reflects that.

This witness may be excused.

MR. JENNINGS: Mr. Examiner, could we take a ten minute, five minute break? I have one more witness to call?

(There followed discussion off the record.)

JACK CASE

being called as a witness and being duly sworn upon his oath, testified as follows, to-wit:

DIRECT EXAMINATION

BY MR. JENNINGS:

Q. Would you state your name, please?

A. Jack Case.

Q. What business are you in, Mr. Case?

A. Oil field service, transport, hot oil or fracing truck, fuel trucks.

MR. KELLAHIN: I'm sorry, Mr. Case, I didn't hear you. What do you do for a living, sir?

A. Work transports, tractor/trailer, rig haulers, hot oil units, vacuum trucks, and pump trucks.

Q. Are you associated with IW, IW, Inc.?

A. Yes, I am.

Q. What is your capacity, Mr. Case?

A. Part owner, vice-president, and manager.

Q. Do you have charge of the day-to-day operations of the business?

A. Yes, I do.

Q. Where is this business located, Mr. Case?

A. In Loco Hills.

Q. And where do you reside?

A. In Loco Hills.

Q. And how long have you so resided -- resided there?

A. I've worked in the field 31 years. I've lived all of that out there except about ten years I lived in Artesia; lived there, like, about 21 years.

Q. Do you haul -- as part of your business do you haul produced water?

A. Yes, I do.

Q. And do you have some idea of the number of wells in the -- let's say a 15 mile radius of Loco Hills?

A. I'd say 1000, 1500.

Q. Is it pretty heavily drilled?

A. Yes, it is, sir.

Q. Are they still drilling from time to time?

A. Still drilling.

Q. How many trucks do you have engaged in the actually hauling of -- hauling of the water that's produced in connection with production?

A. You're talking about produced water?

Q. Yes.

A. All right. We have 13 tractors and trailers and about two vacuum trucks that haul this produced water.

Q. When you are employed to dispose of water in a facility what disposition do you make of the water?

A. We haul it to this Laguna Pollution Control.

Q. Facility?

A. Yes.

Q. How far is that from Loco Hills?

A. It's about 35 miles.

Q. Is it -- what kind of roads do you have in the area?

A. Well, it's blacktop all except about two miles. Some of the blacktop is bad. 126 County Road south of Maljamar that we take down to the -- it's located on the Hobbs and Carlsbad highway, this pollution control.

The road going in is bad, about 2-mile dirt road, but that's about all we have.

Q. How long does it take a truck to go from assume Loco Hills to the location and -- and return?

A. It's three hours, the trip, unloading a load of water, and back to Loco Hills. It runs pretty close to that every trip.

Q. What is the normal charge for making that haul, Mr. Case?

A. Well, the price -- of course, we're regulated by the Corporation Commission, and it's $33.00 an hour plus 18 cents fuel charge, which runs about $38.00 an hour for a tractor and trailer.

Working by the hour, we do have some contract work that we do, like we draw up the contract by the barrel.

Q. Are there other facilities, other than Laguna Gatuna in the area?

A. No, sir. There's no other place to unload it.

Q. Is there production west of Loco Hills?

A. Yes, sir.

Q. Where is that -- is that -- is it necessary to take it to the same facility?

A. Yes. We haul anywhere from the Pecos River to Maljamar, in that area, and everything goes down there.

Q. Well, say from just west of the Pecos River, how much additional time would that take?

A. You're looking at another hour and a half travel time from over there.

Q. Is there any need, Mr. Case, for a water -- a water disposal facility during nighttime, after 7:00 p. m.?

A. Yes, sir, it would be nice. We do a lot of this at night. We have some jobs that come in during the day, rush jobs we do. All of our produced water is -- a lot of it we haul every day we can do any time of the day, and we do a lot of that at night.

Try to keep everything else caught up and then do our produced water hauling at night.

Q. Would there be substantial difference in the cost of hauling from the Loco Hills area to this proposed facility, than that charged at the Laguna Gatuna?

MR. KELLAHIN: Objection to the question I'm going to object to the word "substantial". If Mr. Jennings would like to ask this witness if he knows -- whether or not he knows if there's a cost differential, that would be fine.

MR. JENNINGS: We'll take Mr. Kellahin's advice.

A. Yes, sir, there would be a cost difference.

Q. Assuming that you have an 8-mile haul from some place within 8 miles of Loco Hills, what would be the difference in price of that haul and the haul to Laguna Gatuna, if you know?

A. Oh, here again, as I said, we're regu-

lated. We can bid on this, some of it, haul it 8 miles, everything is the same cost from 100 yards up to 8 miles, but you just do it by the hour, we've still got a 3-hour minimum. But we do, are forced to give them bids and contract this stuff, this would run like 60, 58 or 60 cents a barrel, plus whatever it costs to unload it or dispose of it.

Q. As against the other figure?

A. The three hour travel time plus the disposal fee.

Q. That would be in the nature of $1.40 or more?

A. Yes.

Q. Mr. Case, in your opinion is there a need for a facility in the Loco Hills vicinity?

A. Yes, sir, I'd -- I'd sure like to see one.

Q. Will it not affect your business in that you won't get these long hauls?

A. I figure I'll get more hauls by it being there, get a place to dispose of it.

Q. Explain your answer there.

A. Well, there's -- there's too many people, these small operators that can't afford that trip to Laguna. They'll do something else. On occasions they have plugged a

few wells because disposing of the water was more than what they could produce.

Q. In your opinion, do you feel that this will result in the saving for all operators in the Loco Hills area?

A. Yes, sir.

Q. Mr. Case, in your opinion would the installation of this facility prevent waste and prevent the premature abandoning of many wells in the Loco Hills area?

MR. KELLAHIN: I'm going to object to that question. Mr. Case has not testified in any way, nor Mr. Jennings attempted to qualify him as an expert on whether wells will be abandoned if the disposal charge is what is anticipated for this and what Laguna charges.

I think the man is able to testify as to the costs involved of trucking the water to the disposal area but I don't believe I've heard anything that qualifies this witness to determine whether a well is going to be abandoned or not.

MR. STAMETS: The objection is sustained.

Q. Mr. Case, assuming that we have a 10-barrel well, in the area that is producing a 100 barrels of water per day, what, in your opinion from your experience in the oil business and the trucking business, would it be

economic to continue to produce that well?

A. Well, a 10-barrel, you're looking at probably 100 -- $100 a day to dispose of the water. But really, at the price of oil, that's a pretty good well, 10 barrels of oil. I think probably on 10 barrels, it would.

Q. All right. Then again assume that you have a 2-barrel well?

A. No, that -- that would never pay. You could lose money on that every day.

MR. JENNINGS: I believe that's all.

MR. STAMETS: Any questions of this witness?

MR. KELLAHIN: I'm going to waive the right to recall Mr. Case. I don't believe it's necessary for him to return to the September 23rd hearing unless he desires to come to Santa Fe for a trip, or something.

MR. STAMETS: Mr. Chavez?

QUESTIONS BY MR. CHAVEZ:

Q. Mr. Case, my name is Frank Chavez. You said it would be still a 3-hour minimum charge for operators to use your facility in Loco Hills, the proposed facility, for the trucking charge?

A. Normally there is a 3-hour minimum on

everything. It's regulated by the Commission.

Q. So there would still be a 3-hour charge whether you took the water to Laguna or to your facility in Loco Hills?

A. Not necessarily.

It's like this gentleman here, which will probably do it now, he'll ask me for a bid, so I'll bid it the 8-mile, or 10, whatever it is. I'll charge 60 -- 60 cents a barrel for hauling it, which, whatever the disposal fee is. Right now I'm hauling it for about $1.40, but I'm sure he's going to wise up and I'm going to be hauling it for less than $1.00.

Q. Okay. How much of your bid work is -- how much hauling of brine water is by bid and how much is by flat rate?

A. About 50 percent. We've got lots of it that we don't haul maybe once a week or maybe once every two weeks, maybe just one load in that time, and they just pay by the hour and let it go at that.

MR. CHAVEZ: That's all I have.

MR. STAMETS: Any other questions of this witness? He may be excused, and he need not return on the 23rd unless he wants to.

If there is nothing further today, we

will continue this case until the September 23rd Examiner Hearing, where it will certainly be last on the docket.

Recess the hearing until 1:00 o'clock.

(Hearing concluded.)

C E R T I F I C A T E

I, SALLY W. BOYD, C.S.R., DO HEREBY CERTIFY that the foregoing Transcript of Hearing before the Oil Conservation Division was reported by me; that the said transcript is a full, true, and correct record of the hearing, prepared by me to the best of my ability.

Sally W. Boyd CSR

SALLY W. BOYD, C.S.R.
Rt. 1 Box 193-B
Santa Fe, New Mexico 87501
Phone (505) 455-7409

I do hereby certify that the foregoing is a complete record of the proceedings in the Examiner hearing of Case No. 7329, heard by me on 8-26 19 81.

Richard L. Stamets, Examiner
Oil Conservation Division

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
COMMISSION OF NEW MEXICO FOR
THE PURPOSE OF CONSIDERING:

CASE NO. 7329 DE NOVO
Order No. R-6811-A

APPLICATION OF LOCO HILLS WATER
DISPOSAL COMPANY FOR AN EXCEPTION
TO ORDER NO. R-3221, AS AMENDED,
EDDY COUNTY, NEW MEXICO.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 a.m. on July 14, 1982, at Santa Fe, New Mexico, before the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission."

NOW, on this 29th day of July, 1982, the Commission, a quorum being present, having considered the testimony presented and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That the applicant, Loco Hills Water Disposal Company, seeks an order permitting the installation of a commercial salt water disposal facility whereby salt water would be disposed of into 15 acres of unlined surface pits to be located in the SW/4 of Section 16, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico.

(3) That the matter came on for hearing at 9 a.m. on September 23, 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets and, pursuant to this hearing, Order No. R-6811 was issued on October 30, 1981, which denied Loco Hills Water Disposal Company's application.

(4) That on November 25, 1981, application for Hearing De Novo was made by Loco Hills Water Disposal Company and the matter was set for hearing before the Commission.

(5) That the matter came on for hearing de novo on July 14, 1982.

(6) That Order (3) of Division Order No. R-3221, as amended, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which would constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(7) That the aforesaid Order No. R-3221 was issued in order to afford reasonable protection against contamination of fresh water supplies designated by the State Engineer through disposal of water produced in conjunction with the production of oil or gas, or both, in unlined surface pits.

(8) That the State Engineer has designated, pursuant to Section 65-3-11 (15), N.M.S.A., 1953 Compilation, all underground water in the State of New Mexico containing 10,000 parts per million or less of dissolved solids as fresh water supplies to be afforded reasonable protection against contamination; except that said designation does not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination.

(9) That the applicant seeks an exception to the provisions of the aforesaid Order (3) of Division Order No. R-3221, as amended, to permit the commercial disposal of produced salt water into the aforesaid pits at the site described above.

(10) That the applicant proposes to install and operate an effective system, composed of holding and separating tanks, and a skimming pit, for the removal of oily and solid wastes from the waters to be disposed of into said system.

(11) That there is no fresh water in the immediate vicinity of said disposal system, but there are wells producing fresh water some nine miles south of the proposed disposal pits.

(12) That the native soils underlying said pits will permit the vertical percolation of some of the waters disposed of in said system.

(13) That the vertical percolation of waters from said system should not endanger any fresh waters.

(14) That to ensure that waters percolating from said pits move only vertically, monitor wells should be drilled in a pattern as shown on Exhibit "A" designed to detect horizontal movement of water from said disposal area.

(15) That in the event salt water is detected in any monitor well, Case No. 7329 should be reopened within 90 days to permit applicant to appear and show cause why the authority to use said pits for water disposal should not be rescinded.

(16) That the maximum volume of produced water to be disposed of through said system should not exceed 2500 barrels per acre per month.

(17) That a freeboard of a minimum of three feet should be maintained at all times.

(18) That the granting of the application will not cause waste or impair correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Loco Hills Water Disposal Company, is hereby authorized to install and operate a 15-acre commercial salt water disposal facility to be located in the SW/4 of Section 16, Township 17 South, Range 30 East, NMPM, Eddy County, New Mexico, said system to be limited to the maximum disposal of 2500 barrels per acre per month.

(2) That the operator shall install tanks and a skimming pit, sufficient to ensure that oil or other deleterious substances will not enter the disposal pits in harmful quantities.

(3) That a freeboard of a minimum of three feet will be maintained on all pits at all times.

(4) That monitor wells, as shown on Exhibit "A" attached to and made a part of this order, shall be drilled and equipped with perforated or slotted tubing/casing from a depth of four feet to total depth.

(5) That said monitor wells will be tested monthly to check for migration of the disposed salt water thereto and the results of these tests will be promptly delivered to the Artesia District Office of the Oil Conservation Division.

(6) That if disposed salt water is detected in any monitor well, Case 7329 will be reopened, within 90 days, to permit the applicant to appear and show cause why the disposal authority granted by this order should not be rescinded.

(7) That jurisdiction of this cause is retained for the entry of such further orders as the Commission may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

EMERY C. ARNOLD, Chairman

ALEX J. ARMIJO, Member

JOE D. RAMEY, Member & Secretary

S E A L

fd/

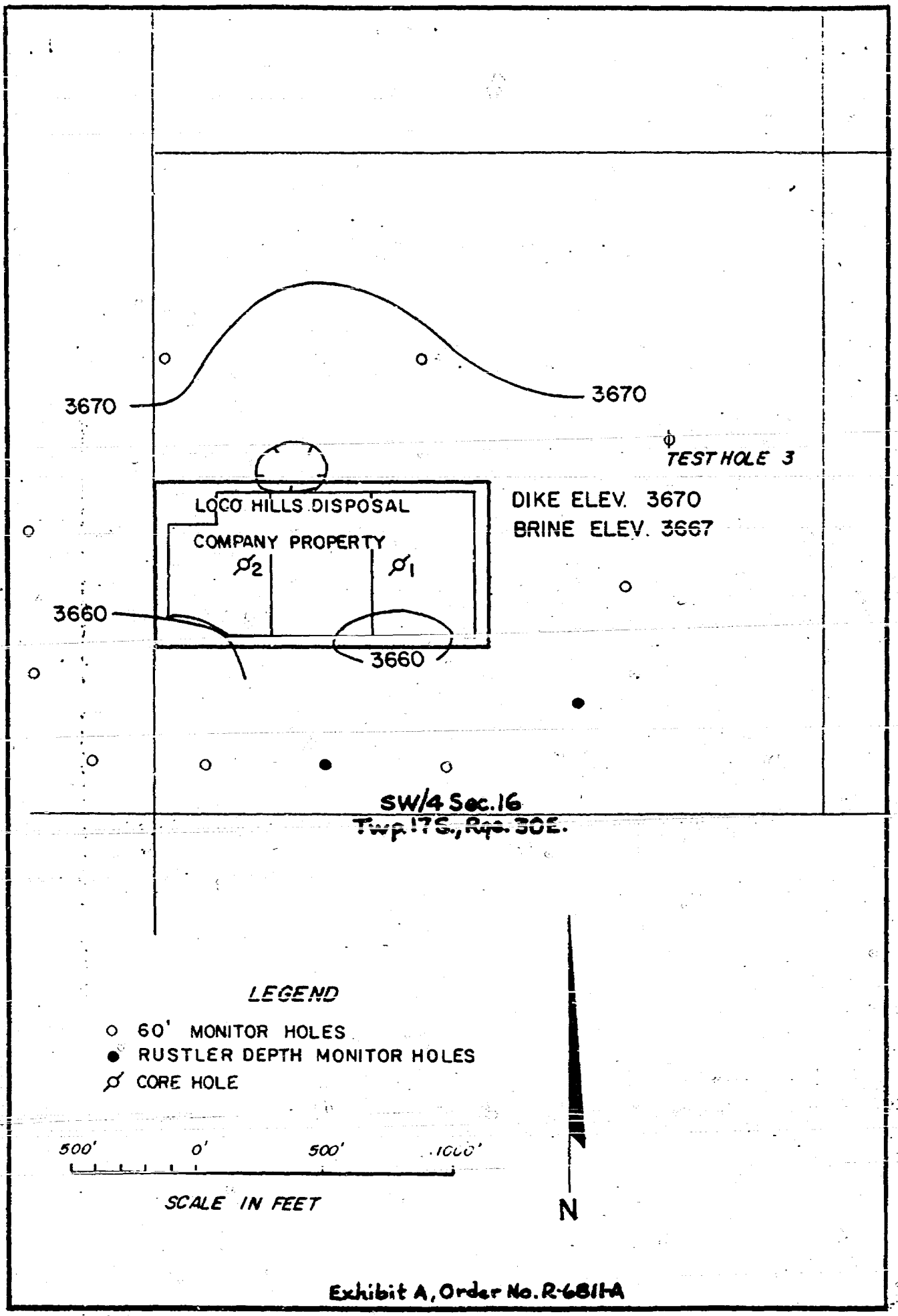


Exhibit A, Order No. R-6811-A

CASE 7359: Application of Energy Reserves Group for creation of a new gas pool and an unorthodox location, Roosevelt County, New Mexico.

Applicant, in the above-styled cause, seeks creation of a new Cisco gas pool for its Miller Com Well No. 1, located in Unit M of Section 12, Township 6 South, Range 33 East.

Applicant further seeks approval of an unorthodox location for its Miller "A" Well No. 1-Y, to be drilled 1800 feet from the South line and 1700 feet from the East line of Section 11 of the same township. The S/2 of said Section 11 to be dedicated to the well.

CASE 7345: (Continued from September 9, 1981, Examiner Hearing)

Application of Bass Enterprises Production Company for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Lovington Penn Pool underlying the N/2 NE/4 of Section 13, Township 16 South, Range 36 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7360: Application of L. J. Buck for salt water disposal, Lea County, New Mexico. Applicant, in the above-styled cause seeks authority to dispose of produced salt water into the Seven Rivers formation in the interval from 3221 feet to 3250 feet in his Monco Well No. 2 in Unit M of Section 25, Township 25 South, Range 36 East.

CASE 7352: (Continued from September 9, 1981 Examiner Hearing)

Application of Yates Petroleum Corporation for designation of a tight formation, Eddy County, New Mexico. Applicant, in the above-styled cause, pursuant to Section 107 of the Natural Gas Policy Act 18-CFR Section 271.701-705, seeks the designation as a tight formation of the Permo-Penn and formation underlying all of the following townships:

Township 17 South, Ranges 24 thru 26 East;

18 South, 24 and 25 East;

19 South, 23 thru 25 East;

20 South, 21 thru 24 East;

20½ South, 21 and 22 East;

21 South, 21 and 22 East;

Also Sections 1 thru 12 in 22 South, 21 and 22 East,

All of the above containing a total of 315,000 acres more or less.

CASE 7329: ~~(Readvertised)~~ (DE NOVO)

Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico

Applicant, in the above-styled cause, seeks an exception to Order No. R-3221 to permit the commercial disposal of produced brine into several unlined surface pits located in the N/2 SW/4 SW/4 of Section 16, Township 17 South, Range 30 East.

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

BRUCE KING
GOVERNOR

LARRY KEHOE
SECRETARY

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501
(505) 827-2434

October 30, 1981

Mr. James Jennings
Jennings, Christy & Copple
Attorneys at Law
Post Office Box 1180
Roswell, New Mexico 88201

Re: CASE NO. 7329
ORDER NO. R-6811

Applicant:

Loco Hills Water Disposal Company

Dear Sir:

Enclosed herewith are two copies of the above-referenced Division order recently entered in the subject case.

Yours very truly,

JOE D. RAMEY
Director

JDR/fd

Copy of order also sent to:

Hobbs OCD x
Artesia OCD x
Aztec OCD

Other Tom Kellahin

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 7329
Order No. R-6811

APPLICATION OF LOCO HILLS WATER
DISPOSAL COMPANY FOR AN EXCEPTION
TO ORDER NO. R-3221, AS AMENDED,
EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on September 23 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 30th day of October, 1981, the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That Order (3) of Division Order No. R-3221, as amended, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which would constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(3) That the aforesaid Order No. R-3221 was issued in order to afford reasonable protection against contamination of fresh water supplies designated by the State Engineer through disposal of water produced in conjunction with the production of oil or gas, or both, in unlined surface pits.

(4) That the State Engineer has designated, pursuant to Section 70-2-23 (15), NMSA, 1978 Compilation, all underground water in the State of New Mexico containing 10,000 parts per million or less of dissolved solids as fresh water supplies to be afforded reasonable protection against contamination; except that said designation does not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination.

(5) That the applicant, Loco Hills Water Disposal Company, seeks as an exception to the provisions of the aforesaid Order (3) to permit the commercial disposal of salt water into an unlined surface pit or pits containing from 5 to 15 surface acres to be located in the N/2 SW/4 SW/4 of Section 16, Township 17 South, Range 30 East, Eddy County, New Mexico.

(6) That disposal rates would be from 2000 to 2500 barrels per month per acre or from 1000 to 1250 barrels per day at the maximum pit size.

(7) That neither the pit(s) nor the immediate underlying sediments are impervious and a percentage of the disposed water would leak into the subsurface to enter the Santa Rosa and Rustler Anhydrite formations.

(8) That while the Santa Rosa formation contains no fresh water in the immediate vicinity of the proposed pit(s), it does contain fresh water at various locations both up-dip and down-dip therefrom.

(9) That clay zones within the Santa Rosa could contribute to the horizontal migration of waters percolating from said pits which waters could reach and contaminate down-dip fresh water supplies in said formation.

(10) That if the salt water from said pits should percolate vertically through the Santa Rosa formation, it would enter the Rustler formation and move therethrough in a generally Southward direction to the Pecos River.

(11) That insufficient data was presented relative to the long term effect of the disposal of salt water in the proposed pit(s) and its potential affect on surface and subsurface waters in the following areas:

(a) percolation rates;

(b) fluid retention by the Santa Rosa formation (volume and area);

(c) Rustler formation water quality outside the immediate area; and,

(d) the ground water regime vis-a-vis the Rustler formation and the Pecos River.

(12) That because of the potential for contamination of fresh water supplies in the Santa Rosa formation and because of insufficient data upon which to make reasonable determinations relative to the need for protection of or the long term effects upon waters in the Rustler formation or Pecos River, the subject application should be denied.

IT IS THEREFORE ORDERED:

(1) That the application of Loco Hills Water Disposal Company for approval of commercial surface salt water disposal facility, as an exception to Order (3) of Division Order No. R-3221, is hereby denied.

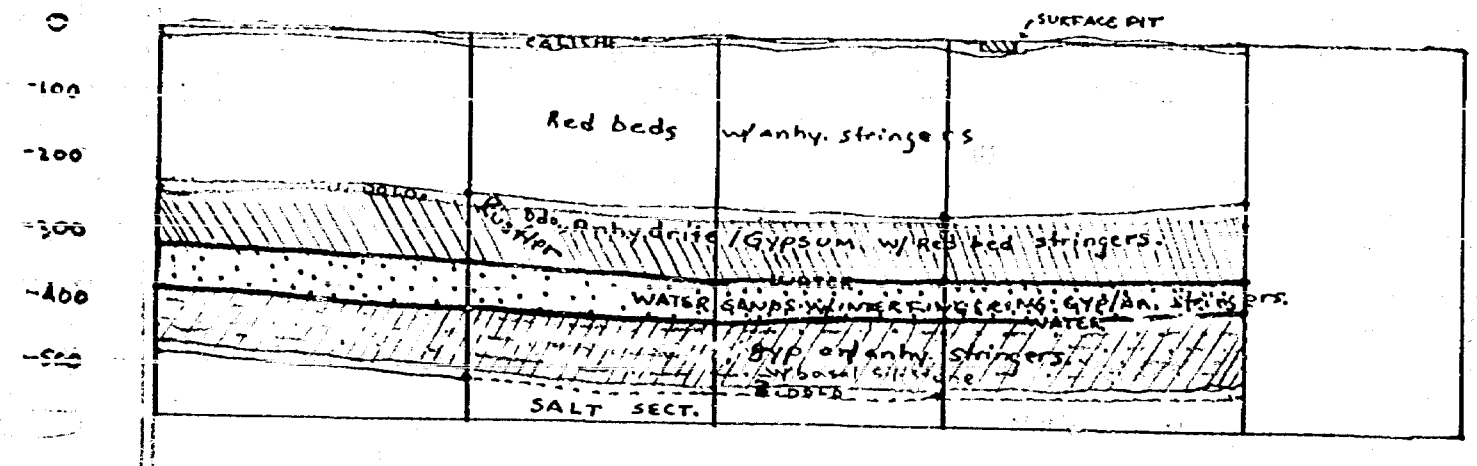
(2) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY,
Director

S



Rustler lithology 100' basal siltstone, gyp, & ss.

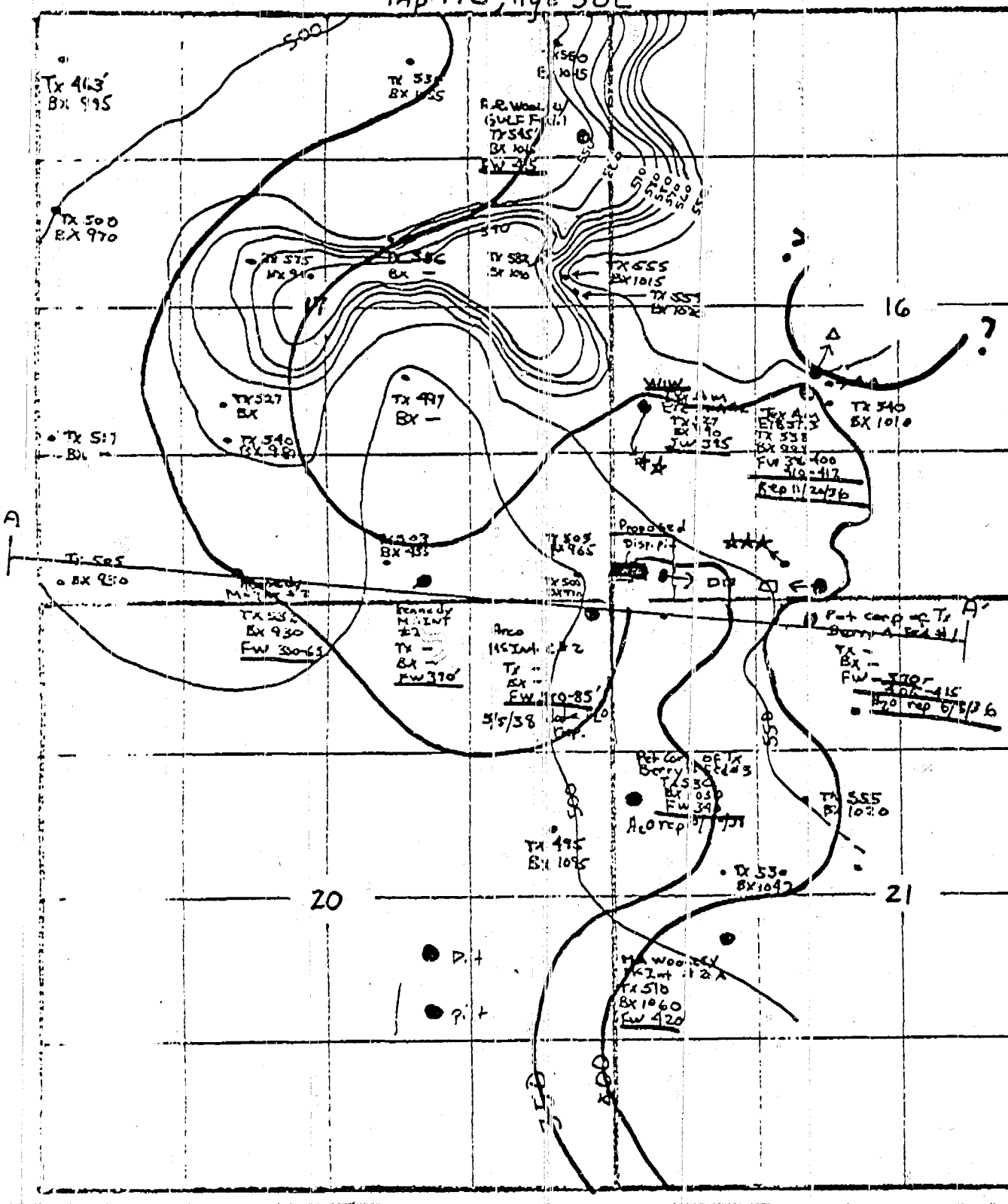
115' Middle member of gyp

lower vuggy culebra dolo.

Upper Magenta dolo.

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SEP 28 1981
OIL CONSERVATION DIVISION
SANTA FE

Twp 17S, Rge 30E



□ Tex. Am ETZ St. 1
Tx - 542
Bx - 990
FW - 390-412
410-415
Rep 2/13/36

□□ C.E. LARUE & B.W. MUNCY
McCollough St. #2.
Tx 530
Bx 1070
FW 345-355
REP 6/23/61

△ Tex Am
ETZ ST. 11
Tx 530
Bx 1005
FW 290-300
REP 11/21/65

△△ Tex Am.
ETZ ST. 24
Tx 533
Bx 1007
FW N/A

☆☆ Tex Am.
ETZ A ST. #16
Tx 523
Bx 1004
FW N/A

☆☆☆ Tex. Am.
ETZ ST 23
Tx 526
Bx 1002
FW N/A

LOC. OF PROPOSED DISPOSAL PIT.

— Contour on Lower H_2O.
— Contour on Upper H_2O.
— Contour on Top of Salt

Remarks: Cattle watered by Double Eagle & Yacca Water Cooperatives, also some stock ponds. No windmills / as per BW Weaver.

Salt H_2O rep. @ 395' ETZ St A #2 NW/SW J-WELL FILE

? 1968 SEO states Cls 2 4400 ppm. J-AS PER JM WRIGHT

H_2O rep. between M36 & M65. J-FILES

ALLEGED RE: KENNEDY [CATTLE WOULDN'T DRINK FROM H_2O WELL DRILLED BY CHART

An./Gyp. beds appx. 250' from surface.

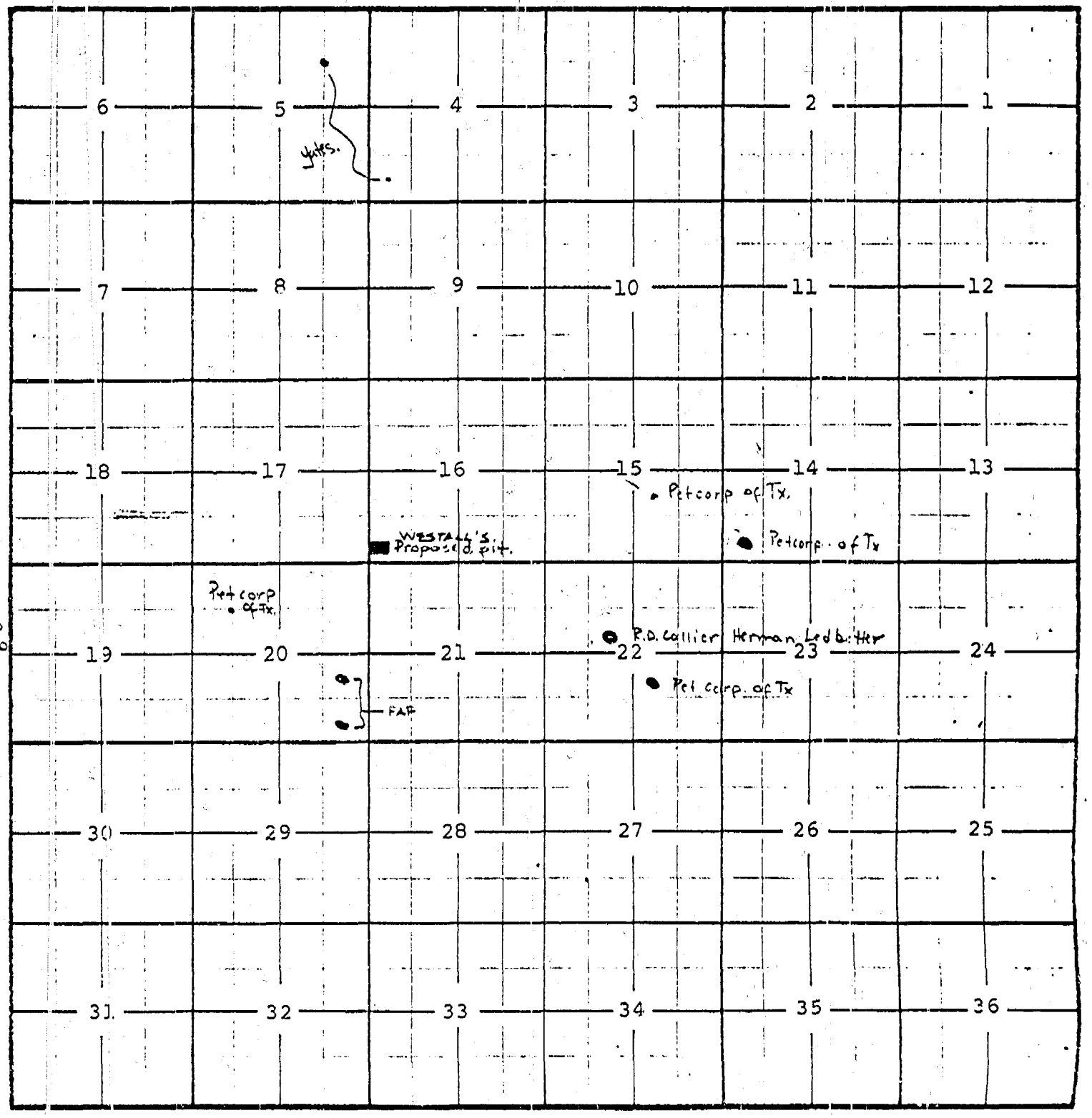
INFO. FROM WELL RECORD LOGS ETC.

BY LLB NMOCD DIST. II.

Gyp	C-21-17-30	250-295	Gyp	FROM DRILLERS LOGS. TOP OF RUSTLER
	L-21-17-30	285-420	An.	
	F-21-17-30	275-360	Gyp.	
	E-21-17-30	245-310	Gyp.	
	A-20-17-30	280-380	An.	
	H-20-17-30	315-495	An.	

Township 17 South Range 30 East

1 PITS APPROVED
2 EXCEPTIONS TO R-3221
3
4
5
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8
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10
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12
13
14 C-4179, R-3812, 8-14-69, Granted M-14-17-30
15
16
17
18
19
20 C-4182, R-3830, 8-27-69, Granted ltd 20-17-30
21 C-4440, R-4130, 3-23-71, Granted lt-21-17-30
22 C-4551, R-4242, Granted 5-10-70, F-22-17-30 J-22-17-30
23
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36



LAW OFFICES OF
JENNINGS & CHRISTY
1012 SECURITY NATIONAL BANK BUILDING
P.O. BOX 1180
ROSWELL, NEW MEXICO 88202-1180

TELEPHONE 622-8432
AREA CODE 505

JAMES T. JENNINGS
SIM B. CHRISTY III
K. DOUGLAS PERRIN
PHIL T. BREWER
DAMON RICHARDS

October 1, 1982

Mr. Joe D. Ramey, Director
Oil Conservation Division
P. O. Box 2088
Santa Fe, NM 87501

RECEIVED
OCT - 7 1982
OIL CONSERVATION DIVISION
SANTA FE

Re: Loco Hills Water Disposal Project
Case No. 7329 De Novo
Order No. R-6811-A

Dear Joe:

In compliance with the Order entered in the above case on July 29, 1982, the Applicant Loco Hills Water Disposal Company has drilled, completed and equipped the monitor wells shown on Exhibit "A" attached to and made a part of the Order, and to complete your files I am enclosing herewith a copy of the Ed Reed & Associates, Inc., report reflecting the drilling and completion, lithology, water levels and water samples in connection with the compliance with the Order.

I might add that Loco Hills has started using the facilities.

I sincerely hope that you find the enclosed material in order and if you have any questions, please call me.

Yours very truly,

JENNINGS & CHRISTY

James T. Jennings
JTJ/jb
Encl.
cc: Loco Hills Water Disposal Co.

Ed L. Reed and Associates, Inc.

Consulting Hydrologists

MIDLAND - CORPUS CHRISTI

TEXAS

Ed L. Reed, P.E.
PRESIDENT

A. Joseph Reed
EXECUTIVE VICE PRESIDENT

Chester F. Skrabacz
VICE PRESIDENT FIELD OPERATIONS

1109 N. Big Spring
Midland, Texas 79701
915 682-0556

V. Steve Reed
VICE PRESIDENT GEOLOGY

Oil Industries Bldg.
Suite 315
723 Upper N. Broadway
Corpus Christi, Texas 78403
512-883-1353

September 19, 1982

RECEIVED
SEP 24 1982
JENNINGS & CHRISTY

Mr. James T. Jennings
Jennings & Christy
P.O. Box 1180
Roswell, New Mexico 88201

Re: Loco Hills Water Disposal Comapny

Dear Mr. Jennings:

Pursuant to Oil Conservation Commission of New Mexico Order No. R-6811-A, Item 4 and Exhibit A, construction of ten (10) monitor holes surrounding proposed disposal pits to be operated by Loco Hills Water Disposal Company was begun on September 7, 1982 and completed on September 10, 1982. These monitor holes are located in the SW/4 of Section 16, and SE/4 of Section 17, T17S, R30E, Eddy County, New Mexico. The approximate position of the monitor holes are shown on attachment A. As required by the Commission, eight holes were drilled to 60' and two were drilled into the Rustler Formation.

Drilling And Completion

All of the holes were drilled using a 6-3/4" rock bit and completed with 4" Schedule 40 PVC. The two Rustler depth monitor holes, #1 and #3, were drilled utilizing water. The shallower 60' holes, #2, 4, 5, 6, 7, 8, 9, and 10 were drilled with air. Monitor holes #1 and #3 were drilled to sub-surface depths of 272' and 244' respectively. The Rustler Formation, characterized in its upper part by anhydrite, was encounted at 270' in monitor hole #1 and at 239' in monitor hole #3.

All monitor holes with the exception of monitor hole #1 were completed with slotted perforations from about four feet to their total depth. Monitor hole #1 was completed with slotted perforations from ten feet to total depth. The casing was cemented from surface to a depth of three to four feet in each hole.

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Lithology

Lithologic samples were collected every ten feet in each hole and have been described. The sample descriptions and lithologic and completion logs are shown in attachment B. These logs indicate a wide range of discontinuous facies across the site. Calcareous sand was encountered to a depth ranging from five to ten feet. This was followed by sandy clay/clayey sand, silty sand, silty clay or sand to total depth. These facies correlate poorly in the shallow holes; somewhat better correlation is seen at depths greater than 100 feet. This wide range of discontinuous lateral facies indicates that water should migrate vertically to the top of the Rustler Formation.

Water Levels

Each monitor well was inspected for presence of fluids on 10 September 1982. These inspections were conducted by Larry Brooks of the Oil Conservation Division and J. R. Jones, a geologist with Ed L. Reed and Associates. All shallow 60' monitor holes were dry. In the deeper, water drilled holes (#1 and #3), small amounts of mud was observed in the lower 5 to 10 feet. The conclusion reached by the drilling team, with the Oil Conservation Division representative concurring, was that the moisture is residual drilling fluid and sediments remaining in the hole which could not be jetted. This moisture should eventually disappear.

Water Samples

Samples of water used to drill monitor holes #1 and #3 were collected. This water was obtained from the Loco Hills public supply. Samples of the mud remaining in the bottom of monitor holes #1 and #3 were also obtained using an open bailer. Analysis of these two samples will be compared to the sample of drilling water. This should confirm that the moisture present is, in fact, drilling fluid. The results of these analyses will be forwarded as soon as they are complete.

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SANTA FE

Oil Conservation Division Participation

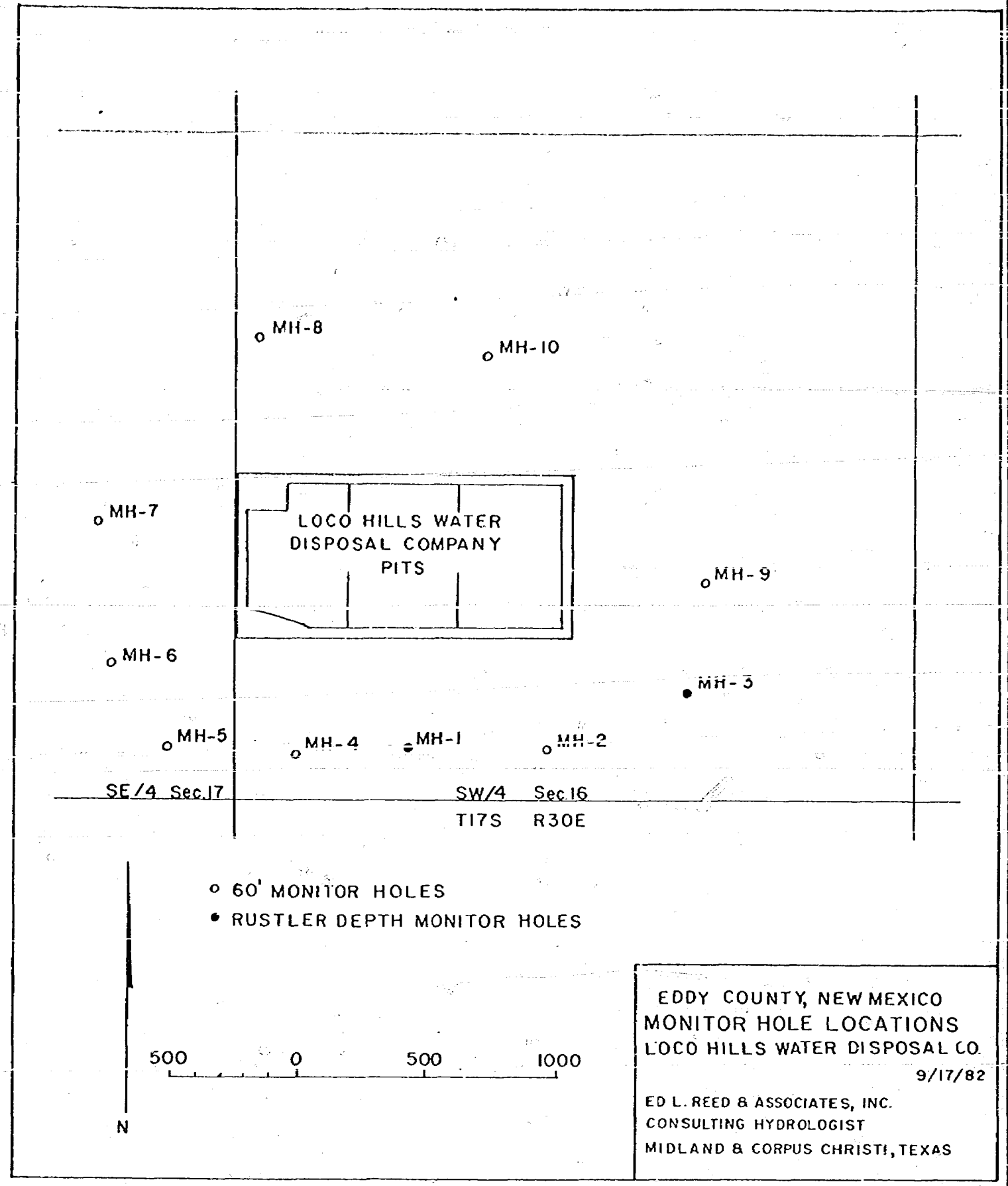
Visits to the drilling site by Larry Brooks and B. F. Weaver, both representing the Oil Conservation Division, were conducted throughout the drilling and completion period. At each visit, the representatives were provided information on locations, depths and completion of the monitor holes.

Very truly yours,

James R. Jones

JRJ:ljs
Enclosures

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SANTA FE



ATTACHMENT A

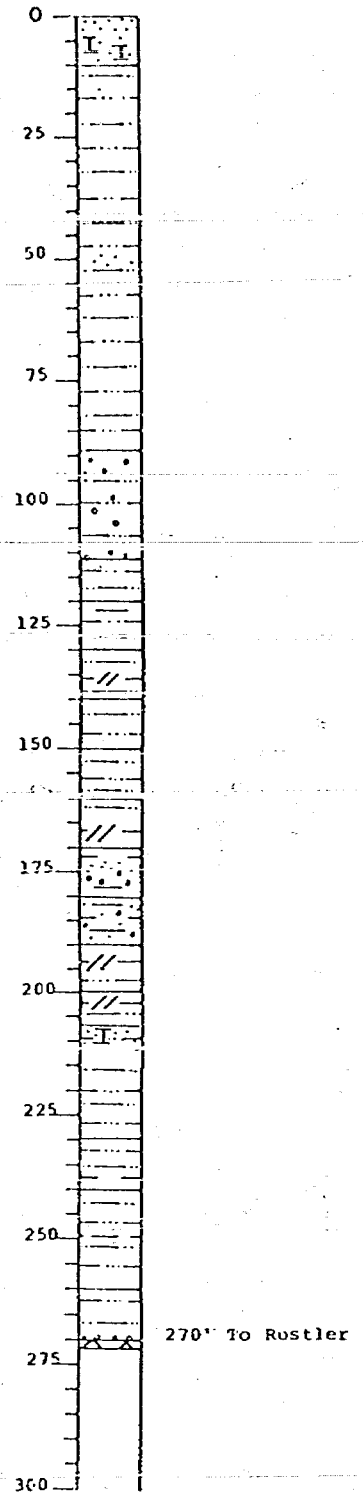
WELL NUMBER MH-1

TOTAL DEPTH 272'

CLIENT Loco Hills

DATE 9/9/82

LITHOLOGIC LOG



COMPLETION LOG



KEY

- PERFORATIONS
- CEMENT
- SAND
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SILTY SAND
- CALCAREOUS SAND
- GRAVEL
- ANHYDRITE
- SILT
- SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

CLIENT Loco Hills Water Disposal Co. S.W.L. Dry 9/9/82 after jetting

LOCATION 680' FWL 210'FSL SW/4 Sec.16 T17SR30E, Eddy Co. N.M. CASING 4" PVC, 272.3'

DATE 9/7/82 PERFORATIONS 10'-270' 6-3/4"/1.5', 1/8 wid

WELL NUMBER MH-1 (Rustler Depth) DRILLER L. Scarborough

ELEVATION 3661'

6-3/4' bit, drilling with water (60-90 cl- ppm, field test)

Location 7' NW of stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	50% quartz sand, multicolored, coarse grain, rounded to subrounded, 50% sandstone caliche, white calcareous.	Good
10-20	60% Argillaceous sand, quartz sand, rounded to sub-rounded coarse grained, reddish brown.	Poor
20-30	As above, finer grains.	Poor
30-40	Argillaceous sand, F-M grained, sub-rounded, reddish brown.	Poor
40-50	As above; sub-rounded, sub-angular; trace sandstone.	Poor
50-60	As above; frosted grains.	Poor
60-70	Sandy clay; fine grained, rounded to sub-rounded, reddish brown. Some clay.	Poor
70-80	Sandy clay and clay; reddish brown, fine grained sub-rounded, sub-angular. Quartz grains are multicolored.	Poor
80-89	Sandy clay; reddish brown, quartz fine grained.	Poor
89	Driller reports gravel	
89-100	Gravel, sandy Bentonitic clay, 80% cryptocrystalline multicolored coarse gravel, 20% sandy clay and sand.	Fair
100-110	Sandy clay; coarse to fine grained quartz, multicolored grains. Some minor interbedded gravel and calareous sandstone.	Poor-Fair
111	Driller reports base of gravel.	
110-120	Sandy clay; reddish brown.	Poor
120-130	Sandy clay and clay; reddish brown, fine grained.	Poor
130-140	Slightly sandy, silty clay; reddish brown and more compact than above.	Poor
140-150	Slightly sandy clay; reddish brown, fine to medium grained quartz, multicolored grains, sub-angular.	Poor
150-160	As above, more compact.	Poor
160-170	Slightly silty to sandy clay; reddish brown, not as compact as 150-160.	Poor
170-180	Clay, sand and gravels; reddish brown; coarse to medium grained multicolored quartz sand angular gravel, some sandstone with a calcareous matrix.	Poor-Fair
180-190	As above with more clay.	Poor
190-200	Sandy to silty clay; reddish brown, medium to very fine grained, compact.	Poor
200-207	As above.	Poor
207-212	Sandy clay and sandstone with calcareous matrix and sand; reddish brown to white.	Poor
212-220	Sandy clay; reddish brown, coarse to medium grained, angular to sub-angular, multicolored quartz grains.	Poor
220-230	Same as above.	Poor
	CONTINUED ON NEXT PAGE	

CLIENT Loco Hills Water Disposal Co. S.W.L.

LOCATION CASING

DATE 9/7/82 PERFORATIONS

WELL NUMBER MH-1 (Rustler) DRILLER

ELEVATION

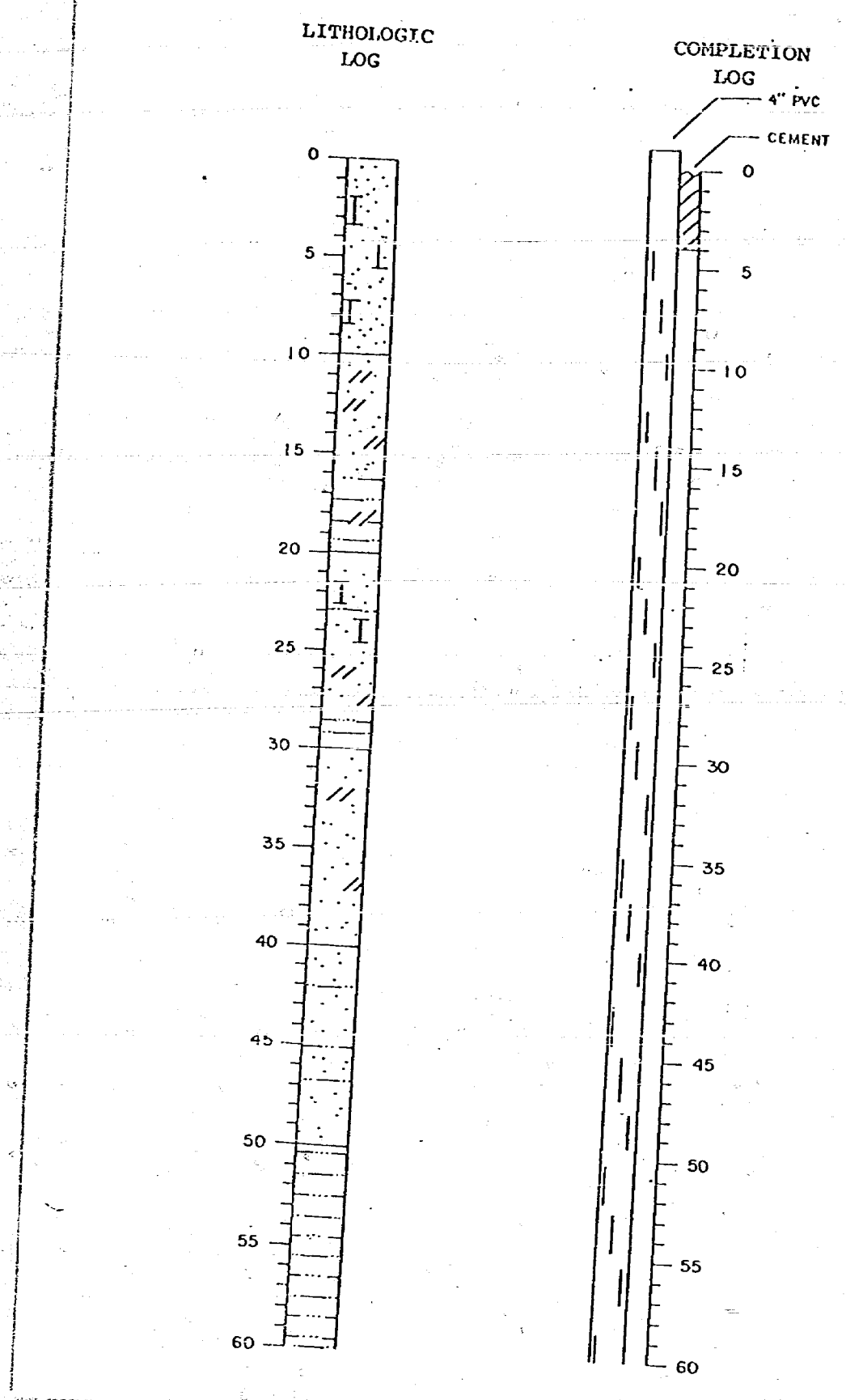
INTERVAL	DESCRIPTION	POROSITY
230-240	Clay, sandy clay, sand, gravel; reddish brown clay and sandy clay, gravels are angular and multicolored.	Poor
240-250	Sandy clay; reddish brown minor amounts of coarse grained multicolored quartz sand at 248'.	Poor-Fair
250	Driller reports "Stickey clay".	
250-260	As above.	Poor
260-270	As above.	Poor
	Top Rustler 270', gravel and anhydrite "powder"	
	Total Depth 272'	
	Cemented surface to 3.0'	
	Total jetting time 40 minutes. Drilling fluid and mud produced for 3-1/2 minutes. Last 36-1/2 minutes nothing produced.	

WELL NUMBER MH-2

TOTAL DEPTH 60'

CLIENT Loco Hills

DATE 9/8/82



ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION 1,200' FWL 200' FSL SW/4 Sec.16 T-17S, R30E, Eddy Co., N.M.
DATE 9/8/82
WELL NUMBER MH-2
ELEVATION ±3,663'

S.W.L. Dry
CASING 4" PVC, 62.1'
PERFORATIONS 4' to TD, 6-3/4"/1.5', 1/8" wide
DRILLER L. Scarborough

6-3/4" bit drilled with air. Location 45' WNW of stake

INTERVAL	DESCRIPTION	POROSITY
0-10	Sand and sandstone with calcareous (caliche) matrix; quartz grains medium to fine, sub-angular, pink to white.	Fair-Good
10-20	Sand, silt, silty clay; reddish brown, quartz fine grained sub-angular to sub-rounded.	Poor
20-30	Sand and sandstone or silt; reddish brown, quartz grains medium to fine, sub-angular to sub-rounded, frosted, some clay matrix.	Poor
30-40	80% sand fine grained and silt; reddish brown, loose, rounded to sub-rounded.	Poor
40-50	Sand; minor clay; reddish brown, sub-angular to sub-rounded, medium to fine grained, clay matrix.	Poor
50-60	Clayey sand; reddish brown, sub-rounded, frosted. More compact than above, slightly bentonitic.	Poor
	Total Depth 60'	
	Cemented from surface to 4'.	

WELL NUMBER MH-3

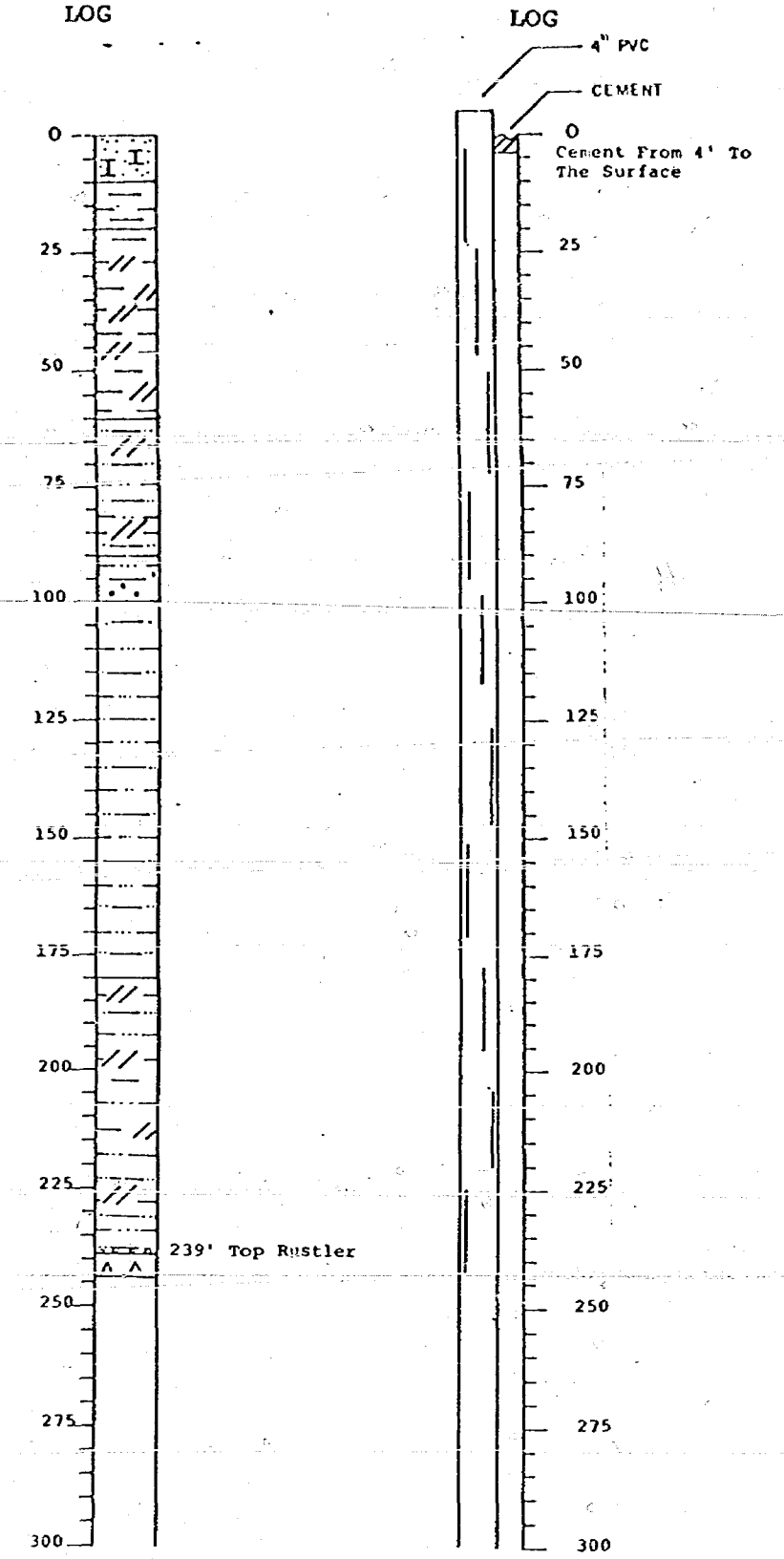
TOTAL DEPTH 244'

CLIENT Loco Hills

DATE 9/8/82

LITHOLOGIC LOG

COMPLETION LOG



KEY

PERFORATIONS

CEMENT

SAND

CLAY

SANDY CLAY OR CLAYEY SAND

SILTY SAND

CALCAREOUS SAND

GRAVEL

ANHYDRITE

SILT

SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

CLIENT Loco Hills Water Disposal Co.
LOCATION 870'FEL, 430'FSL, T17S, R30E SW/4 Sec. 16, Eddy Co. N.M.
DATE 9/8/82
WELL NUMBER MH-3, Rustler Depth
ELEVATION 3,664'

S.W.L. Dry, 9/9/82 after jetting
CASING 4" PVC 243.4'
PERFORATIONS 4' to TD 6-3/4"/1.6',1/8"wide
DRILLER L. Scarborough

6-3/4" bit, drilled with water, Location 10' N of stake,

INTERVAL	DESCRIPTION	POROSITY
0-10	Quartz sand stone in calcareous matrix and sand; pink to red, angular to rounded, fine to medium grained, frosted.	Good-Fair
10-20	Clayey sand (Argillaceous sand) fine to medium grained, sub-rounded multicolored quartz grains. Reddish brown clay.	Poor
20-30	Silty clay; rounded to sub-rounded fine quartz grains, reddish brown.	Poor
30-40	As above; sub-angular.	Poor
40-50	As above; sub-angular, bentonitic clay.	Poor
50-60	As above.	Poor
60-70	Sandy to silty clay; reddish brown, medium to fine grains sub-angular, frosted, bentonitic clay.	Poor
70-80	As above.	Poor
80-90	As above, slightly more silty.	Poor
90-100	Sandy clay, clay and gravel; reddish brown sub-angular gravels, red to dark brown gravels about 1/4". Gravel at 99'.	Poor
100-110	Clayey sand; fine to medium grained, sub-angular to angular, multicolored quartz grains. Reddish brown.	Poor
110-120	Sandy clay; reddish brown bentonitic clays poorly sorted angular quartz grains. Reddish to pink to white grains.	Poor
120-150	As 100-110, some clay between 140-150.	Poor
150-160	As 100-110.	Poor
160-180	Sandy clay; reddish brown, compact bentonitic.	Poor
180-190	Silty to sandy clay; reddish brown; some coarse quartz grains, angular to sub-rounded, poorly sorted.	Poor
190-200	As above.	Poor
200-210	As above.	Poor
210-220	As above.	Poor
220-230	As above.	Poor
230-240	Silty clay, clay and anhydrite. Anhydrite at 239'. 239-244' anhydrite; white powder, alkaline taste.	Poor
	Total Depth 244'	
	Total jetting time 40 minutes. Drilling fluid and mud produced for 10 minutes. Last 30 minutes nothing produced.	
	Cemented from surface to 4'.	

WELL NUMBER MH-4

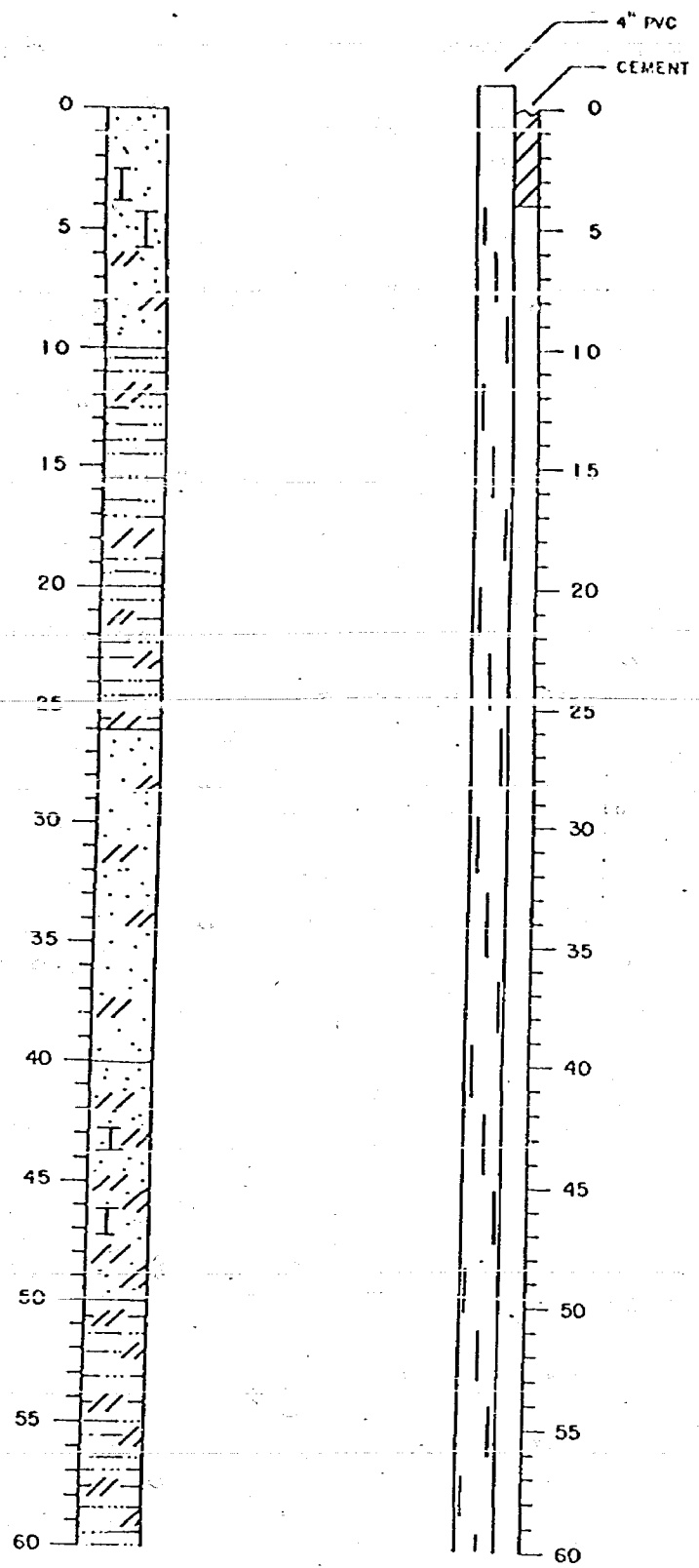
TOTAL DEPTH 60'

CLIENT Loco Hills

DATE 9/9/82

LITHOLOGIC LOG

COMPLETION LOG



KEY

PERFORATIONS

CEMENT

SAND

CLAY

SANDY CLAY OR CLAYEY SAND

SILTY SAND

CALCAREOUS SAND

GRAVEL

ANHYDRITE

SILT

SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION 236'FWL, 180'FSL SW/4 Sec.16 T17S, R30E., Eddy Co., N.M.
DATE ~~9/9/82~~
WELL NUMBER MH-4 shallow
ELEVATION ± 3,657'

S.W.L. Dry
CASING 4" PVC 61.5'
PERFORATIONS 4' to TD 6-3/4"/1.5', 1/8" wide
DRILLER L. Scarborough

6-3/4" bit, drilled with air, location is 31' east of stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	Caliche, sandstone with calcareous matrix, silt and sand.	
10-20	white to reddish brown, rounded to sub-rounded quartz grains.	Poor
20-26	Sandy to silty clay to clayey sand; reddish brown, fine to medium grains, sub-rounded, indurated, almost a shale.	Poor-Fair
26-30	Same as above.	
30-40	Silty sand; reddish brown to pink. Fine to medium quartz grains in sand, some caliche.	Fair
40-50	Silty sand; reddish brown, fine grained sub-rounded to sub-angular, frosted, well sorted.	Fair
50-60	As above, more silt and some caliche gravel.	Fair
	Silty clay and sand; reddish brown to maroon, fine to medium grained multicolored quartz, frosted sub-rounded to rounded.	Poor
	Total Depth 60'	
	Cemented from surface to 4'.	

L. REED & ASSOCIATES, INC.
SULTING HYDROLOGISTS
ND-CORPUS CHRISTI, TEXAS

Page

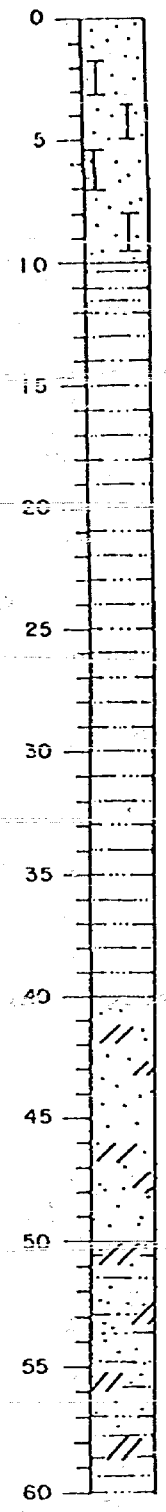
WELL NUMBER MH-5

TOTAL DEPTH 60'

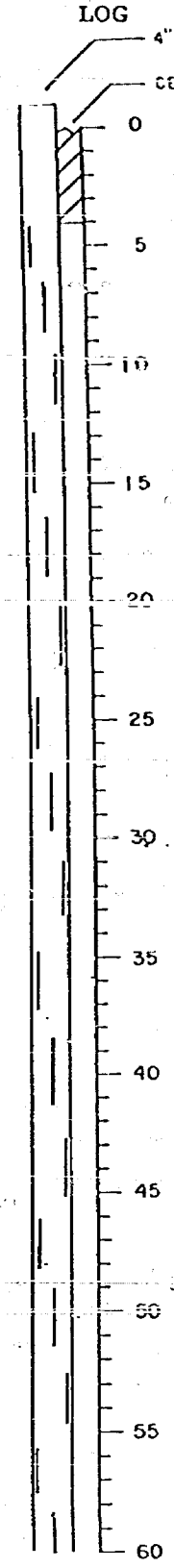
CLIENT Loco Hills

DATE 9/9/82

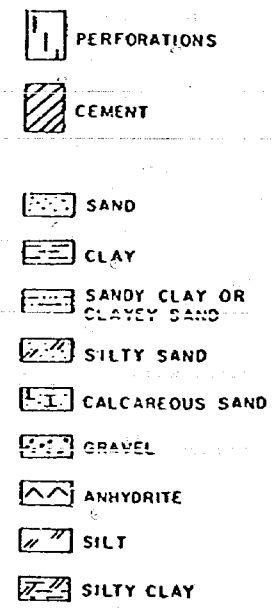
LITHOLOGIC LOG



COMPLETION LOG



KEY



ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L. Dry

LOCATION 260'FEL, 210'FSL, SE/4 Sec.17 T17S, R30E, Eddy Co. N.M. CASING 4" PVC 61.5'

DATE 9/9/82 PERFORATIONS 4' to TD. 6-3/4"/1.5, 1/8" wide

WELL NUMBER MH-5 DRILLER L. Scarborough

ELEVATION ±3,648'

6-3/4" bit, drilled with air, location 17' west of stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	Caliche, sandstone with calcareous matrix; white to pink.	Fair
10-20	Clayey sand; reddish brown, fine quartz grains, sub-rounded.	Poor
20-40	Clayey sand; reddish brown, fine grained rounded to sub-rounded, to sub-angular, frosted.	Poor
40-50	Silty sand; sub-angular to sub-rounded, medium sorting, reddish brown to pink.	Good-Fair
50-60	Silty clay and silty sand; red to brownish red, very fine to fine grained quartz.	Good-Fair
	Total Depth 60'	
	Cemented from surface to 4'.	

WELL NUMBER MH-6

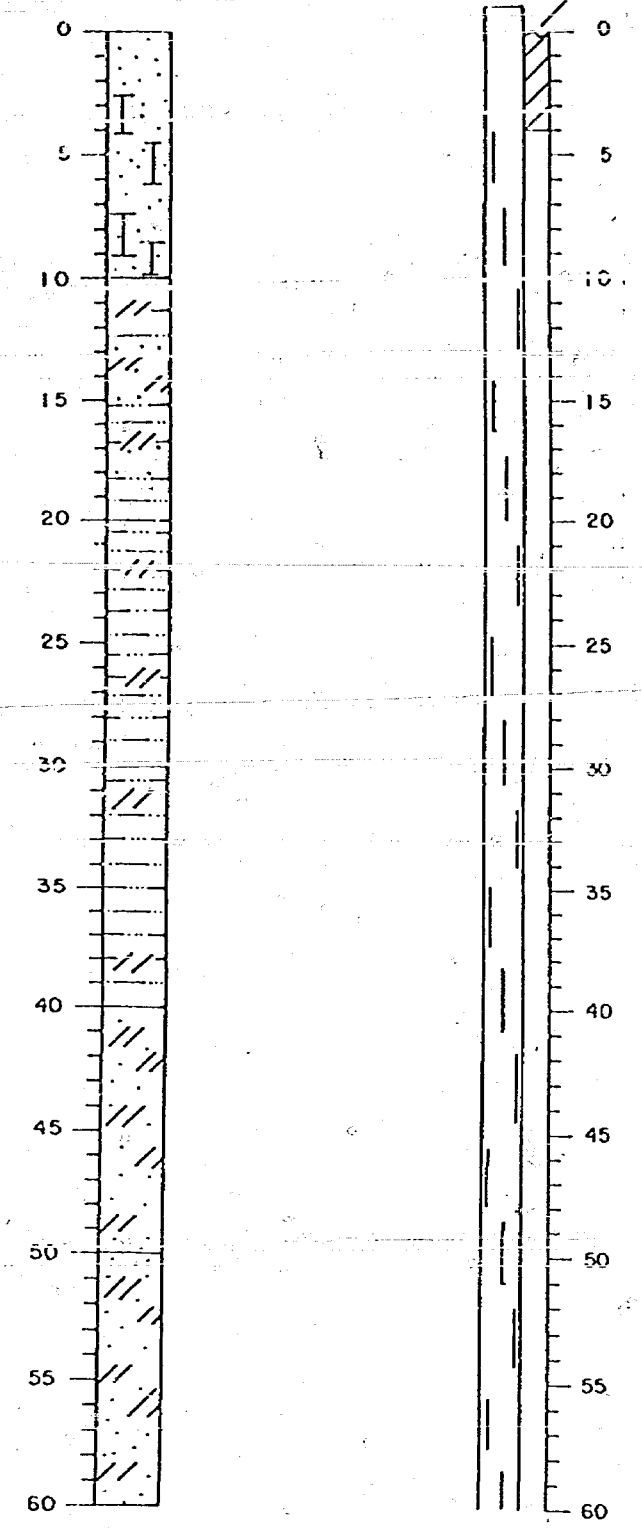
TOTAL DEPTH 60'

CLIENT Loco Hills

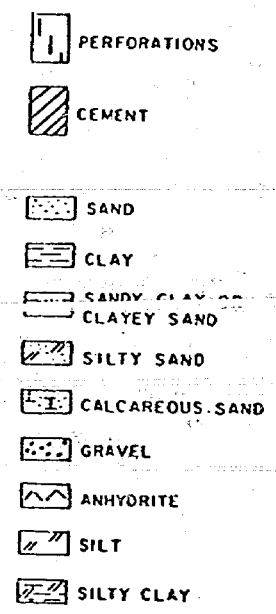
DATE 9/9/82

LITHOLOGIC LOG

COMPLETION LOG



KEY



ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION 470'FEL, 540'FSL, SE/4 Sec.17 T17S, R30E, Eddy Co. N.M.
DATE 9/9/82
WELL NUMBER MH-6
ELEVATION ± 3,657'

S.W.L. Dry
CASING 4" PVC 61.5"
PERFORATIONS 4' to TD, 6-3/4"/1.5', 1/8 wid
DRILLER L. Scarborough

6-3/4" bit, drilled with air.
Location 7' west from stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	Caliche, sandstone with caliche matrix. Some silt and sand. Pink to white.	Fair
10-20	Clayey sand and silt; reddish brown sub-rounded fine quartz grains.	Poor
20-30	Silty sand, clayey sand; reddish brown; fine grained quartz; sub-rounded, frosted.	Poor-Fair
30-40	Clayey sand to sandy silty clay; reddish brown. Darker than 20-30. Sub Angular frosted quartz.	Poor
40-50	Silty sand; pinkish to reddish brown, sub-rounded, fine grained quartz.	Fair
50-60	As above, slightly finer grained, more silt, slightly darker.	Fair
	Total Depth 60'	
	Cemented from surface to 4'.	

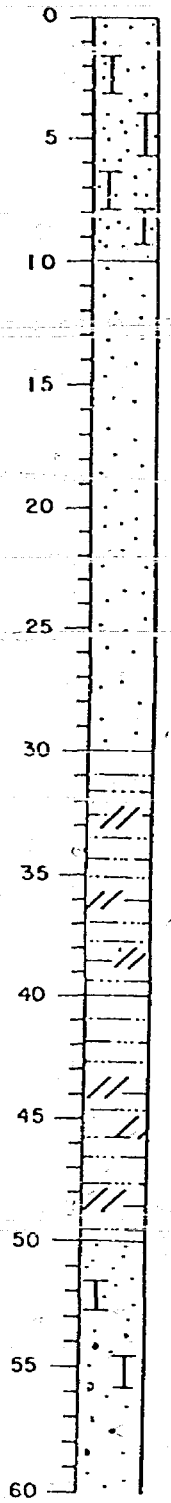
WELL NUMBER MH-7

TOTAL DEPTH 60'

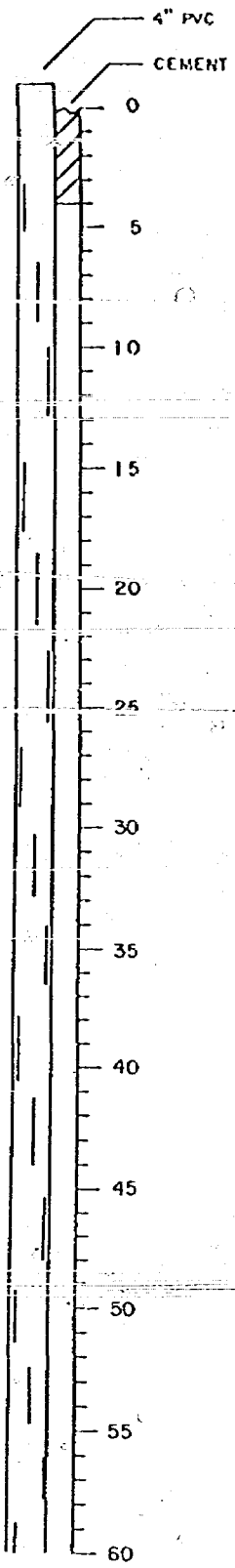
CLIENT Loco Hills

DATE 9/9/82

LITHOLOGIC LOG



COMPLETION LOG



KEY

PERFORATIONS

CEMENT

SAND

CLAY

SANDY CLAY OR CLAYEY SAND

SILTY SAND

CALCAREOUS SAND

GRAVEL

ANHYDRITE

SILT

SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

CLIENT Loco Hills Water Disposal
LOCATION 531'FEL, 1090'FSL, SE/4 Sec.17 T17S, R30E, Eddy Co. N.M.
DATE 9/9/82
WELL NUMBER MH-7
ELEVATION 3,664'

S.W.L. Dry
CASING 4" PVC 61.3'
PERFORATIONS 4' to TD 6-3/4"/1.5',1/8" wide
DRILLER L. Scarborough

6-3/4" bit, drilled with air, 4' S.E. from the stake.

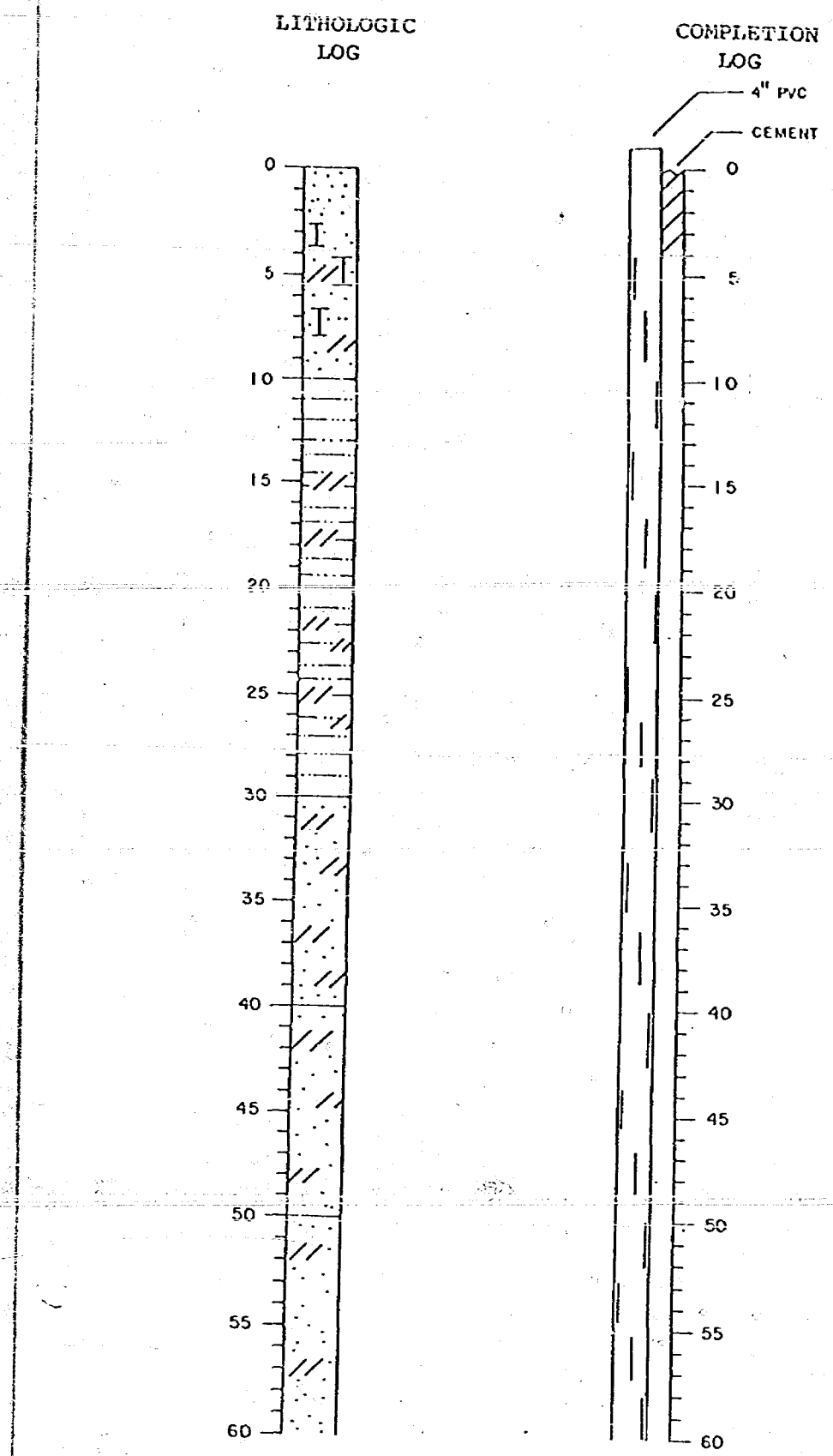
INTERVAL	DESCRIPTION	POROSITY
0-10	Caliche and sandstone with calcareous matrix, white to pink.	Fair
10-20	Quartz sand; pink to reddish brown, sub-angular grains fine grained, minor sandstone.	Fair
20-30	Quartz sand; fine grained, sub-angular, multicolored, well sorted. Tan to pink, frosted.	Good
30-40	Silty to sandy clay; reddish brown, minor caliche.	Fair-Poor
40-50	Silty to sandy clay, brown to reddish brown.	Poor
50-60	Quartz sand, gravels and sandstone. Fine to medium grains in sand, sub-rounded to angular multicolored quartzite gravel up to 3/8". Some caliche.	Good
	Total Depth 60'	
	Cemented from surface to 4'.	

WELL NUMBER Mli-8

TOTAL DEPTH 60'

CLIENT Loco Hills

DATE 9/9/82



KEY

PERFORATIONS

CEMENT

SAND

CLAY

SANDY CLAY OR CLAYEY SAND

SILTY SAND

CALCAREOUS SAND

GRAVEL

ANHYDRITE

SILT

SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION 800'FNL, 100'FWL, SW4, Sec. 16 T17S, R30E. Eddy Co. N.M.
DATE 9/9/82
WELL NUMBER MH-8
ELEVATION ±3,672'

S.W.L. Dry
CASING 4" PVC, 61.7'
PERFORATIONS 4' to TD, 6-3/4"/1.5', 1/8" wide
DRILLER L. Scarborough

6-3/4" bit, drilled with air, 43' ENE of stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	Caliche, silt, sand, and sandstone with calcareous matrix, white to pink.	Fair
10-20	Clayey to silty sand. Pink to reddish brown fine grained sub-angular quartz.	Fair
20-30	Silty to sandy clay; reddish brown, some minor caliche.	Poor
30-40	Silty quartz sand; reddish brown. Very fine, sub-angular sub-rounded, frosted, well sorted.	Good
40-50	As above, medium sorting.	Good
50-60	As 30-40	
	Total Depth 60'	
	Cemented from surface to 4'.	

WELL NUMBER MH-9

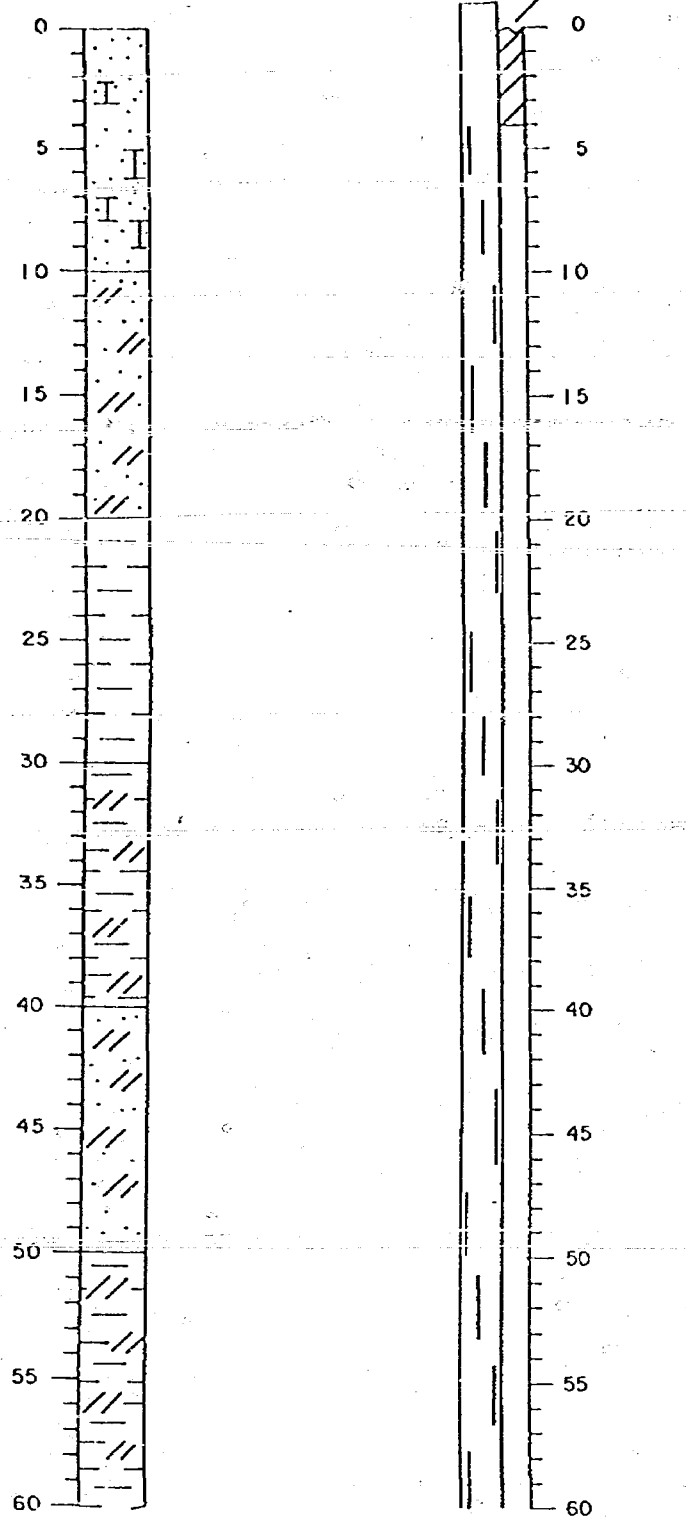
TOTAL DEPTH 60'

CLIENT Loco Hills

DATE 9/10/82

LITHOLOGIC LOG

COMPLETION LOG



KEY

- PERFORATIONS
- CEMENT
- SAND
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SILTY SAND
- CALCAREOUS SAND
- GRAVEL
- ANHYDRITE
- SILT
- SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION 850'FSL, 810 FEL SW/4, Sec. 16 T17S, R30E, Eddy Co. N.M.
DATE 9/10/82
WELL NUMBER MH-9
ELEVATION ±3,668

S.W.L. Dry
CASING 4" PVC, 61.9'
PERFORATIONS 4' to TD, 6-3/4"/1.5',1/8" wide
DRILLER L. Scarborough

6-3/4' bit, drilled with air, location 65' WSW from stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	Caliche, sand and sandstone with calcareous matrix, pink.	Fair
10-20	Sandy silt; reddish brown; minor sandy clay and caliche.	Fair
20-30	Clay; brown to slightly maroon.	Poor
30-40	Silty clay; reddish brown.	Poor
40-50	Silty sand; brownish red, very fine grained, sub-rounded to sub-angular, frosted .	Good
50-60	Silty clay; reddish brown.	Poor
	Total Depth 60'	
	Cemented from surface to 4'.	

WELL NUMBER MW-10

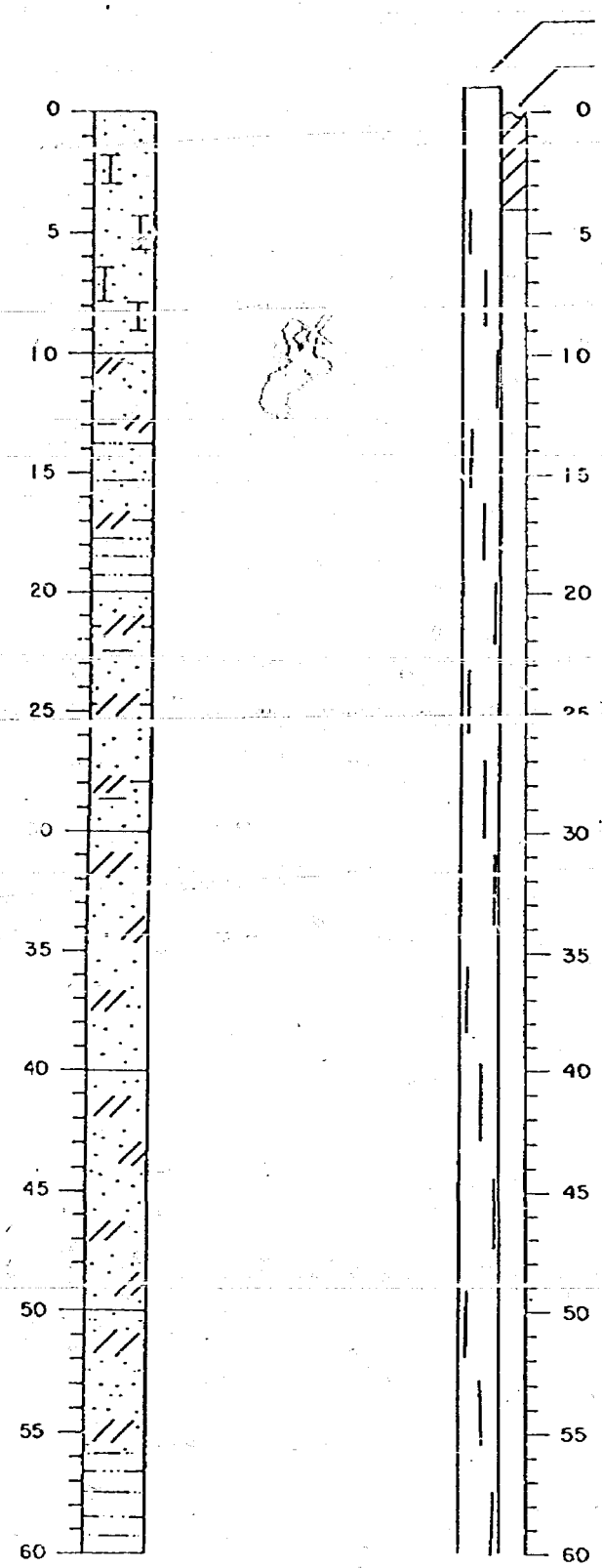
TOTAL DEPTH 60'

CLIENT Loco Hills

DATE 9/10/82

LITHOLOGIC LOG

COMPLETION LOG



KEY

- PERFORATIONS
- CEMENT
- SAND
- CLAY
- SANDY CLAY OR CLAYEY SAND
- SILTY SAND
- CALCAREOUS SAND
- GRAVEL
- ANHYDRITE
- SILT
- SILTY CLAY

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-CORPUS CHRISTI, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L. Dry

LOCATION 870'FNL, 960'FWL, SW/4, Sec.16 T17S, R30E, Eddy Co. N.M. CASING 4" PVC, 61.5'

DATE 9/10/82 PERFORATIONS 4' to TD, 6-3/4"/1.5',1/8" wide

WELL NUMBER MH-10 DRILLER L. Scarborough

ELEVATION ±3,669 (Note: Elevation is @ 5' less than stake 3669-5=3664)

6-3/4" bit drilled with air, location approximately 114' south west of stake.

INTERVAL	DESCRIPTION	POROSITY
0-10	Sand and caliche; pink, sub-rounded to sub-angular grains fine grained pink quartz. Minor sandstone with calcareous matrix.	Good
10-20	Sand, silt and clayey silt and sand; reddish brown.	Fair
20-30	Clayey silt and sand; reddish brown very fine grained.	Poor
30-40	Silty sand; brownish red, sub-rounded to angular, frosted, very fine grained, well sorted.	Good
40-50	Silty sand; brownish red, sub-rounded to sub-angular, very fine to fine grained. Not as well sorted as 30-40.	Good
50-56	Silty sand; brownish, red orange. Fine grained well sorted, sub-angular to sub-rounded.	Fair
56-59	Silty to sandy clay; reddish brown.	Poor
59-60	As 50-56	Fair
	Total Depth 60'	
	Cemented from surface to 4'.	

PROPOSED SALT WATER DISPOSAL FACILITY

LOCO HILLS, EDDY COUNTY, NEW MEXICO

INTRODUCTION

This firm has examined an area just north of Loco Hills, in northeastern Eddy County, New Mexico, for the feasibility of surface disposal of produced oil field brines. The investigation has shown that no fresh ground water is present in the vicinity of the proposed disposal site and thus no ground water degradation is anticipated. The area designated for surface disposal is the north half of the southwest quarter of the southwest quarter of Section 16, T.17S., R.30E.

GEOLOGY

The surface in the vicinity of Section 16 is underlain by about 10 feet of caliche and sandy caliche. This caliche cap rests on top of Triassic redbeds. The Triassic generally extends to a depth of about 250 to 300 feet where it lies on the Permian-age Rustler Formation.

The Triassic redbeds in the study area have been assigned to the Santa Rosa Formation, the lower member of the Dockum Group. The upper member (Chinle) consisting predominantly of red clay which is present in far southeastern New Mexico, is absent in northeastern Eddy County. The Santa Rosa consists principally of fine-grained sand with interbedded siltstone, silty clay and clay. Three cross-sections have been constructed (figures 1, 2, and 3) using gamma ray-neutron logs from oil wells and sample logs from test holes drilled for this study. An attempt was made to correlate the clay zones in the Santa Rosa Formation to determine if the clays were continuous across the site. We

have concluded from this exercise that the clays are essentially discontinuous and cannot be correlated with any confidence.

The Rustler Formation consists predominantly of gypsum and anhydrite in its upper part. The lower part of the Rustler Formation consists of dolomite interbedded with anhydrite. Figure 4 is a structure map contoured on the top of the Rustler Formation. This map shows that the Rustler has a regional southeastward dip. In the vicinity of Section 16 the Rustler has an irregular upper surface. A collapsed or erosional depression in the Rustler lies just southeast of Section 16. This depression plunges southwestward. The southwest quarter of Section 16 lies on the northwestern flank of this depression. The regional dip brings the Rustler Formation to the surface about 10 miles west of Section 16. The older Paleozoic formations dip regionally to the southeast into the Delaware Basin at the rate of about 80 feet per mile (Kelly, 1971).

HYDROLOGY

There is no evidence of ground water in the Santa Rosa Formation within a four mile radius of the proposed disposal site. Six test holes ranging in depth from 130 to 320 feet were drilled for this investigation to determine the presence of ground water and the lithologic characteristics of the Santa Rosa. One of these test holes (TH-6) was drilled 90 feet into the Rustler Formation without encountering ground water (figure 5).

Ground water is produced from the Triassic four to five miles west and seven to eight miles south of the proposed site. These wells are shown on figure 5. The nearest well completed in the Triassic is in Section 35, T-17-S, R-29-E. This well produces

water with reported chloride concentrations of 4,000 milligrams per liter (mg/l). The high chlorides suggest this well may be contaminated by oil field activities. Two wells five miles west of the site in Section 22, T-17-S, R-29-E, are also presumably completed in the Triassic. A water sample from one of these wells has a dissolved solid concentration of 2,722 mg/l. Wells completed in the Triassic south of the disposal site encounter water with total dissolved solids ranging between 932 and 6,882 mg/l. One well six miles northeast of the site (Section 24, T-16-S, R-30-E) produces Triassic water with total dissolved solids of 644 mg/l.

An abandoned water supply well drilled in the southeast quarter of Section 21, T-17-S, R-30-E, about a mile south of the disposal site was completed in the basal Rustler Formation. Analysis of this water indicates that the Rustler contains extremely poor quality water with chlorides exceeding 10,000 mg/l.

The local hydraulic gradient (figure 5) is to the southeast at a rate of about 25 to 30 feet per mile. Hendrickson and Jones (1952) show a regional hydraulic gradient south and southwestward toward the Pecos River.

DISPOSAL SITE FEASIBILITY AND OPERATION

The area of study lies just north of the Clayton Basin exemption. The site is in an area where fresh ground water is nonexistent. Indeed, as shown in figure 6, several brine pits have been permitted in the area because of the absence of fresh ground water. Additionally, surface disposal of salts generated by the potash industry is common in the area.

It is our opinion that brine placed in surface pits on Section 16 will migrate downward through the Santa Rosa to the Rustler Formation. T[illegible] test holes drilled for this study show that the Triassic section is comprised largely of sands and thus vertical percolation is expected. Interbedded clays in the Santa Rosa will divert the brine for some distance horizontally. However, as discussed above, the clay zones appear to be discontinuous and thus, are not expected to create a widespread horizontal barrier. Once the brine has reached the Rustler Formation, it should migrate in a southerly to southeasterly direction.

We believe it is desirable to verify that the brine introduced into pits on Section 16 is indeed traveling downward to the Rustler. Even though there is no Triassic ground water in the vicinity of Section 16, there is potable water south and west of the site. After many years of horizontal movement of brine in the Triassic, the ground water to the south could be jeopardized. In order to detect undue horizontal migration of the brine, a ring of monitor holes is proposed around the disposal pit (figure 7). The original pit is anticipated to cover approximately five acres and ultimately expanded to about 15 acres. Monitor holes will be drilled 500 feet from the perimeter of the pit on a horizontal spacing of 500 feet. Test hole drilling in the area has shown that the first clay of consequence lies between 30 and 50 feet below the surface. This clay, if it is continuous, will divert the brine in a horizontal direction. It is anticipated, therefore, that the monitor holes will be drilled to a depth of 60 feet. Significant horizontal migration of the salt water will thus be detected prior to the brine leaving the property. Two of the monitoring holes (see figure 7)

will be drilled to the top of the Rustler. These two monitoring holes, which are situated downdip structurally from the pit, will detect horizontal migration above the Rustler. All of the monitoring holes will be cased with PVC pipe having at least a two inch inside diameter which will enable periodic sampling. The upper five feet of the casing will be cemented to prevent surface water from migrating down the annulus between the casing and the walls of the hole. The casing will be perforated from total depth to 10 feet below the surface with saw cuts or a minimum of four 1/4 inch holes per foot. The monitoring holes will be examined four times a year for the presence of brine.

In the event that the size of the disposal pit is enlarged, monitor holes which lie inside the expanded pit, or less than 500 feet from its perimeter will be abandoned by completely filling them with cement. Replacement monitor holes will be drilled such that the 500 foot horizontal spacing is maintained. Two Rustler depth monitor holes will be maintained. Should expansion require that the deep monitors be abandoned, they will be plugged with cement and will be redrilled such that a deep monitor is always maintained on the south and southeast sides of the pit.

The pits will be maintained with a minimum three foot freeboard.

Prior to discharging brine into the disposal pit, residual hydrocarbons will be removed by gravity separation in steel tanks. Discharged brine will enter a 50' x 50' earthen skimmer pit which will remove the last remaining hydrocarbons. Brine will be discharged into the disposal pit by siphoning from the bottom of the skimmer pit.

EVAPORATION POTENTIAL

Net evaporation figures have previously been reported to the Oil Conservation Division for data obtained from the Red Bluff Reservoir. Table 1 shows the average net evaporation in inches and the expected monthly evaporation in barrels per acre. We have previously demonstrated by using the Red Bluff evaporation figures that 3,180 barrels of fresh water can be evaporated per month per acre. This rate of inflow allows no accumulation from year to year. The actual evaporation rate at the Loco Hills site is expected to be less than 3,180 barrels per month per acre for the following reasons.

1. Loco Hills is about 60 miles north of Red Bluff Reservoir.
2. The elevation at Loco Hills is about 1,000 feet higher.
3. Evaporation from brine will be lower than fresh water.

With these factors considered we have estimated that the average disposal rate which will not allow yearly accumulation will be between 2,000 and 2,500 barrels per month per acre. This figure, of course, does not take into account infiltration which we know will occur. A 15-acre pit, therefore, should have a capability of disposing a minimum of 1,000 barrels of brine per day.

CONCLUSIONS

This investigation has shown the following:

1. The Loco Hills site is underlain by Triassic Santa Rosa Formation which does not contain ground water.
2. The underlying Rustler Formation contains ground water of extremely poor quality.

3. The Triassic formation 5 to 7 miles from the site contains a small amount of fresh ground water.
4. The material underlying the Loco Hills site is permeable and will allow migration of the brine through the bottom of the pit.
5. Clay zones within the Triassic are probably sufficiently discontinuous that the brine migrating from the pit will reach the Rustler Formation.
6. The possibility that the clays will divert the brine horizontally can not be overlooked. To detect this occurrence, a ring of monitor holes is proposed.
7. Brine that reaches the Rustler Formation will not adversely affect ground water or surface water.

Respectfully submitted,

ED L. REED & ASSOCIATES, INC.

V. Steve Reed

V. Steve Reed

Chester F. Skrabacz, not

Chester F. Skrabacz

VSR/cm

Table 1. Evaporation Rates, Red Bluff Reservoir

Month	Net Evaporation (inches)	Bbl/acre
January	2.18	1409
February	3.01	1946
March	5.32	3439
April	7.97	5152
May	8.87	5734
June	8.55	5527
July	8.4	5430
August	7.1	4590
September	4.67	3019
October	3.59	2320
November	2.79	1804
December	2.15	1390
Totals	64.6	41,760

REFERENCES

Hendrickson, G. E., and Jones, R. S., 1952, Geology and ground-water resources of Eddy County, New Mexico.

Kelley, Vincent C., 1971, Geology of the Pecos Country, Southeastern New Mexico.

SAMPLE DESCRIPTIONS

TEST HOLES

CLIENT Loco Hills Water Disposal Co.

LOCATION NWNW Sec 21 T 17 S R 30 E, Eddy County, 806W & 540N New Mexico

DATE 12/29/80

WELL NUMBER TH 1

ELEVATION 3658.9

S.W.L. No Water

CASING 3" PVC 0' to 50'

PERFORATIONS Slots 100' to 150'

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: Chester F. Skrabacz

This location is approximately 75' SE of abandoned caliche pit which formerly measured 75 x 150' ± 250' SW of Arco #1-C McIntyre oil wells.

INTERVAL	DESCRIPTION	POROS
0- 10	80% Sand; pink-red, medium to coarse grain, quartzitic, round to subround, loose	
	20% Caliche; red-white, calcareous sandstone	good
10- 20	As Above	good
20- 30	100% Sand, fine-medium-coarse, reddish, loose, subround, quartzitic	good
30- 40	70% Siltstone; pinkish, very fine sand and silt	
	20% Red clay with sand	
	10% Caliche; sandstone, trace gravels and calcareous snad	fair
40- 50	75% Silty clay and sandy clay, pink to red	
	25% Clay, reddish	none-sl
50- 80	100% Sand; fine-medium-coarse, reddish, loose, subround to round, quartzitic,	
	trace siltstone	good
80- 90	90% Siltstone; pinkish, argillaceous and sandy; 10% Clay	None
	Dry hole drilling started to inject some water to keep hole from slumping	
90-100	70% Sandstone and silt; pink-red, slightly argillaceous	
	30% Clay, reddish with sand	Sl-none
100-150	100% Clay; reddish-brown, slight sandy, few hard streaks sandstone	none
	Total Depth: 150' Jet from total depth, no fluid; wait 3 minutes, jet again, no fluid	
	Top of Triassic: 9'	
	Drillers:	
0- 9	Caliche	
9-100	Sandy clay and sand	
100-150	Heavy clay with sand streaks	
	Drillers water from Caprock Water Co., Loco Hills. Checked chlorides 30 ppm.	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.

LOCATION Approx. Center of Section 17 T 17 S R 30 E. Eddy Co. New Mexico

DATE 12/29/80 2129' FEL 1960' FS

WELL NUMBER TH 2

ELEVATION 3668.9 topo

S.W.L.

CASING

PERFORATIONS

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: C. F. Skrabacz

138' West of oil well #2-F, General American McIntyre.

INTERVAL	DESCRIPTION	POROSITY
0- 10	100% Caliche; white calcareous sandstone, some free limestone	slight
10- 20	80% Sand; reddish, fine-medium, subround, loose, quartzitic with caliche	
	20% Clay, choc-red	very sl
20- 30	100% Sand, red-orange, round-subround, loose, fine-medium, quartzitic with	
	some clay	none
30- 40	100% Clay; reddish-chocolate, silty	none
40- 60	100% Sand; red-orange, fine-medium, loose, slightly argillaceous	slight
60- 70	100% Clay; reddish-brown, very silty	none
70- 90	100% Sand; fine-medium-coarse, reddish-orange, argillaceous	slight
90-100	100% Clay, red-brown and silt.	none
	Hole dry. Driller started to inject drilling fluid @ 100'.	
100-110	100% Clay and sand, reddish-brown (mix)	none
110-140	75% Sand, fine-medium, red-brown, loose to argillaceous	
	25% red clay and silt	sl-none
140-150	100% Clay; red-brown, sandy	none
	Total Depth: 150' Jet from 150', no water. Waited 3 minutes jet again 150', no fluids	
	Top of Triassic: 14'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L. No Water

LOCATION c/Section 16, T 17 S R 30 E, Eddy Co. New Mexico 1780 S; 2540 W CASING 3" PVC 0 - 153'

DATE 12/29/80 PERFORATIONS 100 - 153'

WELL NUMBER TH 3 DRILLER L. Scarborough, Lamesa, Texas

ELEVATION 3667.3 topo GEOLOGIST: C. F. Skrabacz

212' SE of oilwell Texas American #3 Etz State

INTERVAL	DESCRIPTION	POROSITY
0- 10	100% Caliche; white, calcareous, sandstone, some limestone	slight
10- 20	30% Caliche; 70% Siltstone and clay; reddish brown, sandy	slight
20- 40	75% Sand; reddish, fine-medium-coarse, loose, subround, quartzitic	
	20% Caliche; 5% Clay	slight
40- 50	95% Sand; reddish, fine-medium with clay; 5% caliche	fair-good
50- 80	90% Sand; reddish, fine-medium, subround, loose, quartzitic; 10% silty clay	fair-sl
80-120	95% Sand; As Above; 5% clay streak	fair-good
120-153	75% Sand; 25% Clay, reddish, sandy	fair-good
	Total Depth: 153' Jet @ 153' no water; waited 10 minutes, jetted again, no water in hole.	
	Top of Triassic: 11'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L. None

LOCATION c/section 21, T 17 S R 30 E, Eddy County, 2386 FN 2325 FW New Mexico CASING

DATE 12/30/80 PERFORATIONS

WELL NUMBER TH 4 DRILLER L. Scarborough, Lamesa, Texas

ELEVATION 3647.2 Surv. GEOLOGIST: C. Skrabacz

Location 90' SE of Oilwell Petroleum Corp. of Texas #4, Berry 'A' SE/4 NW/4 Sec 21 T17S R30E

INTERVAL	DESCRIPTION	POROSI
0- 10	100% Caliche, white, calcareous, sandstone, some red loose sand	
10- 30	30% Caliche; 40% red loose sand; 30% gravels up to 3/8"	
30- 40	40% Sand, red loose, medium-coarse; 60% red argillaceous sand	
40- 50	100% Clay, red with sand	
50- 80	75% Sand, fine-medium-coarse, red, loose; 25% red clay	
80-100	50% Sand; 50% clay	
100-150	75% Sand; 25% Clay	
150-170	As Above	
170-180	Gravel up to 1"	
	Samples drilled with water and not distinguishable	
180-200	60% red sandy clay; 40% Sand	
	Jetted - no water from 200'	
	Top of Triassic: 11'	
	No PVC	
	Drillers log:	
0- 11	Caliche	
11- 35	Sand-sandy clay	
35-145	Clay & sand	
145-175	Sand & Gravel	
175-180	Clay	
180-200	Sand & Gravel	

CLIENT Loco Hills Water Disposal Co.

LOCATION Sec 19, T17S, R30E, Eddy County, N.M. 1350' FE 2500'FS

DATE 12/30/80

WELL NUMBER TH 5

ELEVATION 3625 topo

S.W.L.

CASING

PERFORATIONS

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: C. Skrabacz

50' SW of oil well General American No. 25-A Burch SE/4 Sec 19, T17S R30E

INTERVAL	DESCRIPTION	POROSITY
0- 10	75% red siliceous sandstone; some white calcareous sandstone	
	25% red loose sand	none
10- 20	20% caliche; 80% clay, firm, red-brown	none
30	100% Sand; reddish, medium-coarse, loose to cemented with clay	slight
40	70% As Above; 30% Sandy firm clay	none-sl
50	20% Caliche; 60% Sand; medium-coarse, loose to slightly argillaceous	
	20% Clay, red	slight
50- 60	100% Clay, red, firm, some sand	none
60- 90	100% Sand, loose, red, fine-medium-coarse, subround	good
90-100	70% Sand; 30% Gravel	"
100-130	40% Sand, fine-medium-coarse, loose, 60% Clay	
	Total Depth: 130' Abd hole. Hole too large, no circulation or control	
	Drillers log	
0- 11	Caliche	
11- 65	Clay with sand streaks	
65-130	Sand with some clay	
	Top of Triassic: 11'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L.

LOCATION NW SW/4 Sec 21, T17S R30E, Eddy County, New Mexico — 1338 FSL, 112 FWL CASING

DATE 12/31/80 PERFORATIONS

WELL NUMBER TH 6 DRILLER

ELEVATION 3624.4 Surv.

Location is 337' south & little west of Holly #H-2 Brigham SWD Sec 21 , 17S R30E, 1650'S-330'W

INTERVAL	Drilling with water DESCRIPTION	POROSITY
0- 10	70% red fine-medium, loose sand; 30% Caliche, white, calcareous sand	fair
10- 30	100% Sand, red in heavy clay	none
30- 40	70% Sand, red, fine grain in clay; 30% loose sand	none
40- 50	100% Sand in heavy clay (red)	none
50- 80	100% Clay; reddish, firm with sand	none
80-100	100% Sand; reddish in heavy clay	none
100-110	100% Clay, red firm sandy	none
110-120	70% Gravel; loose, round, up to 3/8"; 20% Sand; 10% Clay	fair
120-130	30% Sand & gravel; 70% Sand in heavy clay	slight
130-140	100% Clay; red firm sandy	none
140-150	100% Sand in heavy clay (soft)	none
150-180	70% Sand in heavy clay; 30% Clay, firm	none
180-200	80% Sand in clay and 20% clay, light colored	slight
200-220	As Above	
220-230	60% Sand in heavy clay; 40% Anhydrite, tan-white, fine crystalline	none
230-260	40% White, dense, fine crystalline anhydrite; 50% white soft gypsum	
	10% red clay	slight
260-270	30% Anhydrite; 30% gypsum, 40% orange siltstone	
270-280	70% Anhydrite; 30% gypsum	
280-300	40% Anhydrite; white, fine crystalline; 50% gypsum, white, chalky, purplish	
	10% Sand (conglomerate)	
300-320	70% Anhydrite; 20% Gypsum, 10% red clay	
	@ 300' Jetted hole clean, waited 10 minutes; no fluid, waited 20 minutes;	
	no fluid, waited 30 minutes; no fluid.	
	Drill dry to 320'	
	No fluid, dry cutting to surface only	
	Set 3" PVC 0 - 320' Slotted 220' - 320'	
	Drillers Log:	
0- 11	Caliche-Sand	
11- 52	Red Clay	
52- 65	Sand	
65- 71	Clay	
71- 77	Sand & Clay	
77- 85	Red Clay	
85- 93	Sand & Clay	
93-110	Red Clay	
110-124	Sand & Gravel	
124-140	Red Clay	
140-165	Sand & Gravel with clay streak	
165-180	Red Clay	
180-215	Sand & Red Clay	
215-228	Sand-Clay	
228-320	Gypsum, Anhydrite	

SOUTHWESTERN LABORATORIES

FORT WORTH · DALLAS · HOUSTON · MIDLAND · BEAUMONT · TEXARKANA

CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 1-6-81 File No. C-1950-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 1-2-81

Received from

Identification Marks Eddy County, New Mexico, Jennings & Christy Windmill, 1985 FW, 660 FN, Section 24, T-16-S, R-30-E, 12-30-80, Sampled by Chester Skrabacz.

	mg/L
Chloride	101
Sulfate	242
Total Dissolved Solids @ 180° C.	664

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. 31992

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock Windmill No. 4
Section 24, T-18-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	442
Chloride	28
Total Dissolved Solids (Evap. @ 180° C.)	932

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES
Jack H Barton

Lab. No. 31786

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SOUTHWESTERN LABORATORIES

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock Windmill No. 3
SESW Section 10, T-18-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	2088
Chloride	2035
Total Dissolved Solids (Evap. @ 180° C.)	6882

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES

Jack H Burton

Lab. No. 31785

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STATE OF NEW MEXICO

DEPARTMENT OF ENERGY AND MINERALS

OIL CONSERVATION DIVISION

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OIL CONSERVATION DIVISION
SANTA FE

IN THE MATTER OF THE APPLICATION OF
LOCO HILLS WATER DISPOSAL COMPANY
FOR AN EXCEPTION TO ORDER NO. R-3221
AS AMENDED, EDDY COUNTY, NEW MEXICO

Case 7328

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MOTION TO DISMISS APPLICATION

Comes now William Bogel, individually and on behalf of Bogel Farms, Dexter, New Mexico, by and through their attorneys, Kellahin & Kellahin, and move the Division to dismiss the application on the grounds that applicant lacks standing to file said application and in support thereof state:

1. That William Bogel and Bogel Farms own and operate certain fresh water wells in the area that may be adversely affected by the approval of the Loco Hills Water Disposal Company's application in this case, and are therefore interested parties herein.

2. That the property upon which the applicant proposes to locate its project is owned by the State of New Mexico and administered by the Commissioner of Public Lands of New Mexico.

3. That applicant alleges in its application that it has made an application for a business lease from the Commissioner of Public Lands.

4. That the Commissioner of Public Lands has not yet issued said business lease.

5. That Rule 1203 of the Rules and Regulations of the New Mexico Oil Conservation Division limits applications for hearing to those persons having a property interest, or being an operator or producer or an owner in the SW/4SW/4 of said Section 16.

6. That the applicant in this case has not yet acquired a "property interest" in the absence of an approved business lease being issued to it by the Commissioner of Public Lands and is not a producer or operator or an owner as required.

WHEREFORE, William Bogel and Bogel Farms respectfully request that this application be dismissed.

KELLAHIN & KELLAHIN

By _____
W. Thomas Kellahin
P.O. Box 1769
Santa Fe, New Mexico 87501
(505) 982-4285

CERTIFICATE OF MAILING

I, W. Thomas Kellahin, hereby certify that I have mailed a true copy of the foreoing to James T. Jennings, attorney for applicant this 20th day of August, 1981.

_____
W. THOMAS KELLAHIN

LAW OFFICES OF
JENNINGS & CHRISTY
1012 SECURITY NATIONAL BANK BUILDING
P. O. BOX 1180
ROSWELL, NEW MEXICO 88201

JAMES T. JENNINGS
SIM B. CHRISTY IV
DEAN G. CONSTANTINE

TELEPHONE 622-8432
AREA CODE 505

July 31, 1981

Case 7329

Oil Conservation Division
Energy & Minerals Department
P. O. Box 2088
Santa Fe, NM 87501

Re: Loco Hills Water Disposal Company
Application for Exception to Order R-3221

Attention: Ernest Padilla or Florine Davidson

Dear Ernie or Florine:

Enclosed herewith you will find an Application which we are filing on behalf of Loco Hills Water Disposal Company for an exception to Order R-3221 covering lands in Eddy County, New Mexico. I would appreciate it if you would put this on the docket for August 26. I would imagine that it would probably take the better part of an hour to put on this case, and consequently, you might want to put a few of the short ones on the docket before this, but if possible, I would like to have it on before noon, as all of the witnesses are from outside of Santa Fe. If there are any questions or if you need anything further, please call me Monday.

Yours very truly,

JENNINGS & CHRISTY

James T. Jennings
JTJ/jb
Encl.
cc: Ray Westall
Steve Reed

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OIL CONSERVATION DIVISION
SANTA FE

BEFORE THE OIL CONSERVATION DIVISION
ENERGY & MINERALS DEPARTMENT
STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF LOCO HILLS WATER DISPOSAL COMPANY
FOR AN EXCEPTION TO ORDER NO. R-3221
AS AMENDED, EDDY COUNTY, NEW MEXICO.

Case 7329

APPLICATION

COMES NOW Loco Hills Water Disposal Company, a New Mexico corporation, by its attorneys, Jennings & Christy, and seeks an exception to Order R-3221 as amended to permit the disposal of brine and water produced in conjunction with the production of oil or gas, or both, into unlined, open surface pits located in the SW¼SW¼ of Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, and in support of its Application states:

1. Applicant has made application to the Commissioner of Public Lands of the State of New Mexico for a business lease covering the S½SW¼SW¼ of Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, and proposes to construct thereon the necessary tanks and pits to permit the commercial disposal of water produced in connection with the production of oil or gas, or both, in tanks and pits located thereon.

2. That there are a great number of stripper wells and other wells within a 15-mile radius of Loco Hills, which are producing a large volume of water in connection with their production of oil and gas. It is necessary for operators who have not obtained a permit to dispose of such water in their own pits pursuant to an exception to Order No. R-3221, to truck the produced water to a disposal facility.

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SANTA FE

3. That there is no fresh potable water in the immediate vicinity of the well site. There is no evidence of ground water in the Santa Rose Formation within a 4-mile radius of the proposed site and there is no Triassic water in the immediate vicinity. The only available water in the Loco Hills vicinity is supplied by a pipeline which also serves the potash mines.

4. That the water disposed of into the pits will evaporate or will migrate downward through the Santa Rose Formation to the Rustler Formation. To detect any undue horizontal migration or the water a ring of monitor holes will be drilled around the disposal site at intervals of 500 feet, which wells will be located 500 feet from the perimeter of the disposal pits.

5. That Applicant proposes to install three 500-barrel and two 250-barrel steel tanks and to construct four earthen ponds or pits. The pits will be maintained with a minimum 3-foot freeboard and prior to discharging of the water into the disposal pits, residual hydrocarbons will be removed by gravity separation in steel tanks. Discharge water will enter a 50 x 50 earthen skimmer pit which will remove the last remaining hydrocarbons. Water will be discharged into the disposal pit by siphoning from the bottom of the skimmer pit.

6. There is a great need for a commercial disposal water system in the immediate area, as there are four trucking companies operating more than fifty water trucks in the area.

7. Approval of this Application for an exception to Order R-3221 as amended will prevent waste, protect correlative rights and will not injure any fresh water or present any threat of such injury.

WHEREFORE, Applicant requests that this Application be set for hearing and that after notice and hearing, the Division enter its Order granting Applicant an exception to Order R-3221 as amended and in accordance with this Application.

JENNINGS & CHRISTY

By _____
James T. Jennings
Attorneys for Loco Hills
Water Disposal Company
P. O. Box 1180
Roswell, New Mexico 88201

Dockets Nos. 27-81 and 28-81 are tentatively set for September 9 and September 23, 1981. Applications for hearing must be filed at least 22 days in advance of hearing date.

DOCKET: EXAMINER HEARING - WEDNESDAY - AUGUST 26, 1981

9 A.M. - OIL CONSERVATION DIVISION CONFERENCE ROOM, STATE LAND OFFICE BUILDING, SANTA FE, NEW MEXICO

The following cases will be heard before Richard L. Stamets, Examiner, or Daniel S. Nutter, Alternate Examiner:

CASE 7329: Application of Loco Hills Water Disposal Company for an exception to Order No. R-3221, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an exception to Order No. R-3221 to permit the commercial disposal of produced brine into several unlined surface pits located in the S/2 SW/4 SW/4 of Section 16, Township 17 South, Range 30 East.

CASE 7330: Application of Union Oil Company of California for compulsory pooling, Lea County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Atoka and Morrow formations underlying the E/2 of Section 16, Township 22 South, Range 33 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7331: Application of Bass Enterprises Production Company for an unorthodox location and possible dual completion or downhole commingling, Roosevelt County, New Mexico. Applicant, in the above-styled cause, seeks approval for the unorthodox location of its Bass State Well No. 2, a Wolfcamp test located 534 feet from the South and East lines of Section 16, Township 7 South, Range 35 East, to be plugged back and completed in the Todd Upper and/or Todd Lower San Andres Pools. Applicant further seeks authority to dually complete said well in both of said pools or, if of similar nature, i.e., gas-gas or oil-oil, to commingle the production from said pools in the wellbore. The SE/4 SE/4 of said Section 16 would be dedicated to an oil completion and the E/2 of the section to a gas completion.

CASE 7332: Application of Bass Enterprises Production Company for directional drilling and possible unorthodox location, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks authority to directionally drill its James Ranch Well No. 13 from a surface location 660 feet from the South line and 1340 feet from the East line of Section 36, Township 22 South, Range 30 East, in such a manner as to penetrate the various pays in the Pennsylvania formation at various distances from the outer boundary of the proposed proration unit, being the S/2 of Section 31, Township 22 South, Range 31 East, but in no event closer than an unorthodox location 660 feet from the outer boundary of said unit.

CASE 7333: Application of Coquina Oil Corporation for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Wolfcamp and Pennsylvanian formations underlying the N/2 of Section 14, Township 24 South, Range 28 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7334: Application of R. A. Mendenhall Associates, Ltd. for compulsory pooling, Eddy County, New Mexico. Applicant, in the above-styled cause, seeks an order pooling all mineral interests in the Delaware Mountain Group formation underlying the NW/4 SE/4 of Section 10, Township 22 South, Range 27 East, to be dedicated to a well to be drilled at a standard location thereon. Also to be considered will be the cost of drilling and completing said well and the allocation of the cost thereof as well as actual operating costs and charges for supervision, designation of applicant as operator of the well, and a charge for risk involved in drilling said well.

CASE 7315: (Continued and Readvertised)

Application of Rhema Oil Processing for an oil treating plant permit, Lea County, New Mexico. Applicant, in the above-styled cause, seeks authority for the construction and operation of an oil treating plant for the purpose of treating and reclaiming sediment oil at a site in the SW/4 NE/4 NW/4 of Section 14, Township 20 South, Range 38 East.

Rough - Herbie
On Machine

STATE OF NEW MEXICO
ENERGY AND MINERALS DEPARTMENT
OIL CONSERVATION DIVISION

IN THE MATTER OF THE HEARING
CALLED BY THE OIL CONSERVATION
DIVISION FOR THE PURPOSE OF
CONSIDERING:

CASE NO. 7329
Order No. R-6811

APPLICATION OF LOCO HILLS WATER
DISPOSAL COMPANY FOR AN EXCEPTION
TO ORDER NO. R-3221, AS AMENDED,
EDDY COUNTY, NEW MEXICO.

ORDER OF THE DIVISION

BY THE DIVISION:

This cause came on for hearing at 9 a.m. on September 23 1981, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this _____ day of , the Division Director, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Division has jurisdiction of this cause and the subject matter thereof.

(2) That Order (3) of Division Order No. R-3221, as amended, prohibits in that area encompassed by Lea, Eddy, Chaves, and Roosevelt Counties, New Mexico, the disposal, subject to minor exceptions, of water produced in conjunction with the production of oil or gas, or both, on the surface of the ground, or in any pit, pond, lake, depression, draw, streambed, or arroyo, or in any watercourse, or in any other place or in any manner which would constitute a hazard to any fresh water supplies and said disposal has not previously been prohibited.

(3) That the aforesaid Order No. R-3221 was issued in order to afford reasonable protection against contamination of fresh water supplies designated by the State Engineer through disposal of water produced in conjunction with the production of oil or gas, or both, in unlined surface pits.

(4) That the State Engineer has designated, pursuant to Section 70-2-23 (15), NMSA, 1978 Compilation, all underground

water in the State of New Mexico containing 10,000 parts per million or less of dissolved solids as fresh water supplies to be afforded reasonable protection against contamination; except that said designation does not include any water for which there is no present or reasonably foreseeable beneficial use that would be impaired by contamination.

(5) That the applicant, Loco Hills Water Disposal Company, seeks as an exception to the provisions of the aforesaid Order (3) to permit the commercial disposal of salt water into an unlined surface pit or pits containing from 5 to 15 surface acres to be located in the N/2 SW/4 SW/4 of Section 16, Township 17 South, Range 30 East, Eddy County, New Mexico.

(6) That disposal rates would be from 2000 to 2500 barrels per month per acre or from 1000 to 1250 barrels per day at the maximum pit size.

(7) That neither the pit(s) nor the immediate underlying sediments are impervious and a percentage of the disposed water would leak into the subsurface to enter the Santa Rosa and Rustler Anhydrite formations.

(8) That while the Santa Rosa formation contains no fresh water in the immediate vicinity of the proposed pit(s), it does contain fresh water at various locations both up-dip and down-dip therefrom.

(9) That clay zones within the Santa Rosa could contribute to the horizontal migration of waters percolating from said pits which waters could reach and contaminate down-dip fresh water supplies in said formation.

(10) That if the salt water from said pits should percolate vertically through the Santa Rosa formation, it would enter the Rustler formation and move therethrough in a generally Southward direction to the Pecos River.

(11) That insufficient data was presented relative to the long term effect of the disposal of salt water in the proposed pit(s) and its potential affect on surface and subsurface waters in the following areas:

(a) percolation rates;

(b) fluid retention by the Santa Rosa formation (volume and area);

(c) Rustler formation water quality outside the immediate area; and,

(d) the ground water regime vis-a-vis the Rustler formation and the Pecos River.

(12) That because of the potential for contamination of fresh water supplies in the Santa Rosa formation and because of insufficient data upon which to make reasonable determinations relative to the need for protection of or the long term effects upon waters in the Rustler formation or Pecos River, the subject application should be denied.

IT IS THEREFORE ORDERED:

(1) That the application of Loco Hills Water Disposal Company for approval of commercial surface salt water disposal facility, as an exception to Order (3) of Division Order No. R-3221, is hereby denied.

(2) That jurisdiction of this cause is retained for the entry of such further orders as the Division may deem necessary.

DONE at Santa Fe, New Mexico, on the day and year hereinabove designated.

STATE OF NEW MEXICO
OIL CONSERVATION DIVISION

JOE D. RAMEY,
Director

S E A L

BEFORE THE OIL CONSERVATION DIVISION
ENERGY & MINERALS DEPARTMENT
STATE OF NEW MEXICO

IN THE MATTER OF THE APPLICATION
OF LOCO HILLS WATER DISPOSAL COMPANY
FOR AN EXCEPTION TO ORDER NO. R-3221
AS AMENDED, EDDY COUNTY, NEW MEXICO.

Case 7329

APPLICATION

COMES NOW Loco Hills Water Disposal Company, a New Mexico corporation, by its attorneys, Jennings & Christy, and seeks an exception to Order R-3221 as amended to permit the disposal of brine and water produced in conjunction with the production of oil or gas, or both, into unlined, open surface pits located in the SW¼SW¼ of Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, and in support of its Application states:

1. Applicant has made application to the Commissioner of Public Lands of the State of New Mexico for a business lease covering the S½SW¼SW¼ of Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, and proposes to construct thereon the necessary tanks and pits to permit the commercial disposal of water produced in connection with the production of oil or gas, or both, in tanks and pits located thereon.

2. That there are a great number of stripper wells and other wells within a 15-mile radius of Loco Hills, which are producing a large volume of water in connection with their production of oil and gas. It is necessary for operators who have not obtained a permit to dispose of such water in their own pits pursuant to an exception to Order No. R-3221, to truck the produced water to a disposal facility.

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SANTA FE

3. That there is no fresh potable water in the immediate vicinity of the well site. There is no evidence of ground water in the Santa Rose Formation within a 4-mile radius of the proposed site and there is no Triassic water in the immediate vicinity. The only available water in the Loco Hills vicinity is supplied by a pipeline which also serves the potash mines.

4. That the water disposed of into the pits will evaporate or will migrate downward through the Santa Rose Formation to the Rustler Formation. To detect any undue horizontal migration of the water a ring of monitor holes will be drilled around the disposal site at intervals of 500 feet, which wells will be located 500 feet from the perimeter of the disposal pits.

5. That Applicant proposes to install three 500-barrel and two 250-barrel steel tanks and to construct four earthen ponds or pits. The pits will be maintained with a minimum 3-foot freeboard and prior to discharging of the water into the disposal pits, residual hydrocarbons will be removed by gravity separation in steel tanks. Discharge water will enter a 50 x 50 earthen skimmer pit which will remove the last remaining hydrocarbons. Water will be discharged into the disposal pit by siphoning from the bottom of the skimmer pit.

6. There is a great need for a commercial disposal water system in the immediate area, as there are four trucking companies operating more than fifty water trucks in the area.

7. Approval of this Application for an exception to Order R-3221 as amended will prevent waste, protect correlative rights and will not injure any fresh water or present any threat of such injury.

WHEREFORE, Applicant requests that this Application be set for hearing and that after notice and hearing, the Division enter its Order granting Applicant an exception to Order R-3221 as amended and in accordance with this Application.

JENNINGS & CHRISTY

By James T. Jennings

James T. Jennings
Attorneys for Loco Hills
Water Disposal Company
P. O. Box 1180
Roswell, New Mexico 88201

LAW OFFICES OF
JENNINGS & CHRISTY
1012 SECURITY NATIONAL BANK BUILDING
P. O. BOX 1180
ROSWELL, NEW MEXICO 88201

JAMES T. JENNINGS
SIM B. CHRISTY IV
DEAN G. CONSTANTINE

TELEPHONE 622-8432
AREA CODE 505

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OIL CONSERVATION DIVISION
SANTA FE

August 17, 1981

Oil Conservation Division
Energy & Minerals Department
P. O. Box 2088
Santa Fe, NM 87501

Attention: Ms. Florine Davidson

Re: Loco Hills Water Disposal Company
Case No. 7329

Dear Florine:

On reviewing the advertisement and application, I find that there is a typographical error in Paragraph 1 which is to the effect that applicant has made application to the Commissioner of Public Lands for a business lease covering the S½SW¼SW¼ of Section 16. This is a typographical error and should be the N½SW¼SW¼ of Section 16. In the introductory paragraph I speak of pits being located in the SW¼SW¼ of the section and all of our applications to lease and relinquishment and other documents actually covered the tract upon which we plan to locate the pit, which will be the N½SW¼SW¼. We will proceed with the hearing unless we hear from you to the contrary. I assume that we can present the evidence and if necessary the matter can be re-advertised.

Yours very truly,

JENNINGS & CHRISTY

James T. Jennings

JTJ/jb

4" Load Lines

4" Load Line

500 BBL Tank

250 BBL Tank

6" Bypass Line

6" water leg

SKIM PIT

4" Load Line

500 BBL Tank

250 BBL Tank

6" Bypass Line

6" water leg

4" Load Line

500 BBL Tank

4" Load Line

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 2
CASE NO. 7329
Submitted by Loco Hills
Hearing Date 8-26-71

PROPOSED WATER DISPOSAL PLANT

4" Load Lines

4" Load Line

500 BBL Tank

250 BBL Tank

Highway 180 East

6" Bypass Line

6" water leg

SKIM PIT

4" Load Line

500 BBL Tank

250 BBL Tank

6" Bypass Line

6" water leg

4" Load Line

500 BBL Tank

4" Load Line

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 2
CASE NO. 7329
Submitted by Loco Hills
Hearing Date 8-26-81

PROPOSED WATER DISPOSAL PLANT

BL-1044

NEW MEXICO STATE LAND OFFICE

0-0334

RELINQUISHMENT OF GRAZING LEASE

In consideration of the purchase by Loco Hills Water Disposal Company of P. O. Box 4 Loco Hills, New Mexico 88255 hereinafter referred to as the Purchaser of the improvements of the lands hereinafter described, and embraced in Lease No. GR-817 receipt for the purchase of which said improvements is hereby acknowledged, and in order that a new lease on said lands may be issued to the said Purchaser, I (or we) hereby relinquish to the State of New Mexico the said above mentioned lease and all my (or our) right, title, claim and interest therein as to the following described lands - to wit:

N½SW¼SW¼ Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico, containing 20 acres

JUL 17 8 39 AM '81
STATE LAND OFFICE
SANTA FE, NEW MEXICO

WHAT CONSIDERATION, if any, other than the improvements is being paid or promised you for making this relinquishment? (Your special attention is directed to Rule No. 8.010 on reverse side hereof) Two Thousand and no/100 Dollars ($2,000.00)

I (or we), Charles R. Martin, Inc. do solemnly swear (or affirm) that the statements and answers to questions in this relinquishment are true and correct to the best of my knowledge and belief.

Dated this 10th day of July, 19 81.

Lessee

CHARLES R. MARTIN, INC.
Lessee

Lessee

By Charles M. Wade
Vice President
Lessee

Telephone No. (505) 746-2796

Subscribed and sworn to before me this 10 day of July, 1981.

My Commission expires:
1-27-85

Joan C Boling
Notary Public

Approved in favor of the above-named Purchaser this 4th day of August, 1981.

Alex J. Armijo
Commissioner of Public Lands

NOTE: This relinquishment must be sworn to before some person qualified to administer an oath.

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 3
CASE NO. 7329
Submitted by Loco Hills
Hearing Date 8-26-81

RELINQUISHMENT FEE - $10.00

APPLICATION FEE - $10.00

GR-5 REVISED APRIL, 1981

1000-3-56175A

State of New Mexico

Commissioner of Public Lands

ALEX J. ARMIJO
COMMISSIONER

August 25, 1981

Ph. 827-2838
P. O. BOX 1148
SANTA FE, NEW MEXICO 87501
Zip Code: 87504-1148

Loco Hills Water Disposal Co.
c/o James Jennings
Box 1180
Roswell, New Mexico 88201

Re: Application for Business Lease No. BL-1044

Gentlemen:

I have been instructed to inform you that this office will approve your application for a business lease contingent upon approval of the OCD. Once we have assurance that the OCD has granged permission for the disposal ponds, we will continue to process your application.

Yours very truly,

Benito Lopez

Benito Lopez, Director
Land Resources Division

BL:msa

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 4
CASE NO. 7329
Submitted by Loco Hills
Hearing Date 8-28-81

BEFORE EXAMINER STAMETS
OIL CONSERVATION DIVISION
EXHIBIT NO. 45
CASE NO. 7329
Submitted by Loco Hills
Hearing Date

NEW MEXICO STATE LAND OFFICE

BUSINESS LEASE

LEASE NO. BL-1044

APPLICATION NO. BL-1044

THIS INDENTURE, Made and entered into this 17th day of July, 19 81, by and between the State of New Mexico, acting by and through its Commissioner of Public Lands, hereinafter called the Lessor, and Loco Hills Water Disposal Company whose post office address is P.O. BOX 4, Loco Hills, New Mexico, hereinafter called the Lessee(s).

WITNESSETH:

1. The Lessor, in consideration of the covenants and agreements of the Lessee(s) hereinafter set forth, has this day leased to the Lessee(s) the following described tract of land for the sole and only purpose of using the tract for erecting, maintaining and operating a site for the dispsal of produced oil field brine.

(Be Specific).

2. The tract of land included in this lease is as follows:

N½SW¼SW¼ Section 16, Township 17 South, Range 30 East, N.M.P.M., Eddy County, New Mexico.

3. TO HAVE AND TO HOLD the same for the term of 5 years, beginning at the date of this lease and ending July 17, 1986, for which Lessee(s) agree(s) to pay: $400.00 annually in advance.

4. The Lessee(s) expressly grant(s) to the Lessor a first and prior lien upon any and all improvements and equipment which have been or shall have been placed upon the above described premises during the term of this lease as security for the payment of any due and unpaid rentals provided for in this lease.

5. That the Lessee(s) shall be permitted to remove any or all improvements placed upon the tract embraced in this lease on or before the expiration of this lease, provided that all rentals have been fully paid. In the event of sale of the land, all authorized improvements not so removed shall be appraised by the Commissioner and disposed of in the same manner as provided by law in the case of improvements upon grazing leases. Any improvements placed upon the land without the prior written approval of the Lessor shall be deemed unauthorized and become the property of the Lessor.

6. This lease shall terminate upon default of any payments due, upon thirty (30) days' notice by registered mail to the Lessee(s), evidenced by return receipt, unless such default be curd within such thirty (30) day period.

7. This lease includes the right to Lessee(s) of ingress and egress to and from said premises and any part thereof.

8. This lease is made for the sole use and benefit of Lessee(s), for the express purposes here intended; that except for the purposes of this lease, no sub-lease or under-lease (either written or verbal) shall be made by the Lessee(s) without the written consent of the Commissioner of Public Lands and any violation of this agreement and understanding will subject the lease to cancellation. This lease is not assignable except upon written approval by the Commissioner of Public Lands.

9. The Lessee(s) may at any time surrender and be relieved of any obligations under this lease by the payment of Ten ($10.00) Dollars to the Lessor, provided, however that all rentals then due have been fully paid and the terms of this lease have been complied with. However, upon such surrender, no part of any rentals already paid by the Lessee(s) shall be refunded.

(over)

10. This lease is issued subject to all valid existing rights upon the tract included herein.

11. Applications for a new lease should be submitted to the Lessor for consideration at least thirty (30) days prior to the expiration of the term herein.

12. Lessee(s) is authorized to place the following described improvements upon the land, the total valuation of which shall in no event exceed $50.000.00 without the prior written approval of the Lessor, and future improvements shall not be placed on the land without the written approval of the lessor.

13. Lessor reserves the right to execute leases on the above land for mining purposes or for the extraction of petroleum, oil, gas, salt, geothermal resources, and other mineral deposits therefrom and the right to go upon, explor for, mine, remove and sell same. Lessor further reserves the right to grant rights-of-way and easements over, upon, or across the said land for public highways, railroads, tramways, telephone, telegraph and power lines, irrigation works, sewer lines, drainage ditches, mining, logging, and for other purposes.

14. Lessees, including their heirs, assigns, agents, and contractors shall at their own expense fully comply with all laws, regulations, rules, ordinances, and requirements of the city, county, state, federal authorities and agencies, in all matters and things affecting the premises and operations thereon which may be enacted or promulgated under the governmental police powers pertaining to public health and welfare, including but not limited to conservation, sanitation, aesthetics, pollution, cultural properties, fire, and ecology. Such agencies are not to be deemed third party beneficiaries hereunder; however, this clause is enforceable by the Grantor as herein provided or as otherwise permitted by law.

All the terms of this agreement shall extend to and bind the successors and assigns of the parties hereto.

Executed in duplicate.

Witness the hands and seals of the parties aforesaid the day and year first above written.

LOCO HILLS WATER DISPOSAL COMPANY

Ray Westall
LESSEE

President
LESSEE

SUBSCRIBED AND SWORN TO BEFORE ME THIS 23rd DAY OF September, 1981.

(SEAL)

My Commission expires: 9-27-84

Patricia B. Vigil
NOTARY PUBLIC

Alex J. Armijo
COMMISSIONER OF PUBLIC LANDS

THIS LEASE WILL NOT BECOME EFFECTIVE UNLESS THE OIL CONSERVATION DIVISION APPROVES THE SALT WATER DISPOSAL SYSTEM.

PROPOSED
SALT WATER DISPOSAL FACILITY

FOR

LOCO HILLS WATER DISPOSAL CO.
EDDY COUNTY, NEW MEXICO
AUGUST 1981

PROPOSED SALT WATER DISPOSAL FACILITY

LOCO HILLS, EDDY COUNTY, NEW MEXICO

INTRODUCTION

This firm has examined an area just north of Loco Hills, in northeastern Eddy County, New Mexico, for the feasibility of surface disposal of produced oil field brines. The investigation has shown that no fresh ground water is present in the vicinity of the proposed disposal site and thus no ground water degradation is anticipated. The area designated for surface disposal is the north half of the southwest quarter of the southwest quarter of Section 16, T.17S., R.30E.

GEOLOGY

The surface in the vicinity of Section 16 is underlain by about 10 feet of caliche and sandy caliche. This caliche cap rests on top of Triassic redbeds. The Triassic generally extends to a depth of about 250 to 300 feet where it lies on the Permian-age Rustler Formation.

The Triassic redbeds in the study area have been assigned to the Santa Rosa Formation, the lower member of the Dockum Group. The upper member (Chinle) consisting predominantly of red clay which is present in far southeastern New Mexico, is absent in northeastern Eddy County. The Santa Rosa consists principally of fine-grained sand with interbedded siltstone, silty clay and clay. Three cross-sections have been constructed (figures 1, 2, and 3) using gamma ray-neutron logs from oil wells and sample logs from test holes drilled for this study. An attempt was made to correlate the clay zones in the Santa Rosa Formation to determine if the clays were continuous across the site. We

have concluded from this exercise that the clays are essentially discontinuous and cannot be correlated with any confidence.

The Rustler Formation consists predominantly of gypsum and anhydrite in its upper part. The lower part of the Rustler Formation consists of dolomite interbedded with anhydrite. Figure 4 is a structure map contoured on the top of the Rustler Formation. This map shows that the Rustler has a regional southeastward dip. In the vicinity of Section 16 the Rustler has an irregular upper surface. A collapsed or erosional depression in the Rustler lies just southeast of Section 16. This depression plunges southwestward. The southwest quarter of Section 16 lies on the northwestern flank of this depression. The regional dip brings the Rustler Formation to the surface about 10 miles west of Section 16. The older Paleozoic formations dip regionally to the southeast into the Delaware Basin at the rate of about 80 feet per mile (Kelly, 1971).

HYDROLOGY

There is no evidence of ground water in the Santa Rosa Formation within a four mile radius of the proposed disposal site. Six test holes ranging in depth from 130 to 320 feet were drilled for this investigation to determine the presence of ground water and the lithologic characteristics of the Santa Rosa. One of these test holes (TH-6) was drilled 90 feet into the Rustler Formation without encountering ground water (figure 5).

Ground water is produced from the Triassic four to five miles west and seven to eight miles south of the proposed site. These wells are shown on figure 5. The nearest well completed in the Triassic is in Section 35, T-17-S, R-29-E. This well produces

water with reported chloride concentrations of 4,000 milligrams per liter (mg/l). The high chlorides suggest this well may be contaminated by oil field activities. Two wells five miles west of the site in Section 22, T-17-S, R-29-E, are also presumably completed in the Triassic. A water sample from one of these wells has a dissolved solid concentration of 2,722 mg/l. Wells completed in the Triassic south of the disposal site encounter water with total dissolved solids ranging between 932 and 6,882 mg/l. One well six miles northeast of the site (Section 24, T-16-S, R-30-E) produces Triassic water with total dissolved solids of 644 mg/l.

An abandoned water supply well drilled in the southeast quarter of Section 21, T-17-S, R-30-E, about a mile south of the disposal site was completed in the basal Rustler Formation. Analysis of this water indicates that the Rustler contains extremely poor quality water with chlorides exceeding 10,000 mg/l.

The local hydraulic gradient (figure 5) is to the southeast at a rate of about 25 to 30 feet per mile. Hendrickson and Jones (1952) show a regional hydraulic gradient south and southwestward toward the Pecos River.

DISPOSAL SITE FEASIBILITY AND OPERATION

The area of study lies just north of the Clayton Basin exemption. The site is in an area where fresh ground water is nonexistent. Indeed, as shown in figure 6, several brine pits have been permitted in the area because of the absence of fresh ground water. Additionally, surface disposal of salts generated by the potash industry is common in the area.

It is our opinion that brine placed in surface pits on Section 16 will migrate downward through the Santa Rosa to the Rustler Formation. The test holes drilled for this study show that the Triassic section is comprised largely of sands and thus vertical percolation is expected. Interbedded clays in the Santa Rosa will divert the brine for some distance horizontally. However, as discussed above, the clay zones appear to be discontinuous and thus, are not expected to create a widespread horizontal barrier. Once the brine has reached the Rustler Formation, it should migrate in a southerly to southeasterly direction.

We believe it is desirable to verify that the brine introduced into pits on Section 16 is indeed traveling downward to the Rustler. Even though there is no Triassic ground water in the vicinity of Section 16, there is potable water south and west of the site. After many years of horizontal movement of brine in the Triassic, the ground water to the south could be jeopardized. In order to detect undue horizontal migration of the brine, a ring of monitor holes is proposed around the disposal pit (figure 7). The original pit is anticipated to cover approximately five acres and ultimately expanded to about 15 acres. Monitor holes will be drilled 500 feet from the perimeter of the pit on a horizontal spacing of 500 feet. Test hole drilling in the area has shown that the first clay of consequence lies between 30 and 50 feet below the surface. This clay, if it is continuous, will divert the brine in a horizontal direction. It is anticipated, therefore, that the monitor holes will be drilled to a depth of 60 feet. Significant horizontal migration of the salt water will thus be detected prior to the brine leaving the property. Two of the monitoring holes (see figure 7)

will be drilled to the top of the Rustler. These two monitoring holes, which are situated downdip structurally from the pit, will detect horizontal migration above the Rustler. All of the monitoring holes will be cased with PVC pipe having at least a two inch inside diameter which will enable periodic sampling. The upper five feet of the casing will be cemented to prevent surface water from migrating down the annulus between the casing and the walls of the hole. The casing will be perforated from total depth to 10 feet below the surface with saw cuts or a minimum of four 1/4 inch holes per foot. The monitoring holes will be examined four times a year for the presence of brine.

In the event that the size of the disposal pit is enlarged, monitor holes which lie inside the expanded pit, or less than 500 feet from its perimeter will be abandoned by completely filling them with cement. Replacement monitor holes will be drilled such that the 500 foot horizontal spacing is maintained. Two Rustler depth monitor holes will be maintained. Should expansion require that the deep monitors be abandoned, they will be plugged with cement and will be redrilled such that a deep monitor is always maintained on the south and southeast sides of the pit.

The pits will be maintained with a minimum three foot freeboard.

Prior to discharging brine into the disposal pit, residual hydrocarbons will be removed by gravity separation in steel tanks. Discharged brine will enter a 50' x 50' earthen skimmer pit which will remove the last remaining hydrocarbons. Brine will be discharged into the disposal pit by siphoning from the bottom of the skimmer pit.

EVAPORATION POTENTIAL

Net evaporation figures have previously been reported to the Oil Conservation Division for data obtained from the Red Bluff Reservoir. Table 1 shows the average net evaporation in inches and the expected monthly evaporation in barrels per acre. We have previously demonstrated by using the Red Bluff evaporation figures that 3,180 barrels of fresh water can be evaporated per month per acre. This rate of inflow allows no accumulation from year to year. The actual evaporation rate at the Loco Hills site is expected to be less than 3,180 barrels per month per acre for the following reasons.

1. Loco Hills is about 60 miles north of Red Bluff Reservoir.
2. The elevation at Loco Hills is about 1,000 feet higher.
3. Evaporation from brine will be lower than fresh water.

With these factors considered we have estimated that the average disposal rate which will not allow yearly accumulation will be between 2,000 and 2,500 barrels per month per acre. This figure, of course, does not take into account infiltration which we know will occur. A 15-acre pit, therefore, should have a capability of disposing a minimum of 1,000 barrels of brine per day.

CONCLUSIONS

This investigation has shown the following:

1. The Loco Hills site is underlain by Triassic Santa Rosa Formation which does not contain ground water.
2. The underlying Rustler Formation contains ground water of extremely poor quality.

3. The Triassic formation 5 to 7 miles from the site contains a small amount of fresh ground water.

4. The material underlying the Loco Hills site is permeable and will allow migration of the brine through the bottom of the pit.

5. Clay zones within the Triassic are probably sufficiently discontinuous that the brine migrating from the pit will reach the Rustler Formation.

6. The possibility that the clays will divert the brine horizontally can not be overlooked. To detect this occurrence, a ring of monitor holes is proposed.

7. Brine that reaches the Rustler Formation will not adversely affect ground water or surface water.

Respectfully submitted,

ED L. REED & ASSOCIATES, INC.

V. Steve Reed

V. Steve Reed

Chester F. Skrabacz

Chester F. Skrabacz

VSR/cm

Table 1. Evaporation Rates, Red Bluff Reservoir

Month	Net Evaporation (inches)	Bbl/acre
January	2.18	1409
February	3.01	1946
March	5.32	3439
April	7.97	5152
May	8.87	5734
June	8.55	5527
July	8.4	5430
August	7.1	4590
September	4.67	3019
October	3.59	2320
November	2.79	1804
December	2.15	1390
Totals	64.6	41,760

REFERENCES

Hendrickson, G. E., and Jones, R. S., 1952, Geology and groundwater resources of Eddy County, New Mexico.

Kelley, Vincent C., 1971, Geology of the Pecos Country, Southeastern New Mexico.

CLIENT Loco Hills Water Disposal Co.

LOCATION NWNW Sec 21 T 17 S R 30 E, Eddy County, 806W & 540N New Mexico

DATE 12/29/80

WELL NUMBER TH 1

ELEVATION 3658.9

S.W.L. No Water

CASING 3" PVC 0' to 50'

PERFORATIONS Slots 100' to 150'

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: Chester F. Skrabacz

This location is approximately 75' SE of abandoned caliche pit which formerly measured 75 x 150' ± 250' SW of Arco #1-C McIntyre oil wells.

INTERVAL	DESCRIPTION	POROSITY
0- 10	80% Sand; pink-red, medium to coarse grain, quartzitic, round to subround, loose	
	20% Caliche; red-white, calcareous sandstone	good
10- 20	As Above	good
20- 30	100% Sand, fine-medium-coarse, reddish, loose, subround, quartzitic	good
30- 40	70% Siltstone; pinkish, very fine sand and silt	
	20% Red clay with sand	
	10% Caliche; sandstone, trace gravels and calcareous snad	fair
40- 50	75% Silty clay and sandy clay, pink to red	
	25% Clay, reddish	none-sl
50- 80	100% Sand; fine-medium-coarse, reddish, loose, subround to round, quartzitic,	
	trace siltstone	good
80- 90	90% Siltstone; pinkish, argillaceous and sandy; 10% Clay	None
	Dry hole drilling started to inject some water to keep hole from slumping	
90-100	70% Sandstone and silt; pink-red, slightly argillaceous	
	30% Clay, reddish with sand	Sl-none
100-150	100% Clay; reddish-brown, slight sandy, few hard streaks sandstone	none
	Total Depth: 150' Jet from total depth, no fluid; wait 3 minutes, jet again, no fluid	
	Top of Triassic: 9'	
	Drillers:	
0- 9	Caliche	
9-100	Sandy clay and sand	
100-150	Heavy clay with sand streaks	
	Drillers water from Caprock Water Co., Loco Hills. Checked chlorides 30 ppm.	

CLIENT Loco Hills Water Disposal Co.

LOCATION Approx. Center of Section 17 T 17 S R 30 E, Eddy Co, New Mexico

DATE 12/29/80 2129' FEL 1960' FS

WELL NUMBER TH 2

ELEVATION 3668.9 topo

S.W.L.

CASING

PERFORATIONS

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: C. F. Skrabacz

138' West of oil well #2-F, General American McIntyre.

INTERVAL	DESCRIPTION	POROSI
0- 10	100% Caliche; white calcareous sandstone, some free limestone	slight
10- 20	80% Sand; reddish, fine-medium, subround, loose, quartzitic with caliche	
	20% Clay, choc-red	very sl
20- 30	100% Sand, red-orange, round-subround, loose, fine-medium, quartzitic with	
	some clay	none
30- 40	100% Clay; reddish-chocolate, silty	none
40- 60	100% Sand; red-orange, fine-medium, loose, slightly argillaceous	slight
60- 70	100% Clay; reddish-brown, very silty	none
70- 90	100% Sand; fine-medium-coarse, reddish-orange, argillaceous	slight
90-100	100% Clay, red-brown and silt.	none
	Hole dry. Driller started to inject drilling fluid @ 100'.	
100-110	100% Clay and sand, reddish-brown (mix)	none
110-140	75% Sand, fine-medium, red-brown, loose to argillaceous	
	25% red clay and silt	sl-none
140-150	100% Clay; red-brown, sandy	none
	Total Depth: 150' Jet from 150', no water. Waited 3 minutes jet again 150', no fluids	
	Top of Triassic: 14'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION c/Section 16, T 17 S R 30 E, Eddy Co. New Mexico
DATE 12/29/80 1780 S; 2540 W
WELL NUMBER TH 3
ELEVATION 3667.3 topo

S.W.L. No Water
CASING 3" PVC 0 - 153'
PERFORATIONS 100 - 153'
DRILLER L. Scarborough, Lamesa, Texas
GEOLOGIST: C. F. Skrabacz

212' SE of oilwell Texas American #3 Etz State

INTERVAL	DESCRIPTION	POROSITY
0- 10	100% Caliche; white, calcareous, sandstone, some limestone	slight
10- 20	30% Caliche; 70% Siltstone and clay; reddish brown, sandy	slight
20- 40	75% Sand; reddish, fine-medium-coarse, loose, subround, quartzitic	
	20% Caliche; 5% Clay	slight
40- 50	95% Sand; reddish, fine-medium with clay; 5% caliche	fair-good
50- 80	90% Sand; reddish, fine-medium, subround, loose, quartzitic; 10% silty clay	fair-sl
80-120	95% Sand; As Above; 5% clay streak	fair-good
120-153	75% Sand; 25% Clay, reddish, sandy	fair-good
	Total Depth: 153' Jet @ 153' no water; waited 10 minutes, jetted again, no water in hole.	
	Top of Triassic: 11'	

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co. S.W.L. None

LOCATION c/section 21, T 17 S R 30 E, Eddy County, 2386 FN 2325 FW New Mexico CASING

DATE 12/30/80 PERFORATIONS

WELL NUMBER TH 4 DRILLER L. Scarborough, Lamesa, Texas

ELEVATION 3647.2 Surv. GEOLOGIST: C. Skrabacz

Location 90' SE of Oilwell Petroleum Corp. of Texas #4, Berry 'A' SE/4 NW/4 Sec 21 T17S R30E

INTERVAL	DESCRIPTION	POROSI
0- 10	100% Caliche, white, calcareous, sandstone, some red loose sand	
10- 30	30% Caliche; 40% red loose sand; 30% gravels up to 3/8"	
30- 40	40% Sand, red loose, medium-coarse; 60% red argillaceous sand	
40- 50	100% Clay, red with sand	
50- 80	75% Sand, fine-medium-coarse, red, loose; 25% red clay	
80-100	50% Sand; 50% clay	
100-150	75% Sand; 25% Clay	
150-170	As Above	
170-180	Gravel up to 1"	
	Samples drilled with water and not distinguishable	
180-200	60% red sandy clay; 40% Sand	
	Jetted - no water from 200'	
	Top of Triassic: 11'	
	No PVC	
	Drillers log:	
0- 11	Caliche	
11- 35	Sand-sandy clay	
35-145	Clay & sand	
145-175	Sand & Gravel	
175-180	Clay	
180-200	Sand & Gravel	

CLIENT Loco Hills Water Disposal Co.

LOCATION Sec 19, T17S, R30E, Eddy County, N.M. 1350' FE 2500'FS

DATE 12/30/80

WELL NUMBER TH 5

ELEVATION 3625 topo

S.W.L.

CASING

PERFORATIONS

DRILLER L. Scarborough, Lamesa, Texas

GEOLOGIST: C. Skrabacz

50' SW of oil well General American No. 25-A Burch SE/4 Sec 19, T17S R30E

INTERVAL	DESCRIPTION	POROSITY
0- 10	75% red siliceous sandstone; some white calcareous sandstone	
	25% red loose sand	none
10- 20	20% caliche; 80% clay, firm, red-brown	none
30	100% Sand; reddish, medium-coarse, loose to cemented with clay	slight
40	70% As Above; 30% Sandy firm clay	none-sl
50	20% Caliche; 60% Sand; medium-coarse, loose to slightly argillaceous	
	20% Clay, red	slight
50- 60	100% Clay, red, firm, some sand	none
60- 90	100% Sand, loose, red, fine-medium-coarse, subround	good
90-100	70% Sand; 30% Gravel	
100-130	40% Sand, fine-medium-coarse, loose, 60% Clay	
	Total Depth: 130' Abd hole. Hole too large, no circulation or control	
	Drillers log	
0- 11	Caliche	
11- 65	Clay with sand streaks	
65-130	Sand with some clay	
	Top of Triassic: 11'	

ED L. REED & ASSOCIATES, INC.
CONSULTING HYDROLOGISTS
MIDLAND-SAN ANGELO, TEXAS

SAMPLE DESCRIPTION

CLIENT Loco Hills Water Disposal Co.
LOCATION NW SW/4 Sec 21, T17S R30E, Eddy County New Mexico
DATE 12/31/80 1338 FSL, 112 FWL
WELL NUMBER TH 6
ELEVATION 3624.4 Surv.

S.W.L.
CASING
PERFORATIONS
DRILLER

Location is 337' south & little west of Holly #H-2 Brigham SWD Sec 21 , 17S R30E, 1650'S-330'W

INTERVAL	Drilling with water DESCRIPTION	POROSITY
0- 10	70% red fine-medium, loose sand; 30% Caliche, white, calcareous sand	fair
10- 30	100% Sand, red in heavy clay	none
30- 40	70% Sand, red, fine grain in clay; 30% loose sand	none
40- 50	100% Sand in heavy clay (red)	none
50- 80	100% Clay; reddish, firm with sand	none
80-100	100% Sand; reddish in heavy clay	none
100-110	100% Clay, red firm sandy	none
110-120	70% Gravel; loose, round, up to 3/8"; 20% Sand; 10% Clay	fair
120-130	30% Sand & gravel; 70% Sand in heavy clay	slight
130-140	100% Clay; red firm sandy	none
140-150	100% Sand in heavy clay (soft)	none
150-180	70% Sand in heavy clay; 30% Clay, firm	none
180-200	80% Sand in clay and 20% clay, light colored	slight
200-220	As Above	
220-230	60% Sand in heavy clay; 40% Anhydrite, tan-white, fine crystalline	none
230-260	40% White, dense, fine crystalline anhydrite; 50% white soft gypsum	
	10% red clay	slight
260-270	30% Anhydrite; 30% gypsum, 40% orange siltstone	
270-280	70% Anhydrite; 30% gypsum	
280-300	40% Anhydrite; white, fine crystalline; 50% gypsum, white, chalky, purplish	
	10% Sand (conglomerate)	
300-320	70% Anhydrite; 20% Gypsum, 10% red clay	
	@ 300' Jetted hole clean, waited 10 minutes; no fluid, waited 20 minutes;	
	no fluid, waited 30 minutes; no fluid.	
	Drill dry to 320'	
	No fluid, dry cutting to surface only	
	Set 3" PVC 0 - 320' Slotted 220' - 320'	
	Drillers Log:	
0- 11	Caliche-Sand	
11- 52	Red Clay	
52- 65	Sand	
65- 71	Clay	
71- 77	Sand & Clay	
77- 85	Red Clay	
85- 93	Sand & Clay	
93-110	Red Clay	
110-124	Sand & Gravel	
124-140	Red Clay	
140-165	Sand & Gravel with clay streak	
165-180	Red Clay	
180-215	Sand & Red Clay	
215-228	Sand-Clay	
228-320	Gypsum, Anhydrite	

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland, Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock windmill No. 1, NWNW, Section 22, T-17-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	1719
Chloride	45
Total Dissolved Solids (Evap. @ 180° C.)	2722

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES
Jack H Barker

Lab. No. 31784

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Midland Texas 1-6-81 File No. C-1950-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 1-2-81

Received from

Identification Marks Eddy County, New Mexico, Jennings & Christy Windmill, 1985 FW, 660 FN, Section 24, T-16-S, R-30-E, 12-30-80, Sampled by Chester Skrabacz.

	mg/L
Chloride	101
Sulfate	242
Total Dissolved Solids @ 180° C.	664

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Jack H Barlow

Lab. No. 31992

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AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Jennings, etal, Stock Windmill No. 4
Section 24, T-18-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	442
Chloride	28
Total Dissolved Solids (Evap. @ 180° C.)	932

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Jack H Baker

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CONSULTING, ANALYTICAL CHEMISTS
AND TESTING ENGINEERS

Midland Texas 9-16-80 File No. C-1902-W

Report of tests on Water

To Ed L. Reed & Associates Date Rec'd. 9-3-80

Received from

Identification Marks Eddy County, New Mexico, Hennings, etal, Stock Windmill No. 3
SESW Section 10, T-18-S, R-29-E, 8-28-80, Sampled by Chester Skrabacz.

	mg/L
Sulfate	2088
Chloride	2035
Total Dissolved Solids (Evap. @ 180° C.)	6882

3cc Ed L. Reed & Associates

SOUTHWESTERN LABORATORIES

Jack H Barton

Lab. No. 31785

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