CAR 3014: Appl[illegible] pressure maintenance [illegible] injection of water th[illegible]

Case No.

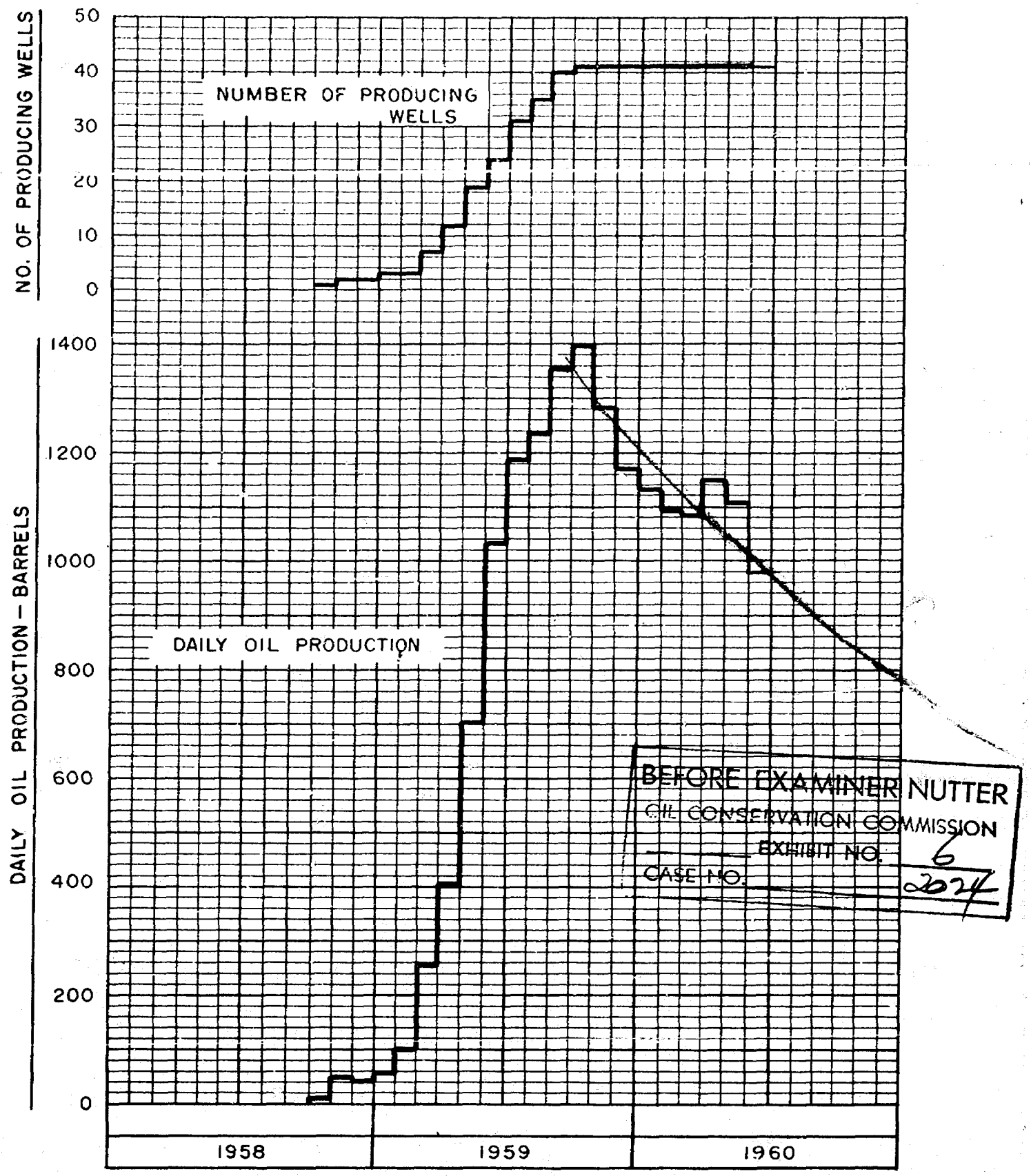
2024

Application, Transcript,

Small Exhibits, Etc.

HORSESHOE GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO
HUMBLE WELL DATA

Lease & Well	Total Depth	Production Casing Size	Depth Set-Feet	Estimated Top of Cement Feet	Perforated Interval	Completion Date	Initial Potential Barrels of Oil/Day	Initial Potential GOR Cu.Ft./Bbl.	May - 1960 Production Barrels of Oil/Day	May - 1960 Production GOR Cu.Ft./Bbl	Cumulative Oil Prod. to 6-1-60 Bbls.	~~June 1960~~ Allowable Bbls/Day	Waterflood Well Status
Humble Navajo Tribe of Indians													
F-1	1227	4-1/2	1227	700	1147-60	11-5-58	30	167	11	166	11,538	15	Inj.
F-2	1152	4-1/2	1118	155 (Survey)	1118-52	10-20-58	39	182	22	139	12,917	15	Prod.
F-3	1136	4-1/2	1128	600	1084-1100 1105-1116	1-26-59	117	129	60	138	24,150	3)	Inj.
F-4	1153	4 DP	1131	600	1078-1094	3-5-59	77	156	31	150	20,055	3)	Prod.
F-5	1047	4 DP	1045	500	1014-1032	3-17-59	63	778	51	144	20,754	5.	Prod.
F-6	1024	4 DP	1021	500	966-990	3-20-59	72	620	60	52	21,730	6.	Prod.
F-7	1080	4 DP	1069	500	1031-1041	4-12-59	24	143	10	98	6,511	1.	Prod.
F-8	972	4 DP	969	400	912-937	3-30-59	71	37	60	14	21,812	6.	Inj.
F-9	924	4 DP	923	400	877-902	4-8-59	124	3096	19	5526	6,985	2*	Inj.
F-10	1048	4 DP	1046	500	990-1002	4-14-59	23	269	12	269	7,298	1.	Prod.
F-11	917	4 DP	914	300	880-894	4-20-59	62	228	9	405	12,303	(	Inj.
F-12	1000	4 DP	998	400	954-967	4-20-59	96	83	60	6	20,704	5(	Prod.
F-13	921	4 DP	919	400	884-897	5-4-59	81	99	60	13	20,166	5(	Prod.
F-14	860	4 DP	850	300	826-836	5-1-59	Associated Gas Well		-	-	-	-	Inj.
F-15	968	5	967	300	910-922	7-2-59	60	100	23	43	11,220	2(	Inj.
F-16	975	5	973	300	922-931	6-27-59	60	100	6	177	9,036	(	Prod.
F-17	954	4 DP	952	400	916-928	5-10-59	85	46	23	14	14,379	2.	Inj.
F-18	1027	4 DP	1025	300	978-999	5-17-59	56	77	21	95	14,791	2.	Inj.
F-19	1047	5	1045	300	1004-1016	5-20-59	108	18	49	52	18,461	4(	Prod.
F-20	975	5	974	300	945-963	5-26-59	115	225	54	11	18,890	5(	Prod.
F-21	998	5	997	300	962-979	6-2-59	61	104	38	108	16,134	3(	Inj.
F-22	995	5	994	300	931-964	6-2-59	120	207	24	44	14,764	2(	Inj.
F-23	1040	5	1037	400	980-1010	6-14-59	78	150	60	100	17,915	6.	Inj.
F-24	1045	5	1043	400	996-1012	6-4-59	63	189	40	81	15,145	4(	Inj.
F-25	1109	5	1105	500	1030-1060	7-13-59	77	100	60	9	16,420	6.	Inj.
F-26	1138	5	1131	500	1054-1068	7-6-59	62	100	52	226	14,297	6.	Prod.
F-27	1092	5	1088	400	1056-1071	7-30-59	41	100	22	46	9,807	2.	Inj.
F-28	1170	5	1152	400	1110-27	7-29-59	30	100	10	245	5,358	1(	Inj.
F-29	1168	5	1161	500	1128-1140	7-11-59	30	TSTM	6	1801	5,511	(	Prod.
F-30	1019	5	983	400	964-973	9-8-59	5	67	5	161	1,527	(	Prod.
F-31	1056	5	1050	450	1012-1022	10-18-59	3	337	3	344	782	(	Inj.
F-32	1076	5	1073	475	1040-1050	9-5-59	6	200	2	516	958	(	Inj.
F-33	1075	5	1071	400	1034-1044	7-19-59	55	100	6	201	10,666	(	Inj.
F-34	1058	5	1053	400	1014-1021	8-7-59	28	353	14	76	5,934	1.	Inj.
F-35	1140	5	1137	475	1085-1095	8-27-59	2	TSTM	3	355	893	(	Prod.
F-36	1022	5	1018	400	981-988	8-26-59	SI	-	-	-	-	-	Inj.
F-37	1156	-	-	-	-	-	Dry, Plugged and Abandoned			-	-	-	Dry
F-38	1125	4-1/2	1122	600	1069-1077	9-16-59	SI	-	-	-	-	-	Inj.
F-39	950	4-1/2	937	514	883-914	9-13-59	70	TSTM	60	83	13,656	6.	Prod.
F-40	911	4-1/2	907	320	851-856	9-8-59	75	173	22	2411	10,640	3*	Inj.
F-41	915	4-1/2	904	300	872-882	8-26-59	160	-	5	27077	5,730	(	Prod.
F-42	1117	-	-	-	-	-	Dry, Plugged and Abandoned			-	-	-	Dry
F-43	1068	4-1/2	1064	668	1005-1010	9-16-59	SI	-	-	-	-	-	Inj.
F-44	-	-	-	-	-	-	Proposed Inj. Well Location			-	-	-	Inj.
G-1	1010	4	1005	400	971-83	5-11-59	104	427	9	87	8,736	1(	Prod.
G-2	930	5	927	300	899-911	5-19-59	100	TSTM	21	45	7,990	2(	Prod.
G-3	992	4-1/2	988	687	932-942	9-28-59	SI	-	-	-	-	-	Inj.
G-4	958	4-1/2	951	200	905-920	8-17-59	106	3325	20	973	5,901	2(	Inj.
G-5	1065	4-1/2	1050	465	1005-1010	9-5-59	SI	-	-	-	-	-	Inj.
G-6	972	4-1/2	969	430	917-927	9-14-59	8	20	6	104	1,612	1(	Inj.
										Totals:	484,076	1124	



PERFORMANCE CURVE

HUMBLE'S NAVAJO "F" & "G" LEASES
HORSESHOE GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO

(Case 2034)

J. M. HERVEY 1874-1953

HIRAM M. DOW
CLARENCE E. HINKLE
W. E. BONDURANT, JR.
GEORGE H. HUNKER, JR.
HOWARD C. BRATTON
S. B. CHRISTY IV
LEWIS C. COX, JR.

PAUL W. EATON, JR.
~~ROBERT C. DECOSSE~~

LAW OFFICES
HERVEY, DOW & HINKLE
HINKLE BUILDING
ROSWELL, NEW MEXICO

TELEPHONE MAIN 2-6510
POST OFFICE BOX 547

July 5, 1960

Mr. A. L. Porter, Jr., Secretary-Director
New Mexico Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Dear Mr. Porter:

We enclose in triplicate application of the Humble Oil & Refining Company for approval of the pressure maintenance and secondary recovery project in a portion of the Horseshoe-Gallup Oil Pool embraced by Humble's "F" and "G" Navajo Indian leases. You will also find enclosed copies of logs of all of the proposed injection wells which are referred to in the application as Exhibit "B". We only had one copy of the well logs and if you consider it necessary to file two additional copies please advise and we will do so; however, I would not want the delay in getting the additional copies to you to delay the hearing on this matter.

We would like to have this matter advertised and set down for the examiner's hearing which I understand is to be set for July 27.

We are preparing a similar application covering the Honolulu Oil Company's leases which adjoin the Humble leases which will probably be forwarded to you tomorrow. If possible, we would like to have the Honolulu case appear on the docket next to the Humble case as we intend to request that they be consolidated for the hearing inasmuch as the evidence will be applicable to both cases.

We would appreciate your sending us a copy of the notice in connection with this matter.

Yours sincerely,

HERVEY, DOW & HINKLE

By

CEH/bp
Encl.

cc: Mr. H. E. Meadows
Mr. W. G. Dutton

No. 21-60

DOCKET: EXAMINER HEARING JULY 27, 1960

Oil Conservation Commission - 9 a.m., Mabry Hall, State Capitol, Santa Fe, N.M.

The following cases will be heard before Daniel S. Nutter, Examiner, or Oliver E. Payne, Attorney, as alternate Examiner:

CASE NOS. 2023 through 2033 will not be heard before 1 p.m. on July 27, 1960.

CASE NOS. 2034 through 2040 will not be heard before 9 a.m. on July 28, 1960.

CASE 2017: Application of Continental Oil Company for an order authorizing an automatic custody transfer system to handle the Maljamar Pool production from its Miller "BX" lease comprising in pertinent part the E/2 of Section 14, Township 17 South, Range 32 East, Lea County, New Mexico.

CASE 2018: Application of Continental Oil Company for an order authorizing the triple completion of its Jicarilla Apache Well No. 27-2, located in the NW/4 NW/4 of Section 27, Township 25 North, Range 4 West, Rio Arriba County, New Mexico, in such a manner as to permit the production of oil from the Gallup formation, the production of oil from the Greenhorn formation and the production of oil from the Dakota formation through parallel strings of 4½ inch, 2 7/8 inch, and 4½ inch casing cemented in a common well bore. Applicant proposes to install tubing to the Gallup and the Dakota formations.

CASE 2019: Application of Continental Oil Company for an order authorizing the triple completion of its Northeast Haynes Apache Well No. 9-1, located in the NW/4 SW/4 of Section 9, Township 24 North, Range 5 West, Rio Arriba County, New Mexico, in such a manner as to permit the production of gas from the Mesaverde formation, the production of gas from the gallup formation and the production of gas from the Greenhorn formation through parallel strings of 2 7/8 inch, 4½-inch, and 4½-inch casing respectively, cemented in a common well bore. Applicant also proposes to install tubing in the latter two zones.

CASE 2020: Application of Amerada Petroleum Corporation for an order authorizing the triple completion of its Wimberly Well No. 13, located in Unit M, Section 24, Township 25 South, Range 37 East, Lea County, New Mexico, in such a manner as to permit the production of gas from the Langlie Mattix Pool, the disposal of salt water into the Grayburg and San Andres formations in the interval from 3500 feet to 4200 feet, and the production of oil from the Justis-Blinebry Pool by means of two parallel strings of 3½-inch casing cemented in a common well bore. Applicant would dispose of the salt water through one string of casing, produce the Blinebry oil through 1½-inch tubing set in the second string of casing, and produce Langlie Mattix gas through the annulus of the 1½-inch tubing and the second casing string.

CASE 2021: Application of Shell Oil Company for authority to recomplete its State BUA Well No. 2 (formerly its Bluitt Unit Well No. 2) at an unorthodox oil well location in the Pennsylvanian formation within one mile of the Bluitt Pennsylvanian Pool. Said well is located 1980 feet from the North line and 660 feet from the West line of Section 16, Township 8 South, Range 37 East, Roosevelt County, New Mexico.

CASE 2022: Application of Sinclair Oil & Gas Company for an order authorizing the dual completion of its Turner "B" SP Well No. 67, located in Unit L, Section 20, Township 17 South, Range 31 East, Eddy County, New Mexico, in such a manner as to permit the production of oil from the Grayburg-Jackson Pool and the production of oil from an undesignated Abo pool through parallel strings of 2-inch tubing.

The following cases will not be heard before 1 p.m. on July 27, 1960:

CASE 2023: Application of Honolulu Oil Corporation for an order authorizing it to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool by the injection of water into the Gallup formation through its Navajo Well No. 4, located in the SE/4 SE/4 of Section 5, Township 31 North, Range 17 West, San Juan County, New Mexico; applicant further seeks the adoption of special rules governing the operation of said project.

CASE 2024: Application of Humble Oil & Refining Company for an order authorizing it to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool by the injection of water into the Gallup formation through 29 wells located in Sections 3, 4, 9, 10, and 11, Township 31 North, Range 17 West, San Juan County, New Mexico; Applicant further seeks the adoption of special rules governing the operation of said project.

CASE 2025: Application of Socony Mobil Oil Company for permission to convert to water injection its Navajo "A" Well No. 9, located in NE/4 NW/4 of Section 14, Township 31 North, Range 17 West, Rio Arriba County, New Mexico, in conjunction with a proposed adjacent pressure maintenance project in the Horseshoe-Gallup Oil Pool.

CASE 2026: Application of The British American Oil Producing Company for an order authorizing the "slim-hole" completion of its Fullerton Well No. 7, located 1850 feet from the South and West lines of Section 11, Township 27 North, Range 11 West, Dakota Producing Interval, San Juan County, New Mexico, utilizing 2 7/8-inch tubing as casing.

CASE 2027: Application of Hondo Oil & Gas Company for an amendment of Order No. R-1643 to provide an alternative to the fail-safe features required in the automatic custody transfer system authorized therein for the Hondo-Western-Yates State 647 lease, Empire-Abo Pool, Eddy County, New Mexico.

CASE 2028: Application of Pan American Petroleum Corporation for an order authorizing it to commingle the production from the Empire-Abo Pool from all wells on eight separate leases in Sections 27 and 34, Township 17 South, Range 28 East, Eddy County, New Mexico. Applicant also seeks authorization of an automatic sustody transfer system to handle said commingled production.

CASE 2029: Application of Pan American Petroleum Corporation for an amendment of Order R-1399 to permit the commingling of Empire-Abo Pool production from Federal Lease No. LC-064050-A, E/2 SE/4 of Section 34 and NW/4 SW/4 of Section 35, Township 17 South, Range 27 East, with the Empire-Abo Pool production from those leases for which commingling was approved by paragraph one of said order and to permit the commingling of Empire-Abo Pool production from Federal Lease No. NM-025602, NW/4 and N/2 SW/4 of Section 15, Township 18 South, Range 27 East with the Empire-Abo Pool production from those leases for which commingling was approved by paragraph two of said order. Applicant also seeks an amendment of Order No. R-1399-A to permit production from the above-described leases in Eddy County, to be handled by the automatic custody transfer systems authorized in said order.

CASE 2030: Application of Pan American Petroleum Corporation for permission to commingle the Empire-Abo Pool production from eleven separate State leases in Townships 17 and 18 South, Range 28 East, Eddy County, New Mexico. Applicant further seeks permission to install automatic custody transfer facilities to handle said commingled production.

CASE 2031: Application of Union Oil Company of California for approval of its South Caprock Queen Unit Agreement, which unit is to embrace 9526 acres in Townships 14 and 15 South, Ranges 30 and 31 East, Caprock Queen Pool, Chaves County, New Mexico.

CASE 2032: Application of Union Oil Company of California for an order authorizing it to institute a waterflood project in the Caprock-Queen Pool on its proposed South Caprock Queen Unit by the injection of water into the Queen formation through ten wells located in Township 15 South, Range 31 East, Chaves County, New Mexico, and for authority to drill a water injection well at an unorthodox location, being 330 feet West of the East line and 1320 feet South of the North line of Section 18, Township 15 South, Range 31 East.

CASE 2033: Application of Cabeen Exploration Corporation for permission to complete its State 1-K Well located 1980 feet from the South and West lines of Section 11, Township 10 South, Range 32 East, in an undesignated Permo-Pennsylvanian pool in Lea County, New Mexico as a "slim-hole" completion, using 2-7/8 inch casing.

The following cases will not be heard before 9 a.m. on July 28, 1960

CASE 2034: Application of Gulf Oil Corporation for an order authorizing the dual completion of its J. N. Carson Well No. 6, located 330 feet from the South line and 965 feet from the East line of Section 28, Township 21 South, Range 37 East, Lea County, New Mexico, in such a manner as to permit the production of oil from the Penrose-Skelly Pool and the production of gas from the Blinebry Gas Pool through parallel strings of 2 3/8-inch tubing.

CASE 2035: Application of Gulf Oil Corporation for an order authorizing the dual completion of its W. T. McCormack Well No. 12, located 554 feet from the North line and 1874 feet from the East line of Section 32, Township 21 South, Range 37 East, Lea County, New Mexico, in such a manner as to permit the production of oil from the Drinkard Pool and the production of oil from the Wantz-Abo Pool through parallel strings of 2 3/8-inch tubing.

CASE 2036: Application of Charles Loveless, Jr., for the establishment of a 280-acre non-standard gas unit in the Atoka-Pennsylvanian Gas Pool consisting of the NE/4, N/2 NW/4 and SW/4 NW/4 of Section 21, Township 18 South, Range 26 East, Eddy County, New Mexico. Applicant proposes that said unit be dedicated to the Brunner No. 1 Dayton Townsite Well to be located on an unorthodox location at a point 1650 feet from the North line and 2310 feet from the East line of said Section 21.

CASE 2037: Application of Sun Oil Company for the creation of a new oil pool for Wolfcamp production to be designated as the Jenkins-Wolfcamp pool and to consist of Sections 2, 3, 4, 8, 9, 10 and 11 of Township 9 South, Range 34 East, Lea County, and Sections 34 and 35, Township 8 South, Range 34 East, Roosevelt County, New Mexico. Applicant further seeks the promulgation of special rules and regulations for said pool including a provision for 80-acre drilling and proration units.

CASE 2038: Application of Benson-Montin-Greer Drilling Corporation for an order authorizing the dual completion of the Jones Well No. 1, located in Unit P, Section 17, Township 28 North, Range 13 West, San Juan County, New Mexico, in such a manner as to permit the production of oil from an undesignated Gallup Pool and the production of gas from the West Kutz-Dakota Pool through parallel strings of 1½-inch OD tubing.

CASE 2039: Application of Southwest Production Company for approval of an unorthodox oil well location in the Gallegos-Gallup Oil Pool for its Rummel Federal Well No. 1, located 790 feet from the North line and 1190 feet from the West line of Section 36, Township 27 North, Range 12 West, San Juan County, New Mexico.

CASE 2040: Application of Neville G. Penrose, Inc., for an order authorizing the dual completion of its Grizzel Well No. 1, located in Unit G, Section 5, Township 22 South, Range 37 East, Lea County, New Mexico, in such a manner as to permit the production of gas from the Tubb Gas Pool and the production of oil from the Drinkard Pool through the casing-tubing annulus and 2 3/8-inch tubing respectively.

BEFORE THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO

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

CASE No. 2024
Order No. R-1745

APPLICATION OF HUMBLE OIL & REFINING
COMPANY FOR A PRESSURE MAINTENANCE
PROJECT IN THE HORSESHOE-GALLUP OIL
POOL, SAN JUAN COUNTY, NEW MEXICO,
AND FOR THE PROMULGATION OF SPECIAL
RULES GOVERNING THE OPERATION OF
SAID PROJECT.

ORDER OF THE COMMISSION

BY THE COMMISSION:

This cause came on for hearing at 9 o'clock a.m. on July 27, 1960, at Santa Fe, New Mexico, before Daniel S. Nutter, Examiner duly appointed by the Oil Conservation Commission of New Mexico, hereinafter referred to as the "Commission," in accordance with Rule 1214 of the Commission Rules and Regulations.

NOW, on this 9th day of August, 1960, the Commission, a quorum being present, having considered the application, the evidence adduced, and the recommendations of the Examiner, Daniel S. Nutter, 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, Humble Oil & Refining Company, proposes to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, by the injection of water into the Gallup formation through 29 wells initially, all of which wells are within the proposed project area which consists of the following-described acreage:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM
Section 3: SW/4 SE/4, S/2 SW/4 and NW/4 SW/4
Section 4: N/2 NW/4, S/2 N/2 and S/2
Section 9: N/2 N/2, SE/4 NW/4, S/2 NE/4, N/2 SE/4 and SE/4 SE/4
Section 10: N/2, N/2 S/2, SW/4 SW/4 and SW/4 SE/4
Section 11: SW/4 NW/4, SW/4 and SW/4 SE/4

(3) That in regard to provisions governing allowables for the project, the applicant seeks an order identical to the one approved

for The Atlantic Refining Company in Case No. 1979, Order No. R-1699, which order provides that top unit allowable is to be assigned to each injection well and that the allowable assigned to any producing well in the project area shall be no greater than the demonstrated ability of the well to produce, subject to top unit allowable for the pool. In the case of curtailed or shut-in producing wells, the allowable shall be no greater than the demonstrated ability of such well to produce as reflected by a 24-hour test at a stabilized rate of production immediately prior to such shut-in or curtailment. In no event is such allowable to be greater than the current normal unit allowable for the Horseshoe-Gallup Oil Pool during the month of transfer.

(4) That the applicant also proposes that an administrative procedure be established whereby the pressure maintenance project may be expanded for good cause shown, and whereby additional wells in the project area may be converted to water injection.

(5) That Special Rules and Regulations for the operation of the Horseshoe-Gallup Pressure Maintenance Project Number 2 should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project in any proportion, provided that no well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply should be allowed to produce in excess of top unit allowable for the Horseshoe-Gallup Oil Pool until such time as the well has experienced a substantial response to water injection. When such a response has occurred, the well should be permitted to produce up to two times top unit allowable for the Horseshoe-Gallup Oil Pool. Production of such well at a higher rate should be authorized only after notice and hearing.

IT IS THEREFORE ORDERED:

(1) That the applicant be and the same is hereby authorized to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, to be designated as the Horseshoe-Gallup Pressure Maintenance Project No. 2, by the injection of water into the Gallup formation through the following-described wells in Township 31 North, Range 17 West, NMPM, San Juan County, New Mexico:

Navajo "F" Well No. 1, Unit D, Section 4
Navajo "F" Well No. 3, Unit L, Section 4
Navajo "F" Well No. 8, Unit E, Section 10
Navajo "F" Well No. 9, Unit K, Section 10
Navajo "F" Well No. 11, Unit I, Section 10
Navajo "F" Well No. 14, Unit M, Section 10
Navajo "F" Well No. 15, Unit J, Section 9
Navajo "F" Well No. 17, Unit G, Section 10
Navajo "F" Well No. 18, Unit C, Section 10

Navajo "F" Well No.	21,	Unit D,	Section 10
Navajo "F" Well No.	22,	Unit H,	Section 9
Navajo "F" Well No.	23,	Unit B,	Section 9
Navajo "F" Well No.	24,	Unit P,	Section 4
Navajo "F" Well No.	25,	Unit N,	Section 4
Navajo "F" Well No.	27,	Unit J,	Section 4
Navajo "F" Well No.	28,	Unit F,	Section 4
Navajo "F" Well No.	31,	Unit N,	Section 3
Navajo "F" Well No.	32,	Unit L,	Section 3
Navajo "F" Well No.	33,	Unit D,	Section 9
Navajo "F" Well No.	34,	Unit F,	Section 9
Navajo "F" Well No.	36,	Unit A,	Section 10
Navajo "F" Well No.	38,	Unit H,	Section 4
Navajo "F" Well No.	40,	Unit P,	Section 9
Navajo "F" Well No.	43,	Unit O,	Section 3
Navajo "F" Well No.	44,	Unit O,	Section 10
Navajo "G" Well No.	3,	Unit K,	Section 11
Navajo "G" Well No.	4,	Unit M,	Section 11
Navajo "G" Well No.	5,	Unit O,	Section 11
Navajo "G" Well No.	6,	Unit E,	Section 11

(2) That Special Rules and Regulations governing the operation of the Horseshoe-Gallup Pressure Maintenance Project No. 2, San Juan County, New Mexico, be and the same are hereby promulgated as follows, effective September 1, 1960:

SPECIAL RULES AND REGULATIONS
FOR THE HORSESHOE-GALLUP PRESSURE
MAINTENANCE PROJECT NO. 2

RULE 1. The project area of the Horseshoe-Gallup Pressure Maintenance Project No. 2, hereinafter referred to as the Project, shall comprise that area described as follows:

TOWNSHIP 31 NORTH, RANGE 17 WEST, NMPM

Section 3:	SW/4 SE/4, S/2 SW/4 and NW/4 SW/4
Section 4:	N/2 NW/4, S/2 N/2 and S/2
Section 9:	N/2 N/2, SE/4 NW/4, S/2 NW/4, N/2 SE/4 and SE/4 SE/4
Section 10:	N/2, N/2 S/2, SW/4 SW/4 and SW/4 SE/4
Section 11:	SW/4 NW/4, SW/4 and SW/4 SE/4

RULE 2. The allowable for the Project shall be the sum of the allowables of the several wells within the project area, including those wells which are shut-in, curtailed, or used as injection wells. Allowables for all wells shall be determined in a manner hereinafter prescribed.

RULE 3. Allowables for injection wells may be transferred to producing wells within the project area, as may the allowables for producing wells which, in the interest of more efficient

operation of the Project, are shut-in or curtailed because of high gas-oil ratio or are shut-in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

RULE 4. The allowable assigned to any well which is shut-in or which is curtailed in accordance with the provisions of Rule 3, which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test prescribed by Rule 6, below, or greater than the current top unit allowable for the pool during the month of transfer, whichever is less.

RULE 5. The allowable assigned to any injection well on a 40-acre proration unit shall be top unit allowable for the Horseshoe-Gallup Oil Pool.

RULE 6. The allowable assigned to any well which is shut-in or curtailed in accordance with Rule 3, shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the Horseshoe-Gallup Oil Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission, if they so desire.

RULE 7. The allowable assigned to each producing well in the Project shall be equal to the well's ability to produce or to top unit allowable for the Horseshoe-Gallup Oil Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of top unit allowable for the pool until such time as the well receives a substantial response to water injection. When such a response has occurred, the well shall be permitted to produce up to two times top unit allowable for the Pool. Production of such well at a higher rate shall be authorized only after notice and hearing. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the Horseshoe-Gallup Oil Pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net" gas-oil ratio basis, which net gas-oil ratio shall be determined by applying credit for daily average gas injected, if any, into the Horseshoe-Gallup Oil Pool within the project area to such high gas-oil ratio well. The daily adjusted

oil allowable for any well receiving gas injection credit shall be determined in accordance with the following formula:

$$A_{adj} = \frac{TUA \times F_a \times 2{,}000}{\frac{P_g - I_g}{P_o}}$$

where:

A_{adj} = the well's daily adjusted allowable

TUA = top unit allowable for the pool

F_a = the well's acreage factor

P_g = average daily volume of gas produced by the well during the preceding month, cubic feet

I_g = the well's allocated share of the daily average gas injected during the preceding month, cubic feet

P_o = average daily volume of oil produced by the well during the preceding month, barrels

In no event shall the amount of injected gas being credited to a well be such as to cause the net gas-oil ratio, $\frac{P_g - I_g}{P_o}$, to be less than 2,000 cubic feet of gas per barrel of oil produced.

RULE 8. Credit for daily average net water injected into the Horseshoe-Gallup Oil Pool through any injection well located within the project area may be converted to its gas equivalent and applied to any well producing with a gas-oil ratio in excess of two thousand cubic feet of gas per barrel of oil. Total credit for net water injected in the project area shall be the gas equivalent volume of the daily average net water injected during a one-month period. The daily average gas equivalent of net water injected shall be computed in accordance with the following formula:

$$E_g = (V_{w\ inj} - V_{w\ prod}) \times 5.61 \times \frac{P_a}{15.025} \times \frac{520^\circ}{T_r} \times \frac{1}{Z}$$

where:

E_g = Average daily gas equivalent of net water injected, cubic feet

$V_{w\ inj}$ = Average daily volume of water injected, barrels

$V_{w\ prod}$ = Average daily volume of water produced, barrels

5.61 = Cubic foot equivalent of one barrel of water

P_a = Average reservoir pressure at mid-point of the pay-zones of Horseshoe-Gallup Oil Pool in project area, psig + 12.01, as determined from most recent survey

15.025 = Pressure base, psi

520^o = Temperature base of 60^oF expressed as absolute temperature

T_r = Reservoir temperature of 87^oF expressed as absolute temperature (547^oR)

Z = Compressibility factor from analysis of Horseshoe-Gallup gas at average reservoir pressure, P_a, interpolated from compressibility tabulation below:

Reservoir Pressure	Z	Reservoir Pressure	Z	Reservoir Pressure	Z
50	.9725	300	.8325	500	.6560
100	.9465	350	.8030	600	.6135
150	.9215	400	.7710	650	.5655
200	.8885	450	.7220	700	.5220
250	.8600	500	.6900	750	.4630
				800	.3935

RULE 9. Each month the project operator shall, within three days after the normal unit allowable for Northwest New Mexico has been established, submit to the Commission a Pressure Maintenance Project Operator's Report, on a form prescribed by the Commission, outlining thereon the data required, and requesting allowables for each of the several wells in the Project as well as the total Project allowable. The aforesaid Pressure Maintenance Project Operator's Report shall be filed in lieu of Form C-120 for the Project.

RULE 10. The Commission shall, upon review of the report and after any adjustments deemed necessary, calculate the allowable for each well in the Project for the next succeeding month in accordance with these rules. The sum of the allowables so calculated shall be assigned to the Project and may be produced from the wells in the Project in any proportion except that no well in the Project which directly or diagonally offsets a well outside the Project producing from the same common source of supply shall produce in excess of two times top unit allowable for the Pool.

RULE 11. The conversion of producing wells to injection, the drilling of additional wells for injection, and expansion of the project area shall be accomplished only after approval of the same by the Secretary-Director of the Commission. To obtain such approval, the Project operator shall file proper application with the Commission, which application, if it seeks authorization to convert additional wells to injection or to drill additional injection wells shall include the following:

(1) A plat showing the location of proposed injection well, all wells within the project area, and offset operators, locating wells which offset the project area.

(2) A schematic drawing of the proposed injection well which fully describes the casing, tubing, perforated interval, and depth showing that the injection of gas or water will be confined to the Gallup formation.

(3) A letter stating that all offset operators to the proposed injection well have been furnished a complete copy of the application and the date of notification.

The Secretary-Director may approve the proposed injection well if, within 20 days after receiving the application, no objection to the proposal is received. The Secretary-Director may grant immediate approval, provided waivers of objection are received from all offset operators.

Expansion of the project area may be approved by the Secretary-Director of the Commission administratively when good cause is shown therefor.

DONE at Santa Fe, New Mexico, on the day and year herein-above designated.

STATE OF NEW MEXICO
OIL CONSERVATION COMMISSION

JOHN BURROUGHS, Chairman

MURRAY E. MORGAN, Member

A. L. PORTER, Jr., Secretary-Director

esr/

GOVERNOR
JOHN BURROUGHS
CHAIRMAN

State of New Mexico
Oil Conservation Commission

LAND COMMISSIONER
MURRAY E. MORGAN
MEMBER

STATE GEOLOGIST
A. L. PORTER, JR.
SECRETARY DIRECTOR

P. O. BOX 871
SANTA FE

August 9, 1960

Mr. Howard Bratton
Hervey, Dow & Hinkle
Box 547
Roswell, New Mexico

Re: Case No. 2024
Order No. R-1745
Applicant:

Humble Oil & Refining Co.

Dear Sir:

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

Very truly yours,

A. L. PORTER, Jr.,
Secretary-Director

ir/

Carbon copy of order also sent to:

Hobbs OCC X
Artesia OCC
Aztec OCC X

Other

BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
Gpp EXHIBIT NO. 1
CASE NO. 2024

EXHIBIT 1

AREA MAP OF HORSESHOE GALLUP FIELD SAN JUAN COUNTY, NEW MEXICO

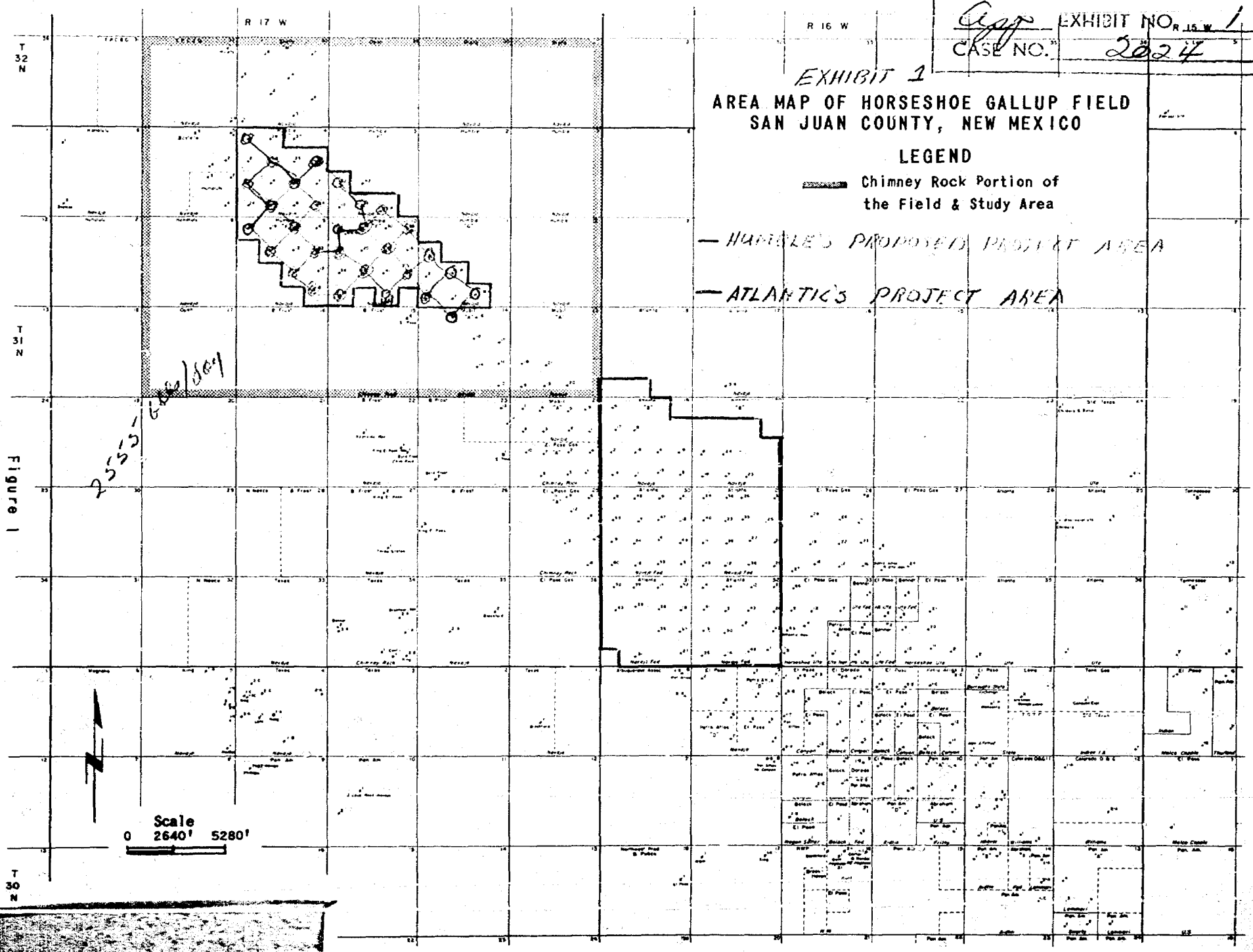


Figure 1

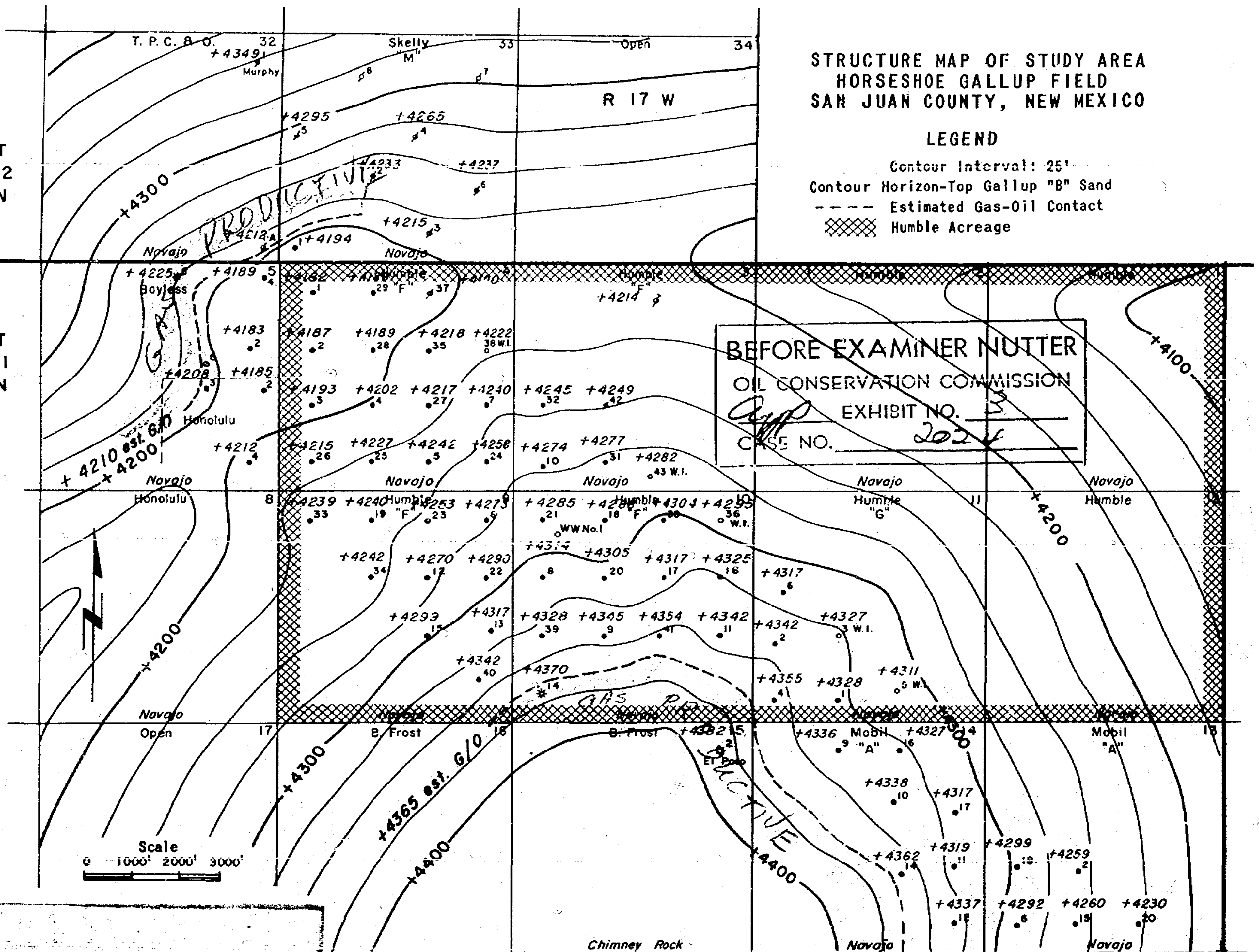

STRUCTURE MAP OF STUDY AREA
HORSESHOE GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO
LEGEND
Contour Interval: 25'
Contour Horizon-Top Gallup "B" Sand
Estimated Gas-Oil Contact
Humble Acreage
BEFORE EXAMINER NUTTER
OIL CONSERVATION COMMISSION
EXHIBIT NO. 3
CASE NO. 2024
R 17 W
T 32 N
T 31 N
T. P. C. & O.
Skelly "M"
Open
Murphy
Navajo
Humble
Humble "F"
Humble "G"
Boyless
Honolulu
B. Frost
Mobil "A"
El Paso
Chimney Rock
WW No. 1
+4100
+4200
+4300
+4400
+4210 est. G/O
+4365 est. G/O
Scale
0 1000' 2000' 3000'

Figure 2

BEFORE THE
OIL CONSERVATION COMMISSION
SANTA FE, NEW MEXICO
JULY 27, 1960

EXAMINER HEARING

IN THE MATTER OF:

CASE 2024 and: Application of Humble Oil & Refining Company for an order authorizing it to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool by the injection of water into the Gallup formation through 29 wells located in Sections 3, 4, 9, 10, and 11, Township 31 North, Range 17 West, San Juan County, New Mexico. Applicant further seeks the adoption of special rules governing the operation of said project.

CASE 2025: Application of Socony Mobil Oil Company for permission to convert to water injection its Navajo "A" Well No. 9, located in NE/4 NW/4 of Section 14, Township 31 North, Range 17 West, Rio Arriba County, New Mexico, in conjunction with a proposed adjacent pressure maintenance project in the Horseshoe-Gallup Oil Pool.

BEFORE:

Daniel S. Nutter, Examiner.

TRANSCRIPT OF PROCEEDINGS

MR. NUTTER: The next case will be Case 2024.

MR. PAYNE: Case 2024. Application of Humble Oil & Refining Company for an order authorizing it to institute a pressure maintenance project in the Horseshoe-Gallup Oil Pool by the injection of water into the Gallup formation through 29 wells located in Sections 3, 4, 9, 10, and 11, Township 31 North, Range 17 West,

San Juan County, New Mexico. Applicant further seeks the adoption of special rules governing the operation of said project.

MR. BRATTON: Howard Bratton, Roswell, appearing on behalf of the applicant, Humble Oil & Refining Company. We have one witness. I ask that he be sworn.

MR. ERREBO: If it please the Commission, I'm Burns Errebo, appearing on behalf of the application of Socony Mobil Oil Company. Socony Mobil Oil Company has an application for conversion to water injection of the Navajo "A" No. 9 in Case 2025, which immediately follows this case on the docket. The Navajo "A" No. 9 is designed and proposed as a buffer well on the south boundary of the pressure maintenance area, which will be proposed by Humble here today. We would like to ask that for the purposes of hearing and receiving evidence that the Commission combine these two cases, and then issue separate orders.

MR. NUTTER: In other words, your motion is for the consolidation for hearing purposes only of Cases 2024 and 2025?

MR. ERREBO: True.

MR. BRATTON: Fine.

MR. NUTTER: The cases will be consolidated for hearing purposes.

MR. BRATTON: Are you going to have any witnesses, Mr. Errebo?

MR. ERREBO: We will have one witness.

(Witnesses sworn)

WILLIAM G. DUTTON,

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. BRATTON:

Q Will you state your name, address, by whom employed?

A William G. Dutton. Petroleum engineer for Humble Oil & Refining at Hobbs, New Mexico.

Q Will you state briefly your qualifications?

A I received a B.S. in petroleum engineering from Colorado School of Mines. Had approximately a year's training assignment with Humble, and attended their reservoir engineering school, and worked three years with the reservoir engineering department. I am currently doing reservoir engineering work at Humble's Roswell district office.

Q The area in question is within your jurisdiction?

A Yes.

Q You have made a reservoir study of this area?

A Yes, sir.

MR. BRATTON: Are the witness' qualifications acceptable?

MR. MUTTER: Yes. Please proceed.

(Whereupon, Applicant's Exhibits Nos.1 through 7 were marked for identification.)

Q (By Mr. Bratton) Turn to Exhibit No. 1, and explain what it is and what it shows.

A Exhibit No. 1 is a map of the Horseshoe-Gallup Oil Pool. The area cross-hatched by the black outline is the old Chimney Rock portion of the field which was consolidated into the present Horseshoe-Gallup Pool, and is also the area to which Humble confined its study. The area outlined in red is the proposed project area which Humble is requesting. This map shows the proximity of Humble's project to Atlantic's approved project, which is outlined in green. As you will note on this Exhibit, at Humble's southern lease line offsetting Mobil in Township 31 North, Range 17 West the field necks down to a very narrow oil productive interval, approximately two locations wide. This necking down facilitates a cooperative water injection project and will allow the creation of a water block at this point which will block communication from Humble's project with the larger or the original Horseshoe-Gallup Pool to the southeast, which is presently being studied and evaluated for unitization purposes.

Q Have you made a study of Humble's proposed project here and made a cross-section based thereon?

A Yes, sir.

Q Turn to your Exhibit No. 2, now, which is your cross-section, and explain what it shows.

A Exhibit No. 2 is a series of three cross-sections, the map showing how they lie through the field. This Exhibit demonstrates the continuity of the sand to be flooded and, in addition, cross-sections BB Prime and CC Prime indicate the sand pinchouts

which occur to the southwest and northeast of the field as demonstrated by the logs on the furthest extremities of these two cross-sections.

Q This just generally shows the continuity of the sand in the area?

A And the definition of the reservoir by sand pinchout.

Q Then, have you made a structure map of the area? Your Exhibit No. 3, will you refer to it, please?

A This Exhibit delineates the oil column and shows the control that the structural influence has on the trap condition by the presence of the two gas caps. The oil accumulation is in a paddle between two structural highs.

Q Is there anything else you care to say with regard to your structure map, now, Mr. Dutton?

A No, sir.

Q Turning now to your Exhibit No. 4, which is the proposed water flood pattern within your project area, will you explain what that shows, Mr. Dutton?

A The red outline on Exhibit 4 is the proposed project area which Humble is requesting. The wells circled by the dashed circles are the proposed injection wells.

Q And to the south and east lies the Mobil area, which would be the water block?

A Yes, sir. We are mainly dealing with Mobil's lease in Section 14. It's the only one that offsets our production, but they

also offset a Humble lease, which is nonproductive in Section 13.

Q What are the allowables of the wells in the red area, the project area?

A This project will have 29 injection wells, one of which remains to be drilled. The current allowable from the proposed injection wells is 605 barrels per day. The 29 producing wells have a current allowable of 525 barrels per day, for a total allowable for the Humble Navajo "F" and "G" lease of 1130 barrels per day.

Q What allowable provisions have you requested in your application?

A It is proposed that Humble's flood receive the same treatment as Atlantic's Horseshoe-Gallup project that they requested in Case 1979, and was approved by Commission Order R-1699.

Q What is that, Mr. Dutton? Explain what that is.

A The allowable provisions that they requested?

Q Yes.

A Basically, they requested a project allowable equal to the sum of the capabilities of the individual producing wells not to exceed top allowable and top allowable credit for all injection wells.

Q And that's the provisions of that Order and that's all you are asking in this case?

A Yes, sir.

Q What would the immediate project allowable be under these proposed rules?

A Humble's immediate project allowable would be 2,555 barrels per calendar day, assuming the remaining injection well is drilled immediately.

Q We'll get, in our next Exhibit, into the production, the present production of these wells, but as a matter of fact, can this project area, or are these wells now capable of that kind of production?

A No, sir. They have declined considerably in capacity and have little capacity in excess of their existing allowables. The excess capacity above the present 2525 barrel a day allowable is virtually nil because there are only four top allowable wells and two of these will be converted to injection.

Q Actually, there are only two top allowable wells--

A That could take a transfer.

Q --that could receive a transfer before you get a response from the pressure maintenance?

A Yes.

Q Would you explain the flood pattern that you have set up here?

A We are proposing a compensatory injection pattern, as pointed out earlier, you see it better on this Exhibit. The reservoir necks down to your southern lease line and cooperative injection can be obtained by injecting Humble's "C" 4 and "C" 5, and

Mobil injecting their "A" 9. In addition to creating compensatory injection at that point, this will also create a water block which will block communication with the major portion of the Horseshoe-Gallup field to the southeast.

Q And your pattern is shown on this Exhibit as well as the outline of your proposed project area?

A Yes, the dark blue lines are connections from the injection wells.

Q The project area itself includes only producing acreage or acreage upon which wells are drilled?

A It includes developed 40-acre units, yes, sir.

Q Do you have anything else you care to say with regard to this Exhibit, Mr. Dutton?

A We have informed our offset operators of this plan, of our plan of operation here and have requested their cooperation and proposed to offer them the same provisions we have offered Mobil, to furnish them water at Humble's handling cost pending approval of the Navajo Tribal Council.

Q Under this arrangement, if you do or don't have any additional cooperation from any other operators, the only ones whose correlative rights could be violated would be Humble's?

A That is correct.

Q The entire area is Navajo royalty, is it not?

A That's right.

Q All the area and the surrounding area is the same basic

royalty owner?

A Yes, sir.

Q Turn to your Exhibit No. 5, Mr. Dutton. Go through there and explain what your Exhibit 5 shows with relation to all of your wells in this area.

A Well, Exhibit 5 was prepared and submitted with the application to include the casing information on the injection wells. It was further enlarged to show the initial potential and the May '60 production of the individual wells, and cumulative production, which exhibits a magnitude of decline by individual wells. It further shows the status, the proposed status of all the wells under the proposed program. As stated previously, we said our producing wells were not capable of the proposed project allowable. For example, "F" 4 has declined from 77 barrels to 31 barrels per calendar day, per day; "F" 11 has declined from 92 to 9 barrels per day; "F" 19 from 108 to 49 barrels per day; "F" 22 has declined from 102 to 24 barrels per day. All of this decline has occurred since completion, which is a matter of 12 to 15 months' interval.

Q This shows all the wells, both injection and producing, that will be in the area?

A Yes, sir. It also includes the additional injection well to be drilled.

Q It shows your casing program and your cementing as well as showing the status of these wells, as far as production, that

they are on the decline?

A Yes, sir.

Q In your opinion, is the casing and cementing program such as to protect any fresh water strata in the area?

A Yes, sir, it is.

MR. NUTTER: What will be the number of the proposed well, Mr. Dutton? Is that No. 44?

A The proposed--

MR. NUTTER: Injection well?

A Yes, sir, No. 44. Its location is, I believe, 1,000 feet from the South line, 1980 from the East line, Section 10.

MR. BRATTON: Did you have it located, Mr. Nutter?

MR. NUTTER: Yes, sir.

MR. BRATTON: All right.

Q (By Mr. Bratton) Is there anything else that you would like to comment about Exhibit No. 5?

A No, sir.

Q Turn to your Exhibit No. 6, Mr. Dutton, and state what that shows.

A This is a performance curve on the combined Humble Navajo "P" and "G" lease. As this curve indicates, it emphasizes the declime in production which has been experienced. It emphasizes the need for immediate pressure maintenance project in order to prevent waste and guarantee maximum economic return.

Q It shows that you are just over the top of production

and on the way down?

A It shows that we've definitely declined in production.

Q In this connection, Mr. Dutton, is there a necessity for an immediate order on this project? Are you in a hurry on it?

A Yes, sir. In addition to economic reasons for desiring immediate approval, we are very anxious to receive approval of this project in order that the equipment, which is on hand, can be installed before cold weather sets in to hinder or defer its installation.

Q Turn to your Exhibit No. 7, Mr. Dutton, which, I believe, are just the logs of the wells?

A Yes, sir.

Q Those are the logs of what, all the wells in the area?

A Exhibit 7 is a copy of the log on all the proposed injection wells, plus a log on our Navajo "F" water Well No. 1, which will be our water source well. One copy of these logs was submitted with the application, and we are furnishing a second set.

Q Mr. Dutton, is this program in the interest of conservation? Where are you in relation to the development production history of this area?

A My study indicated that primary recovery would be in the order of 18 percent of the original oil in place. This proposed project is estimated to increase recovery to 42 percent recovery of the original oil in place. The value of the additional re-

covery is considerably in excess of the investment required to install the project. In view of this, I think we can definitely say that this project will contribute considerably to the conservation of oil.

Q How about your water source?

A Our water source is located on Navajo "F" lease, and it's completed in the Morrison formation.

Q And do you have permission to use this water?

A Yes, sir. By letter from the Navajo Tribal Council, dated February 23, 1960, the permission was granted to use the water for water flooding on Humble's leases. It is our intention, in order to obtain the most efficient flooding of this area, to offer Mobil and any other offset operators water at Humble's handling cost. Permission has been requested of Navajo Tribal Council to do this, but has not as yet been obtained.

Q That's just a matter of process, it's going toward the same end that they have already approved?

A That's correct.

Q Have you complied with the requirement of furnishing information to the State Engineer in connection with the water and casing program and so forth?

A Yes, in our letter of July 1st, 1960, subsequently acknowledged by their letter of July 8.

Q This area is entirely Navajo and is under the supervision of the U.S.G.S.?

A That is correct.

Q Have you submitted this matter of the U.S.G.S. for their approval?

A Yes, sir, and we received their approval in their letter of July 7.

Q Will you explain very briefly, without going into detail, just exactly what you are requesting in your application in connection with this matter?

A As requested in Humble's application, we are requesting authority to install a pressure maintenance project by conversion of the proposed injection wells shown on Exhibit 4 to water injection. As stated previously, we are very anxious to receive this approval in order that our equipment installation may be completed before cold weather sets in. We are requesting a project allowable for the proposed project area as outlined on Exhibit 4. The requested project allowable is the same as that granted Atlantic, which is equal to the sum of the capabilities of the individual producing wells, not to exceed top allowable, plus top allowable credit for the injection wells. Each producing well will remain subject to limiting GOR with voidage replaced. Monthly pressure maintenance operators' reports will be submitted for the allowable for the several wells in the total project allowable on which the Commission will calculate succeeding month's allowable. We are further requesting that administrative approval to expand this project, the project area to drill or to convert ad-

ditional wells also be granted.

Q In your opinion, would the granting of the application be in the interest of conservation and protect correlative rights?

A Yes, sir, it would.

Q Do you have anything further to offer in this case, Mr. Dutton?

A No, sir.

Q Did you prepare all of Humble's Exhibits here?

A Prepared or under my supervision, yes, sir.

MR. BRATTON: We would offer Humble's Exhibits 1 through 7, inclusive.

MR. NUTTER: Humble's Exhibits 1 through 7 will be admitted.

(Whereupon, Humble's Exhibits Nos. 1 through 7 were received in evidence.)

MR. BRATTON: That concludes our direct examination.

MR. NUTTER: Does anyone have any questions?

MR. ERREBO: Yes, I have a question.

MR. NUTTER: Mr. Errebo.

CROSS-EXAMINATION

BY MR. ERREBO:

Q With regard to your injection wells 4 and 5, which immediately offset the Mobil lease, the Mobil lease in Section 14, under the rules which you propose, would each of those wells receive 70 barrels a day, which could be transferred?

A The injection wells ultimately would receive 70 barrels a day. Well, initially, under Atlantic's rules, they would receive it immediately. The injection wells would; we could not produce it, but they would receive it.

Q You mean your project would not be able to produce it, is that it?

A Our producing well capability would not allow us to.

MR. ERREBO: That's all I have.

MR. NUTTER: Any further questions?

MR. PAYNE: Yes, sir.

MR. NUTTER: Mr. Payne.

BY MR. PAYNE:

Q Mr. Dutton, I understand that the Horseshoe-Gallup Pool actually has two producing zones; is that right?

A Yes, sir.

Q Do you intend to flood both of them?

A We intend to flood the lower, as we call it, the "B" sand, which is the only one present under Humble's acreage.

Q Are you going to inject the tubing?

A Propose to inject down the casing.

Q How old are these wells?

A Earliest one is not quite two years old, and the latest one about a year old. They're very near.

Q Will Humble be satisfied with an order that limited the allowable to a well which offsets a well outside the project area

to top unit allowable? In other words, not transfer your allowables to wells which offset someone else who is not in the project area; at least until such time as that well has received a response from water injection?

A If I follow you right, well, for example, our No. 1--

Q Yes.

A --and Mobil did not inject their No. 9.

MR. NUTTER: A better example, Mr. Dutton, would be your No. 2 Well over in Section 4 offsetting Baylis?

A We would, under the provisions granted Atlantic, we would ultimately desire to have two times top allowable assigned to that well, assuming that would be after response.

Q After response?

A Yes.

MR. NUTTER: You weren't aware that this provision in Atlantic's hearing is up for hearing de novo?

A Yes. But pending the outcome of that under the present rules, we would desire equal treatment with Atlantic. We would abide by whatever rules come out of the other hearing. As stated previously, our main interest here is to get approval of the project in order that we can get our equipment installation going.

Q (By Mr. Payne) Do you anticipate, Mr. Dutton, that in a relatively short period of time this entire pool will be water flooded?

A I don't know the time involved, but eventually it should all be flooded, yes, sir.

MR. PAYNE: Thank you.

BY MR. NUTTER:

Q Mr. Dutton, you heard counsel for Honolulu request that that case be dismissed, Do you know what the status of Honolulu's plans is for conversion of a well out there on their acreage?

A I don't know exactly what prompted all of that, and I don't feel qualified to make a statement along that line.

Q I see. So, you are not aware whether they plan to go ahead and inject some water out there or not?

A All of our offset operators have been offered and requested to cooperate with us and exactly why they have withdrawn from the hearing, I cannot state.

MR. PAYNE: Do you propose to initiate your entire project all at the same time? In other words, put all your wells on injection at once?

A Yes, sir.

Q (By Mr. Nutter) What is the total cumulative production to date from this area, Mr. Dutton?

A As Exhibit 5 indicates, production through the end of May was 484,076 barrels.

Q What is your estimate of total production by primary means only for this area?

A 1,935,000 barrels.

Q So you might say this is 25 percent depleted, as far as primary is concerned, approximately 25 percent?

A No, it's approximately--of the original in place?

Q No, your expected ultimate?

A Right.

Q You are expecting about two million. You have roughly half a million?

A We have produced right at four point seven percent of our estimated primary.

Q What percentage did you anticipate that you would recover on primary?

A 18 percent.

Q And you expect to raise this to 42--

A 42 percent.

Q --by water injection, and gain an additional two million barrels of oil?

A That is correct.

Q Have you made tests, Mr. Dutton, of the water from your water well in the Morrison formation to test its compatibility--

A Yes, sir.

Q --with formation waters here?

A Yes. The matter of formation water is very difficult. This has produced very little water. You just get a trace of it, but by simulating other Gallup waters and on Gallup sand floods from this field, we have found it to be compatible.

Q Do you anticipate any serious treating problem for this water?

A No, sir.

Q Will you be using an open system or closed system?

A Closed system.

Q I note, Mr. Dutton, that you have several wells which have high GOR's. You are requesting a net water injection gas credit be allowed for these high GOR wells?

A These wells, yes, specific reference to "F" 9, I would imagine, and "F" 40, these wells,"F" 9 will be converted to injection. And these high GOR's are not a function of completion but strictly of their proximity to the gas cap.

Q I see.

A They will be closed in. I haven't done any figuring on it, but I doubt if the net ratio rule will amount to anything to Humble at all.

Q Of the three high ratio wells, only one will be a producer; that's "F" 41. What is the location of it?

A "F" 41 is again closed to the gas cap, if you will make reference to Figure 3.--

Q Yes.

A --Exhibit 3.

Q Everything to the south of that dotted line would be gas productive within the limits of the pool; is that correct?

A Within the accuracy you can define a gas contact, yes,

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sir.

Q The acreage to the northwest of the dotted line in the upper left-hand corner of this Exhibit would be gas productive?

A The area south of the dotted line.

Q The other dotted line up in the upper left-hand corner--

A Yes, sir.

Q --northwest of that line would be gas productive?

A Yes, sir.

Q I see. Now, your estimate of allowable, I think you stated you had approximately 2555 barrels?

A That's correct.

Q What is that assuming, 70 barrels per day for 29 injection wells?

A 29 injection wells, and the present capabilities in the 19 producing wells.

Q I see. Of the two sands that are productive in the Horseshoe-Gallup Pool, the one that you've labeled Gallup "B" sand on your cross-section is the lower sand; is that correct?

A Yes, sir.

Q And you show Gallup "A" sand in the long cross-section in a few wells. Is that interval perforated in those wells?

A I could not testify to that. That is, I believe that is on other operators' leases. Possibly--

Q It is in all cases except one?

A R. C. Mills.

Q Your No. 4 "G" Navajo shows that sand?

A It is not perforated in that well.

Q So, all of your flooding activities will be in the lower sand; is that correct?

A Yes, sir.

Q Are you perforated in the upper sand in any wells?

A The only place we even catch a very limited amount of the upper sand is right along this area offsetting Mobil. They aren't completed in that sand. You cannot make a commercial completion in it on our acreage.

Q So, you haven't perforated the upper sand in any wells; is that correct?

A No, sir.

BY MR. PAYNE:

Q Mr. Dutton, did you say the Baylis and Honolulu lease in Section 5 was, generally speaking, the gas cap area?

A By our geological information, they should have gas contact on their acreage. If you notice, Baylis No. 5 is a gas well or was at one time.

Q So that when your No. 2 well in Section 4 responds to injection, if you didn't have complete flexibility in transferring your allowable and producing it out of that well, you might have some oil pushed into the dry gas sands outside your project area?

A If we install this total project immediately without offsetting cooperation, we could push some oil that way. That is

correct.

Q So that it would be to everybody's benefit if another project is started offsetting you here?

A Well, that is our ultimate desire, to get everybody's cooperation all the way around us.

BY MR. NUTTER:

Q Has Humble conducted any negotiations with Baylis to discuss the possibility of putting an injection well on their acreage?

A We have contacted all of our offset operators and requested their cooperation with the exception of Mobil. We don't have anything from them at the present time.

Q Is there any possibility that this area may be unitized at some future date?

A Not the northern portion of it, I don't believe so.

MR. NUTTER: Are there any further questions of Mr. Dutton? He may be excused.

MR. BRATTON: I want to ask one or two questions.

MR. NUTTER: Oh.

REDIRECT EXAMINATION

BY MR. BRATTON:

Q On this question of top allowables offsetting, offset operators, do you have any top allowable wells offsetting anybody here?

A We have one. Our "F" 3 offsets Honolulu, but that is one of the top allowables that will be converted to injection.

Our other top is "F" 6, which does not offset anybody. "F" 8 does not offset anybody, and "F" 39 does not offset anybody.

Q So, actually, it's a question of whether you have a single or double allowable for wells offsetting adjoining properties rather academic under your proposed pattern here?

A That is correct; we couldn't produce it.

Q Now, when you said you would recover 42 percent by pressure maintenance and secondary recovery in this area, that is actually 42 percent of a somewhat smaller area than your primary area you were talking about?

A That is correct. That is 42 percent from the area enclosed by our pattern. The 18 percent recovery as applied to primary applies to the total area as defined by the reservoir configuration, pinchout, and gas contact.

Q So, your percentage of total primary would be a little less than 42 percent, but it would still be in the magnitude of 20 percent or 22 percent of total oil above what you would get by primary method?

A If you are referring to the original in place underlying all of Humble's acreage, yes.

MR. NUTTER: Do I follow you correctly, sir, that the 18 percent represents the entire productive area that Humble owns whereas the 42 percent is restricted to the project area only?

A Which is the restricted area that will be affected by injection.

MR. NUTTER: So those two figures cannot be compared in the strictest sense?

A No, sir.

Q (By Mr. Bratton) If you were to have a figure comparable to your 18 percent, it would probably be in the neighborhood of 40 percent, wouldn't it?

A Yes, sir.

Q A little smaller than the 42 percent?

A Yes, sir. I can probably clarify that a little right here. The total oil productive acreage, Humble's total oil productive acreage is 16,800 acre feet; for the pattern enclosed or the area enclosed by the pattern is 15,200 acre feet. That is the difference that they are based on.

Q Do you have anything else you care to state, Mr. Dutton?

A No, sir.

RECROSS EXAMINATION

BY MR. PAYNE:

Q At such time as one of the wells did receive a response, which was offsetting the well not in the project, would you anticipate that there should be any top limitation on that well? It's received a response, but it offsets a well which is outside the project area?

A I may need to huddle on this. We would have to look at it on the individual basis, depending on what our injection program was, and how migration was going at the time.

Q The reason I brought it up, I'm still somewhat concerned

about this gas cap area. If those wells were restricted to normal unit allowable, and your well which had received a response was restricted to two times top unit allowable, some of the oil might end up in the dry gas sand which neither well got a chance to produce. At least, that's a possibility; isn't it?

A There's some conjecture right here on exactly what our offset operators are going to do, but I feel fairly safe in saying that before too long in the near future our pattern will be set, and injection will be instigated along the gas cap, so you will not have to worry about pushing it into the gas cap.

MR. BRATTON: Would it be a fair statement to say that Humble is going to seek cooperation and, as you say, attempt to complete the pattern?

A Right.

MR. BRATTON: And if a situation arises where it appears that some oil is going to be pushed into a dry gas zone, that Humble will come before the Commission to seek to prevent that situation?

A As stated previously, Humble, pending approval of the Navajos, we are installing plant facilities, our water source is capable, and we will furnish offset operators water at cost to get their cooperation.

MR. BRATTON: Do you have anything further?

A No, sir.

MR. NUTTER: Is there anything further from Mr. Dutton?

He may be excused.

(Witness excused)

MR. NUTTER: Do you have anything further, Mr. Bratton?

MR. BRATTON: No, sir.

MR. NUTTER: Mr. Errebo.

MR. ERREBO: If it please the Commission, we would like to call Mr. Mills at this time as a witness.

ROBERT MILLS,

called as a witness, having been first duly sworn, testified as follows:

DIRECT EXAMINATION

BY MR. ERREBO:

Q State your name, please.

A My name is Robert Mills.

Q Mr. Mills, where are you employed, in what capacity, and by whom?

A Senior production engineer for the Mobil Oil Company in Durango, Colorado.

Q Have you ever appeared before this Commission as an expert witness?

A No, sir, I have not.

Q Would you give the Commission staff a brief resume of your experience and education?

A Yes. I graduated from the University of Southern California with a Bachelor of Engineering degree, major in petroleum

engineering and a minor in geology. I worked for Mobil Oil Company, formerly General Petroleum Corporation, for seven years. Spent two years on an engineering training program in California. I worked one half year in Wyoming, another year back in California as a junior engineer, and I have worked in Durango, working the Four Corners area for the past three and a half years. My work has involved drilling, engineering work, development, and evaluation work.

MR. ERREBO: Are Mr. Mills' qualifications acceptable?

MR. NUTTER: Yes, sir. That time in California, I guess that was with General Petroleum?

A That's right. We just changed our name January 1st this year. Same organization but just a different name.

MR. NUTTER: Same horse but a different color?

A No, it's still red.

MR. NUTTER: Still red.

Q (By Mr. Errebo) Mr. Mills, as a part of your duties in your location in Durango, have you had occasion to become acquainted with the Mobil Oil Company's Navajo "A" lease, which was the subject of the previous Humble hearing?

A Yes, sir.

Q Well, actually, this lease offsets the area involved in the previous hearing, is that not correct?

A Yes, that is correct.

Q Are you familiar with the application of the Mobil Oil

Company today insofar as the injection into the Navajo "A" No. 9 is concerned?

A Yes, I am.

(Whereupon, Applicant's Exhibits Nos.1, 2, 3 and 4 were marked for identification.)

Q I'll refer you to what has been designated, I believe, Mobil's Exhibit No. 1, and ask you to state just briefly what that shows?

A It's a plat showing Mobil's Navajo "A" lease which is shaded there in red pencil. It encompasses an area of about 1760 acres, has 21 wells on it. You will note that Navajo "A" No. 9 is marked with a blue ring around it that denotes the well that we are requesting permission to inject water into.

Q Now, does the Navajo "A" lease lie between the Humble and Atlantic areas which were depicted on Exhibit No. 1 of Humble Oil & Refining Company?

A Yes, it does.

Q Actually, the Mobil lease abuts each area, does it, on opposite sides?

A Yes, sir, that's correct.

Q So the Mobil lease lies between these two areas, and what are the plans of the Mobil Oil Company insofar as participating in either of these projects?

A For the immediate present, our plans would call for the conversion of Navajo "A" No. 9 to a water injection well to help

provide a buffer zone along the common lease boundary between Humble's "G" lease and Mobil's Navajo "A" lease to prevent migration along that line. We have also been engaged in engineering committee activity with other operators in the field to the south and east, an engineering committee which has been chaired by Atlantic. The ultimate hope there and goal is to form a field-wide unit for water flooding purposes; field-wide to the exclusion of Humble's proposed water flood at the northwest extremity of the field.

Q I take it that you anticipate that ultimately the Mobil Navajo "A" lease will be taken into the Atlantic unit, and the northwest boundary of the Atlantic unit will be moved to what is now the northwest boundary of the Mobil Navajo "A" lease?

A Yes, sir, that is correct.

Q I'll now refer you to Mobil's Exhibit No. 2, and ask you to state what that is and what is shown thereon?

A This is a copy of the induction electric log of this proposed water injection well, Well No. 9, down in the 1,000 foot depth range is shown the production, casing string, cementing information, the perforations and the formation tops.

Q What does the red color on that Exhibit depict?

A It depicts the zone into which we plan to inject water.

Q Now, referring to the cross-section which Humble introduced as their Exhibit No. 2, does any part of the upper stringer appear in the log on this well that you are now--

A Only a vestige of it. It's not deemed productive in

that area of the field.

Q Then, actually, you will be injecting only to the lower zone which is the main producing zone; is that correct?

A Yes, sir.

Q Is the upper zone behind the pipe now, or what is its status?

A Yes, sir, it has never been perforated in this well.

Q When was this Navajo 9 completed?

A It was completed in June of 1959.

Q What was the initial potential on it?

A The initial potential was 114 barrels a day.

Q What was the initial gas-oil ratio?

A 65 cubic feet per barrel.

Q What is the present ability of the well to produce?

A Well, in June of 1960, its average daily production was 19 barrels per day.

Q What is the present gas production?

A It's, on the basis of recent gas-oil ratio tests, it's reported as too small to measure.

Q Now, I'll refer you to your Exhibit No. 3, and ask you to explain just briefly what that shows? That actually depicts, does it not, the information that you have just given?

A That is correct. Exhibit No. 3 is a production curve for both oil and gas production of Navajo "A" No. 9 by months since the time of its completion.

Q Is there anything in connection with that Exhibit which you would particularly desire to call to the attention of the staff?

A I think it's significant that within the first few months after completion, there was a rather marked decline in oil production. There is still some tendency towards decline, has been for the past seven months, but not nearly as severe as in the first four to five months of continuous production.

Q Refer, now, if you will, to your Exhibit No. 4, and just briefly state what that shows?

A Exhibit No. 4 depicts the cumulative oil and gas production for Navajo "A" No. 9.

Q Have you been in contact with Humble in regard to the buffer system of which this well will be a part?

A Yes, we have. We have corresponded with Humble in an effort to reach some equitable agreement whereby we can provide a water injection buffer zone along the common lease boundary.

Q Have you reached such an agreement?

A A verbal agreement has been reached, yes, sir.

Q In other words, you have no objection to the injection pattern immediately offsetting your lease to the north?

A No, we haven't.

Q What do you anticipate will be the initial injection rate into the well No. 9 if your application is granted?

A Approximately 125 barrels a day.

Q Do you have any idea as to what the ultimate maximum rate might be?

A We anticipate that that initial rate of 125 barrels a day will probably be the maximum injection rate, and that after we have achieved fillup in the area in which we're injecting, and we see some response in offsetting producing wells, that the injection rate of Navajo "A" No. 9 would be roughly comparable to the withdrawals of the surrounding producing wells, and that would be limited by the top unit allowable.

Q Now, have you determined or given any thought as to what the method of completion, downhole speaking, would be of the injection well?

A Yes, we have. As you may note on Exhibit 2 where the perforations are shown and the injection zone depicted with the red pencil, there's a small stringer of sonosity formation which was perforated in this well depth of 1046 to 1051. We plan to squeeze, cement that zone and inject water into the upper stringer there from 1014 to 1032 through tubing which would have a packer isolating the injection zone from the annular space between the tubing and the casing.

Q You figure this would be sufficient to prevent any escape of the water or the pressure?

A Yes.

Q It would be sufficient?

A Yes.

Q Let me ask you this: Have you contacted at this point the office of the State Engineer?

A No, we have not.

Q Do you expect to contact them and satisfy such requirements as they may have?

A Yes, we certainly do.

Q What will be the source of the water which you will inject?

A We have a verbal agreement with Humble whereby they will supply us with the necessary injection water for which we will pay their operating costs.

Q Do you feel that the buffer which has been proposed today, both by Humble and by Mobil, will be effective in preventing communication between your lease and the Humble barrier?

A Yes, sir.

Q Now, as an adjunct to the conversion of this well into an injection well, have you given thought to production of the allowable which will be lost by such conversion from other wells?

A We would like to receive permission to have a top unit allowable assigned to the injection well which could be transferred to other wells on our lease, excluding those wells which are offset by wells of another operator.

Q Actually, this would be giving your injection well the same treatment as the well in the Atlantic area and the wells in the Humble area would receive, is that not correct?

A Yes, that's the basis for this request.

Q Do you have anything further to offer at this time?

A No, I haven't.

Q Were these Exhibits prepared by you or under your supervision?

A They were prepared by me and under my supervision.

MR. ERREBO: We would like to offer these Exhibits, Mobil's Exhibits 1 through 4 inclusive, in evidence.

MR. NUTTER: Socony Mobil's Exhibits 1 through 4 will be entered in evidence.

(Whereupon, Applicant's Exhibits Nos. 1 through 4 were received in evidence.)

MR. ERREBO: That's all we have.

MR. NUTTER: Does anyone have any questions of Mr. Mills?

MR. IRBY: I would like to ask a question, if I may.

MR. NUTTER: Mr. Irby.

CROSS-EXAMINATION

BY MR. IRBY:

Q Mr. Mills, not having your Exhibit, I'm not sure where your project is going to be. Can you describe that for me,please?

A The map may be more helpful to you.

Q Thank you. Mr. Mills, you propose expansion of this from this one well, I presume?

A What we propose to do would be to join with Atlantic and El Paso and Sohio, and many of the other operators down in the

southeast portion of the field to form a field-wide unit. This is a temporary measure; its aim is to cooperate with Humble, permitting their lease to commence water flood operations, but we would not propose at this time to expand the water flood on our lease except when it's done on a field-wide unit basis.

MR. NUTTER: All you are seeking today is authority for this one well; is that correct?

A That's correct.

Q (By Mr. Irby) And this is a protective agreement between you and Humble--

A Yes, sir.

Q --to keep from affecting each other?

A Yes.

Q Do you have the construction of this well with regard to the casing, cementing program and so forth?

A Yes, sir. Are you interested in just the production casing, or would you also like the information regarding the surface casing? I have both here.

Q Both, if you please.

A Have 8 and 5/8ths inch casing cemented at 119 feet with 80 sacks. The 5 1/2 inch casing cemented at 1101 with 100 sacks.

Q What do you know of the waters encountered in the drilling of this well?

A I have no information on that.

Q Is it available to you?

A It possibly would be by referring to people that were experienced with the drilling of this well. I was not responsible for the northwest New Mexico area at the time this well was drilled, and I have no first-hand knowledge of what occurred. However, I do know that the well spudded in Mancos and it's doubtful that any appreciable amount of water was encountered while drilling.

Q That's what I was waiting for. Thank you. And you said that the water supply for this will come from Humble's well?

A Yes, there'll be a common source of supply from Humble's water source well which they described before.

BY MR. NUTTER:

Q Mr. Mills, you stated that you would be injecting at the rate of 125 barrels a day in your 9-A until fillup?

A Yes, we think that would be approximately the initial rate.

Q And then after fillup, you would adjust the injection rate to coincide with the withdrawals from the adjoining wells?

A Yes.

Q Mr. Dutton's is approximately the same as in your No. 5 injection well?

A 4 and 5. We correspond with the 125 based on an average well. The individual wells will be adjusted, based on the pay thickness involved. But we are basically in accord with the 125.

Q The water injection rates between the two of you will be

adjusted to coincide with each other by a line agreement of some sort?

MR. DUTTON: Yes.

A Yes.

Q Mr. Dutton, will the injection be done in the casing or through tubing?

MR. DUTTON: Down the casing.

Q Did you say you would set a packer, and inject through the tubing?

A That's the way we anticipate doing it.

Q Mr. Mills, you said that this 70 barrels or top unit allowable which would be assigned to the No. 9 "A" after it is converted to water injection would be distributed to other wells on the lease with the exception of wells which offset other operators' properties. It would appear that probably your 16 "A" is going to be a well that will receive a response to water injection. Now, that offsets Humble's acreage. Would you be interested in perhaps transferring some of the allowable to that well?

A I think that would depend on what transfer provisions are made for their well immediately across the line, their No. 4.

Q Would Humble have objection to Socony's No. 16 "A" being eligible for receipt of transferred allowable?

MR. DAVIS: Do you want me to swear myself in? We would expect equitable treatment among the respective injection

projects in this field, and we feel that the Commission will so rule to that end. We have asked for equal treatment with the one existing project that is there now. If you feel like one or two allowables in this instance would probably be equitable, if Humble had it and Mobil also had it, I feel there would be no objection.

BY MR. PAYNE:

Q What's the producing ability of the No. 16 Well at the present time?

A About 16 barrels a day.

Q So that until it did receive a kick, this is academic too?

A Yes, it is.

MR. NUTTER: We have a lot of academic wells here. Are there any further questions of Mr. Mills? He may be excused.

(Witness excused)

MR. NUTTER: Do you have anything further, Mr. Errebo?

MR. ERREBO: Nothing further, Mr. Nutter.

MR. NUTTER: Does anyone have anything further to offer in Cases 2024 and 2025? We will take these cases under advisement and call next Case 2026.

STATE OF NEW MEXICO)
) ss
COUNTY OF BERNALILLO)

I, ADA DEARNLEY, Court Reporter, in and for the County of Bernalillo, State of New Mexico, do hereby certify that the foregoing and attached Transcript of Proceedings before the New Mexico Oil Conservation Commission was reported by me in machine shorthand and reduced to typewritten transcript under my personal supervision, and that the same is a true and correct record to the best of my knowledge, skill and ability.

WITNESS my Hand and Seal this, the 8th day of August, 1960, in the City of Albuquerque, County of Bernalillo, State of New Mexico.

Ada Dearnley
NOTARY PUBLIC

My Commission expires:

June 19, 1963

I do hereby certify that the foregoing is a co... proceedings in the ... heard by me on 7/27, 1960.

..., Examiner
New Mexico Oil Conservation Commission

MAIN OFFICE OCC

BEFORE THE OIL CONSERVATION COMMISSION

1960 JUL 7 AM 8:43

OF THE STATE OF NEW MEXICO

APPLICATION OF THE HUMBLE OIL & REFINING COMPANY FOR AN ORDER AUTHORIZING THE INJECTION OF WATER FOR PRESSURE MAINTENANCE AND SECONDARY RECOVERY PURPOSES INTO THE GALLUP FORMATION UNDERLYING APPLICANT'S NAVAJO "F" AND "G" LEASES IN THE HORSESHOE-GALLUP OIL POOL, SAN JUAN COUNTY, NEW MEXICO, PURSUANT TO RULE 701 OF THE RULES AND REGULATIONS OF THE NEW MEXICO OIL CONSERVATION COMMISSION AND FOR THE PROMULGATION OF SPECIAL RULES GOVERNING THE OPERATION OF SAID PROJECT

CASE NUMBER 2024

TO THE HONORABLE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO:

Comes the HUMBLE OIL & REFINING COMPANY, a corporation, with a certificate of authority to do business in the State of New Mexico, and hereby makes application to the New Mexico Oil Conservation Commission for an order authorizing the injection of water for pressure maintenance and secondary recovery purposes into the Gallup formation underlying the Navajo "F" and "G" leases of applicant embracing lands within the Horseshoe-Gallup Oil Pool, San Juan County, New Mexico, pursuant to Rule 701 of the Commission, and for the promulgation of special rules governing the operation of said project, and in support thereof respectfully shows:

1. That there is attached hereto, made a part hereof, and for purposes of identification marked Exhibit "A", a plat showing the Navajo "F" and "G" leases of applicant embracing lands within the Horseshoe-Gallup Oil Pool, together with the location of all wells drilled thereon and all wells drilled within a radius

of two miles from the proposed injection wells hereinafter referred to, all of which said wells located upon said leases are producing from the Gallup formation which is a member of the Mancos formation of Cretaceous age. Said Exhibit "A" also shows the location of the proposed injection wells and the ownership of the respective leasehold interests within a radius of two miles from applicant's oil and gas leases.

2. That there is outlined in red on Exhibit "A" attached hereto, the proposed project area which is a part of the lands embraced in applicant's Navajo "F" and "G" leases, and which embrace the following described lands, to-wit:

Township 31 North, Range 17 West, N.M.P.M.

Section 3: $SW\frac{1}{4}SE\frac{1}{4}$, $S\frac{1}{2}SW\frac{1}{4}$, $NW\frac{1}{4}SW\frac{1}{4}$
Section 4: $N\frac{1}{2}NW\frac{1}{4}$, $S\frac{1}{2}N\frac{1}{2}$, $S\frac{1}{2}$,
Section 9: $N\frac{1}{2}N\frac{1}{2}$, $SE\frac{1}{4}NW\frac{1}{4}$, $S\frac{1}{2}NE\frac{1}{4}$, $N\frac{1}{2}SE\frac{1}{4}$, $SE\frac{1}{4}SE\frac{1}{4}$
Section 10: $N\frac{1}{2}$, $N\frac{1}{2}S\frac{1}{2}$, $SW\frac{1}{4}SW\frac{1}{4}$, $SW\frac{1}{4}SE\frac{1}{4}$
Section 11: $SW\frac{1}{4}NW\frac{1}{4}$, $SW\frac{1}{4}$, $SW\frac{1}{4}SE\frac{1}{4}$

containing 1,920 acres, more or less.

3. That there is filed herewith and for purposes of identification marked Exhibit "B", electrical logs of the proposed injection wells, more particularly described as follows:

Navajo "F" Well No. 1, Unit D, Section 4
Navajo "F" Well No. 3, Unit L, Section 4
Navajo "F" Well No. 8, Unit E, Section 10
Navajo "F" Well No. 9, Unit K, Section 10
Navajo "F" Well No. 11, Unit I, Section 10
Navajo "F" Well No. 14, Unit M, Section 10
Navajo "F" Well No. 15, Unit J, Section 9
Navajo "F" Well No. 17, Unit G, Section 10
Navajo "F" Well No. 18, Unit C, Section 10
Navajo "F" Well No. 21, Unit D, Section 10
Navajo "F" Well No. 22, Unit H, Section 9
Navajo "F" Well No. 23, Unit B, Section 9
Navajo "F" Well No. 24, Unit P, Section 4
Navajo "F" Well No. 25, Unit N, Section 4
Navajo "F" Well No. 27, Unit J, Section 4
Navajo "F" Well No. 28, Unit F, Section 4
Navajo "F" Well No. 31, Unit N, Section 3
Navajo "F" Well No. 32, Unit L, Section 3
Navajo "F" Well No. 33, Unit D, Section 9
Navajo "F" Well No. 34, Unit F, Section 9
Navajo "F" Well No. 36, Unit A, Section 10
Navajo "F" Well No. 38, Unit H, Section 4
Navajo "F" Well No. 40, Unit P, Section 9

Navajo "F" Well No. 43, Unit O, Section 3
*Navajo "F" Well No. 44, Unit O, Section 10
Navajo "G" Well No. 3, Unit K, Section 11
Navajo "G" Well No. 4, Unit M, Section 11
Navajo "G" Well No. 5, Unit O, Section 11
Navajo "G" Well No. 6, Unit E, Section 11

*Proposed Injection Well Location to be drilled.

4. That there is also attached hereto, made a part hereof, and for purposes of identification marked Exhibit "C", a schedule showing all of applicant's wells located upon its Navajo "F" and "G" leases within the proposed project area, including the proposed injection wells which have been indicated on the exhibit, and which shows the total depth of each well, the production casing size, the depth to which the casing has been set, estimated top of the cement used in setting the casing, perforated interval, and completion date of each well. Said exhibit also shows the initial production of each well, the May, 1960 production, and the cumulative production to date.

5. Applicant proposes to inject water through the injection wells above set forth into the Gallup-Sandstone producing formation underlying the project area, the water to be injected at rates ranging between 75 barrels and 350 barrels per day per well.

Applicant proposes to obtain the water for injection purposes from its water Well No. 1 located in the $NW\frac{1}{4}NW\frac{1}{4}$ of Section 10, Township 31 North, Range 17 West, N.M.P.M., and which is shown on Exhibit "A" attached hereto, and which said well is capable of producing water in quantities believed to be sufficient for the proposed pressure maintenance and secondary recovery project from the Morrison formation. That applicant has furnished the Office of the State Engineer with a description of said well, together with a water analysis report of the water which complies with Commission Memorandum No. 5-58 dated January 31, 1958.

6. That applicant is the sole owner of the oil and gas leases referred to as Humble's Navajo "F" and "G" leases shown on Exhibit "A" attached hereto, and which together embrace all of the proposed project area, and applicant believes that it will be in the interest of conservation and the prevention of waste to inaugurate a water injection program for pressure maintenance and secondary recovery purposes as soon as possible by the injection of water into the injection wells above referred to, and that said project is in the interest of obtaining the greatest ultimate recovery of oil and gas from said formation. Applicant therefore respectfully requests that the area hereabove described be designated as the project area, and that an allowable formula be fixed therefor, and in connection therewith recommends the adoption of special field rules governing said project as follows:

(a) The conversion of the producing wells listed in paragraph 3 hereof to water injection wells, including the drilling of prosposed injection well "Navajo 'F' Well No. 44, Unit O, Section 10".

(b) That the allowable for the project area be the sum of the allowables of the several wells within the project area including those wells which may be shut in, curtailed, or used as injection wells.

(c) That allowables for injection wells be transferred to producing wells within the project area as well as allowables for producing wells which, in the interest of more efficient operation of the project, are shut in or curtailed because of high gas-oil ratio or are shut in for any of the following reasons: pressure regulation, control of pattern or sweep efficiencies, or to observe changes in pressures or changes in characteristics of reservoir liquids or progress of sweep.

(d) That the allowable assigned to any well which is shut in or which may be curtailed in accordance with the applicable special rules, and which allowable is to be transferred to any well or wells in the project area for production, shall in no event be greater than its ability to produce during the test period prescribed by the special rules, or greater than the top unit allowable for the pool during the month of transfer, whichever is less.

(e) That the allowable assigned to any injection well on a 40-acre proration unit shall be the top unit allowable for the Horseshoe-Gallup Oil Pool.

(f) That the allowable assigned to any well which is shut in or curtailed in accordance with the special rules shall be determined by a 24-hour test at a stabilized rate of production, which shall be the final 24-hour period of a 72-hour test throughout which the well should be produced in the same manner and at a constant rate. The daily tolerance limitation set forth in Commission Rule 502 I (a) and the limiting gas-oil ratio (2,000 to 1) for the Horseshoe-Gallup Oil Pool shall be waived during such tests. The project operator shall notify all operators offsetting the well, as well as the Commission, of the exact time such tests are to be conducted. Tests may be witnessed by representatives of the offsetting operators and the Commission if so desired.

(g) That the top allowable assigned to each producing well in the project shall be equal to the well's ability to produce or to the top unit allowable of the Horseshoe-Gallup Oil Pool, whichever is less, provided that any producing well in the project area which directly or diagonally offsets a well outside the project area producing from the same common source of supply shall not produce in excess of two times top unit allowable for the pool. Each producing well shall be subject to the limiting gas-oil ratio (2,000 to 1) for the Horseshoe-Gallup Oil Pool, except that any well or wells within the project area producing with a gas-oil ratio in excess of 2,000 cubic feet of gas per barrel of oil may be produced on a "net gas-oil ratio basis", which net gas-oil ratio shall be determined in accordance with such equitable formula as may be determined by the Commission including credit for daily average net water injected through any injection well located within the project area.

(h) That the project operator submit each month, within a reasonable time after the normal unit allowable for Northwest New Mexico has been established, to the Commission, a pressure maintenance project operator's report on a form prescribed by the Commission requesting allowables for each of the several wells in the project area as well as the total project allowable.

(i) That the Commission calculate the allowable for each well in the project area, and that the sum of the allowables so calculated be assigned to the project so that the same may be produced from the wells in the project in any proportion except that no well in the project which directly or diagonally offsets a well outside the project producing from the same common source of supply shall produce in excess of two times top unit allowable for the Horseshoe-Gallup Oil Pool.

(j) That provision be made for the administrative approval by the Commission of the conversion of additional producing wells to injection wells, and the drilling of additional producing and injection wells, and the expansion of the project area under such reasonable conditions as may be prescribed by the Commission.

WHEREFORE, Applicant requests that this application be set down for hearing before an examiner after due notice as required by law and the rules and regulations of the Commission.

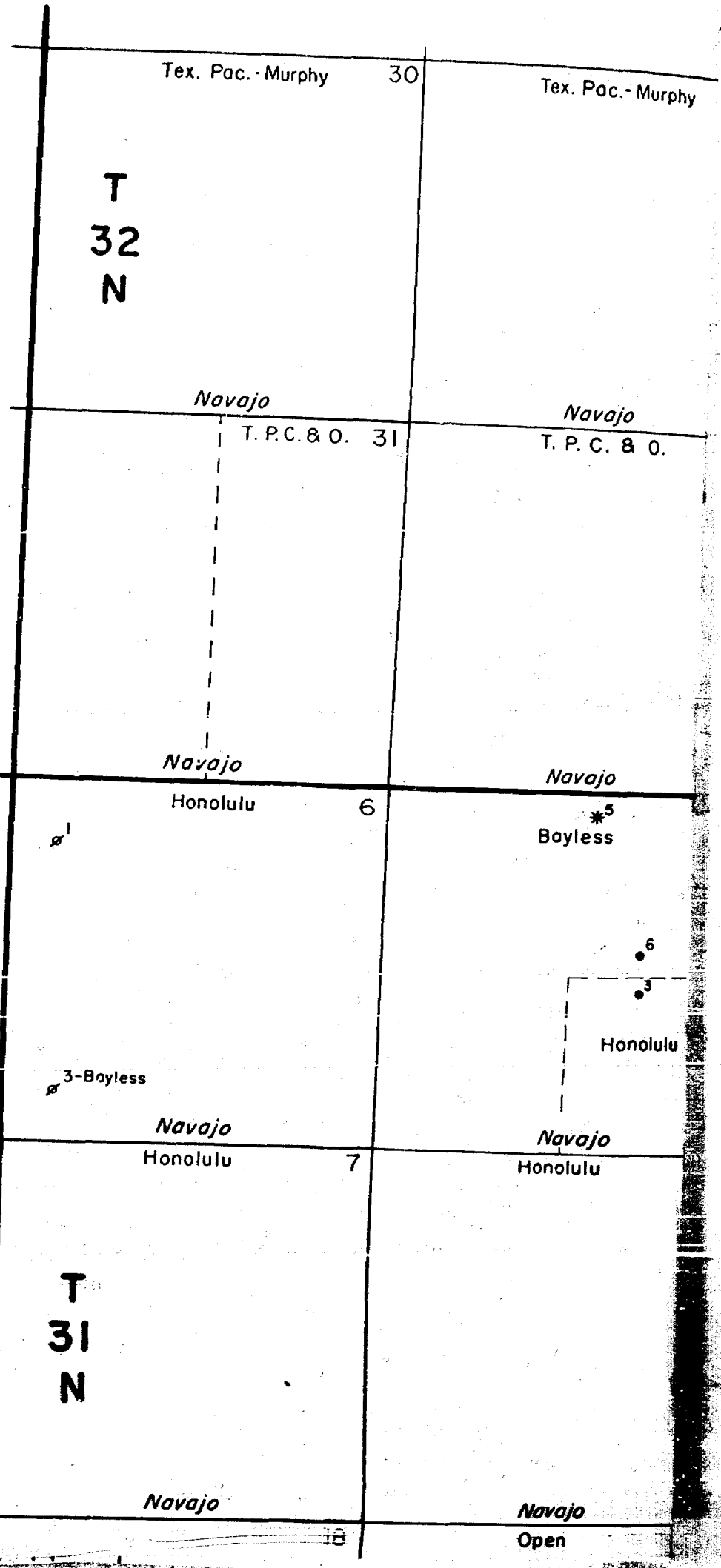
Respectfully submitted,

HUMBLE OIL & REFINING COMPANY

By _____

HERVEY, DOW & HINKLE

By _____
Roswell, New Mexico
Attorneys for Applicant


Tex. Pac. - Murphy
30
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Navajo
18
Navajo
Open

29 T. P. Coal & Oil 28 T. P. Coal & Oil 27 Superior 26

Skelly

Navajo *Navajo* *Navajo*

32 Skelly "M" 33 Skelly 34 Skelly 35

Murphy

R 17 W

Navajo *Navajo* *Navajo*

5 Humble "F" 4 Humble "F" 3 Humble 2

Navajo *Navajo* *Navajo*

8 Humble 9 Humble 10 Humble "G" 11

"F"

WW No. 1

Navajo *Navajo* *Navajo*

17 B. Frost 16 B. Frost 15 Mobil 14

Superior 25 | Skelly 30

Skelly | Texas

Navajo | *Navajo*

Skelly 36 | Texas 31

R 16 W

Navajo | *Navajo*

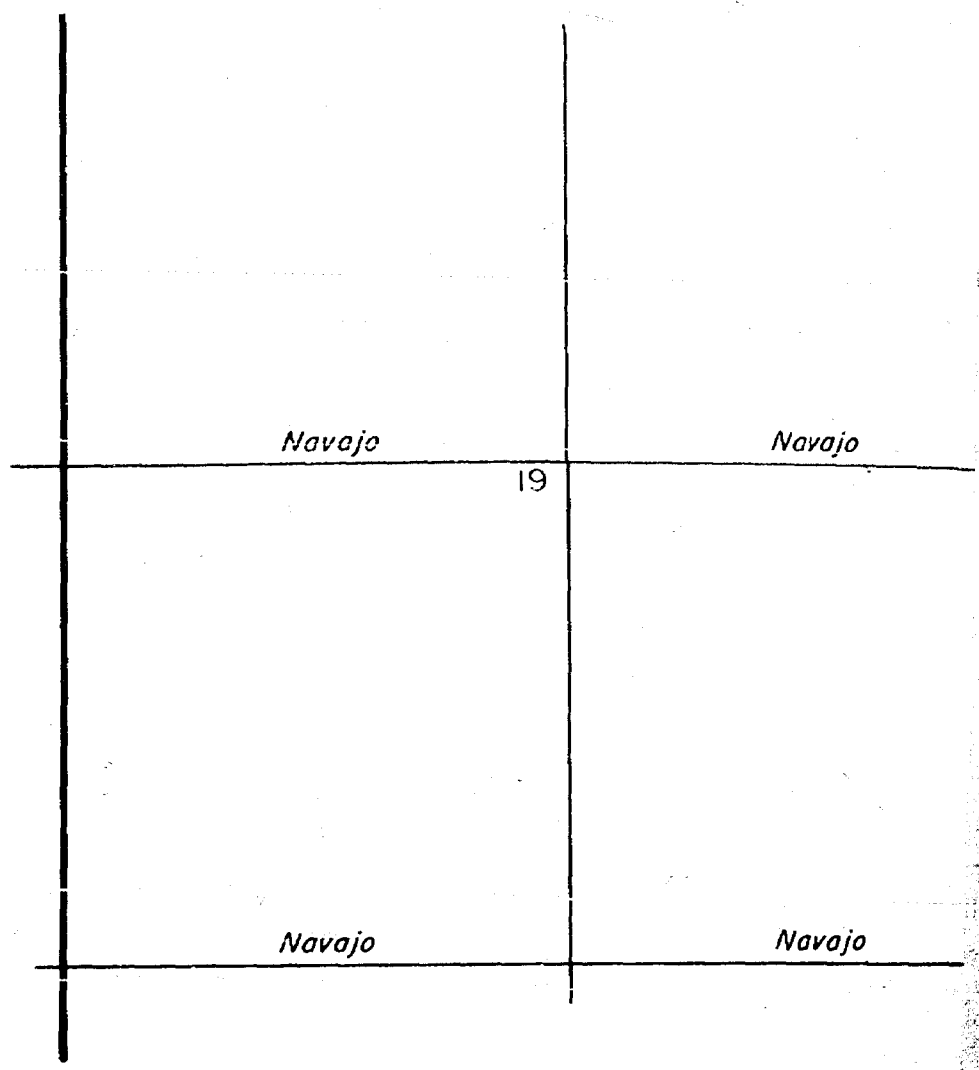
Humble 1 | Mobil 6

Navajo | *Navajo*

Humble 12 | Mobil 7

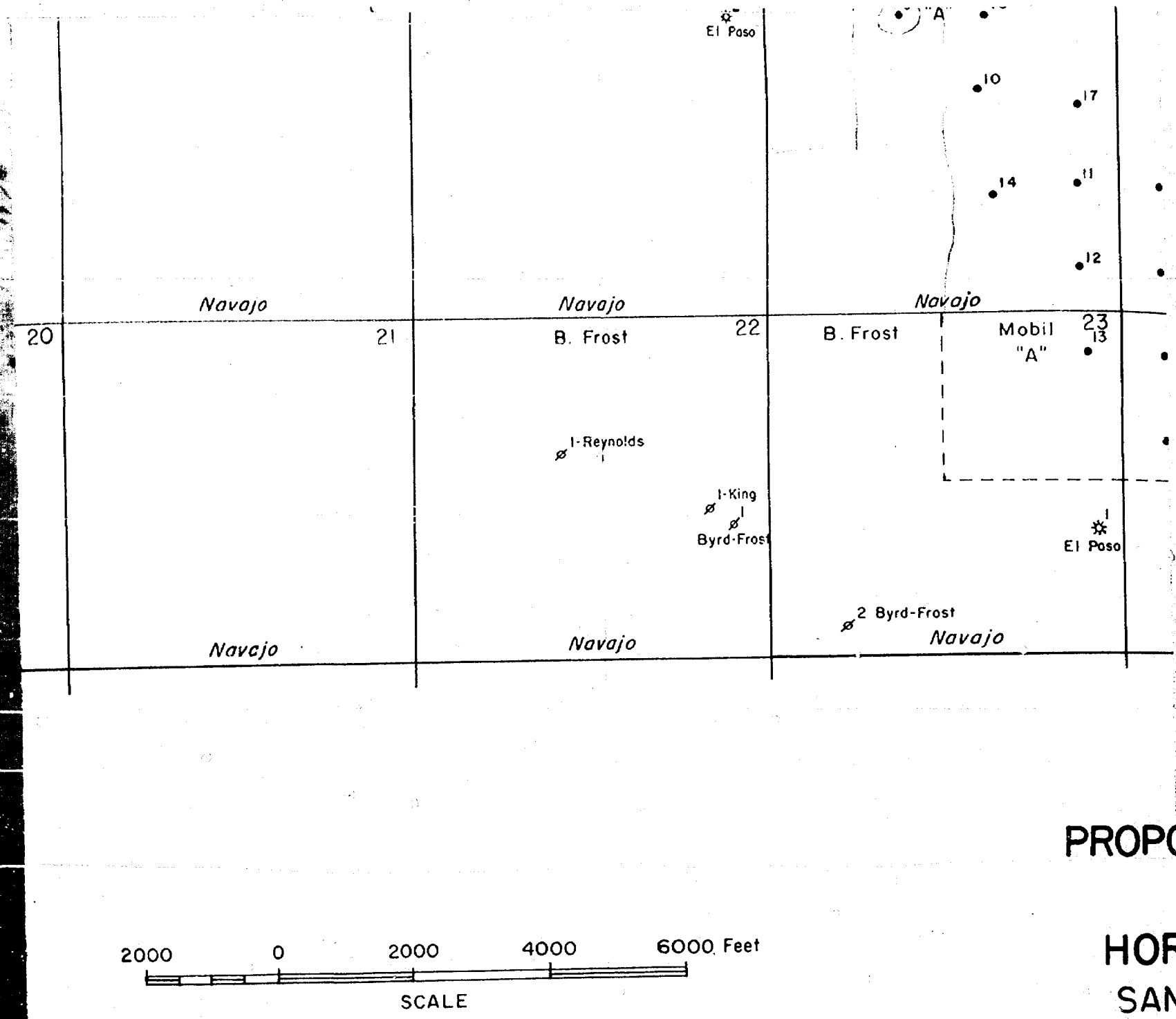
Navajo | *Navajo*

Mobil 13 | Atlantic 18



— LEGEND —

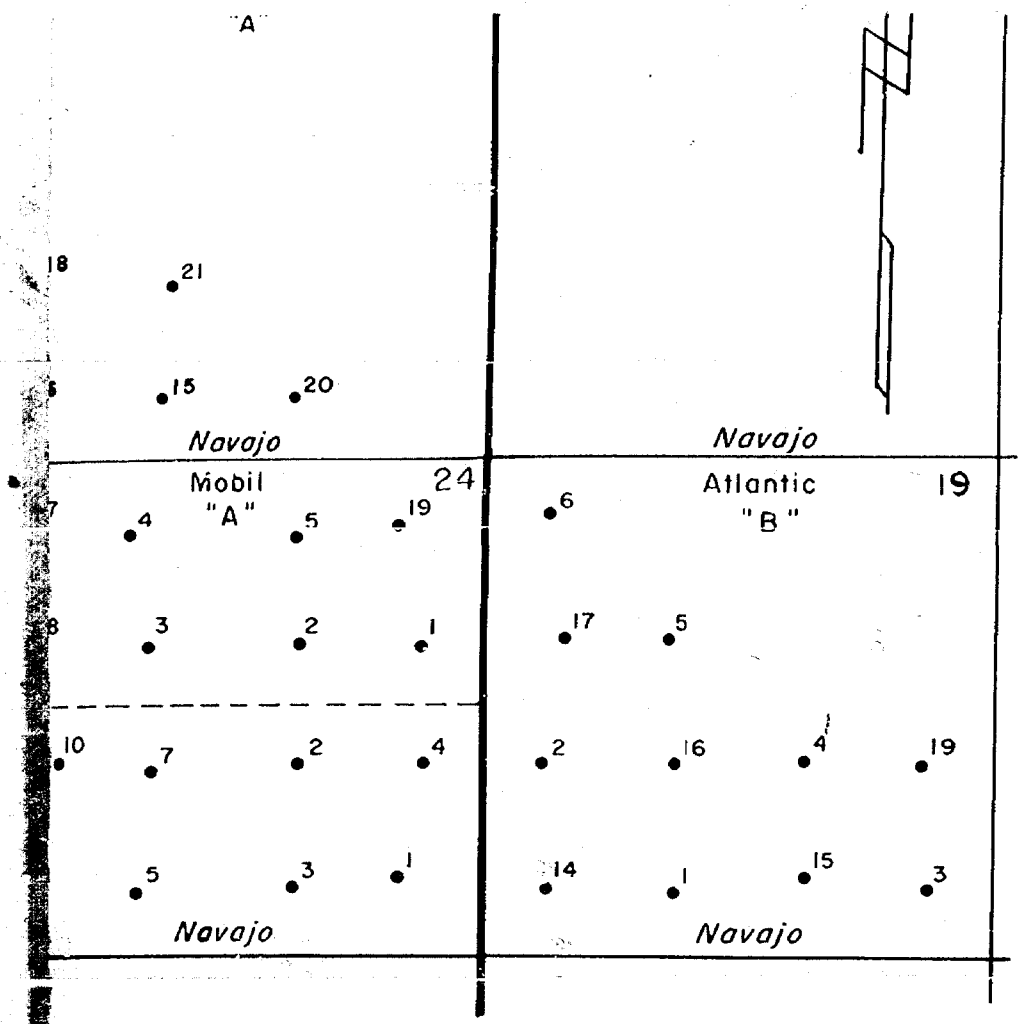
- Producing Wells
- Proposed Injection Wells
- Proposed Injection Well Location
- Dry & Abandoned
- Abandoned Location
- Gas Well
- WW Water Supply Well
- Outline of Humble Acreage



PROPO

HOR

SAN



OSED WATERFLOOD PATTERN

(HUMBLE ACREAGE)

SESHOE GALLUP FIELD

JUAN CO., NEW MEXICO

EXHIBIT "A"

HORSESHOE GALLUP FIELD
SAN JUAN COUNTY, NEW MEXICO
HUMBLE WELL DATA

Lease & Well	Total Depth	Production Casing Size	Depth Set-Feet	Estimated Top of Cement Feet	Perforated Interval	Completion Date	Initial Potential Barrels of Oil/Day	Initial Potential GOR Cu.Ft./Bbl.	May - 1960 Production Barrels of Oil/Day	May - 1960 Production GOR Cu.Ft./Bbl	Cumulative Oil Prod. to 6-1-60 Bbls.	June-1960 Allowable Bbls/Day	Waterflood Well Status
Humble Navajo Tribe of Indians													
F-1	1227	4-1/2	1227	700	1147-60	11-5-58	30	167	11	166	11,538	13	Inj.
F-2	1152	4-1/2	1118	155 (Survey)	1118-52	10-20-58	39	182	22	139	12,917	16	Prod.
F-3	1136	4-1/2	1128	600	1084-1100 1105-1116	1-26-59	117	129	60	158	24,150	30	Inj.
F-4	1153	4 DP	1131	600	1078-1094	3-5-59	77	156	31	150	20,055	30	Prod.
F-5	1047	4 DP	1045	500	1014-1032	3-17-59	63	778	51	144	20,754	51	Prod.
F-6	1024	4 DP	1021	500	966-990	3-20-59	72	620	60	52	21,730	61	Prod.
F-7	1080	4 DP	1068	500	1031-1041	4-12-59	24	143	10	98	6,511	11	Prod.
F-8	972	4 DP	969	400	912-937	3-30-59	71	37	60	14	21,812	61	Inj.
F-9	924	4 DP	923	400	877-902	4-8-59	124	3096	19	5526	8,985	23*	Inj.
F-10	1048	4 DP	1046	500	990-1002	4-14-59	23	269	12	269	7,298	12	Prod.
F-11	917	4 DP	914	300	880-894	4-20-59	62	228	9	405	12,303	8	Inj.
F-12	1000	4 DP	998	400	954-967	4-20-59	96	83	60	6	20,704	50	Prod.
F-13	921	4 DP	919	400	884-897	5-4-59	81	99	60	13	20,166	50	Prod.
F-14	860	4 DP	850	300	826-836	5-1-59	Associated Gas Well		-	-	-	-	Inj.
F-15	968	5	967	300	910-922	7-2-59	60	100	23	43	11,220	20	Inj.
F-16	975	5	973	300	922-931	6-27-59	60	100	6	177	9,036	6	Prod.
F-17	954	4 DP	952	400	916-928	5-10-59	85	46	23	14	14,379	13	Inj.
F-18	1027	4 DP	1025	300	978-999	5-17-59	56	77	21	95	14,791	13	Inj.
F-19	1047	5	1045	300	1004-1016	5-20-59	108	18	49	52	18,461	49	Prod.
F-20	975	5	974	300	945-963	5-26-59	115	225	54	12	18,890	36	Prod.
F-21	998	5	997	300	962-979	6-2-59	61	104	33	108	16,134	38	Inj.
F-22	995	5	994	300	931-964	6-2-59	120	207	24	44	14,764	14	Inj.
F-23	1040	5	1037	400	980-1010	6-14-59	78	150	60	100	17,915	61	Inj.
F-24	1045	5	1043	400	996-1012	6-4-59	63	189	40	81	15,145	40	Inj.
F-25	1109	5	1105	500	1030-1060	7-13-59	77	100	60	9	16,420	61	Inj.
F-26	1138	5	1131	500	1054-1068	7-6-59	62	100	52	228	14,297	61	Prod.
F-27	1092	5	1088	400	1056-1071	7-30-59	41	100	22	46	9,807	23	Inj.
F-28	1170	5	1152	400	1110-27	7-29-59	30	100	10	245	5,358	10	Inj.
F-29	1168	5	1161	500	1128-1140	7-11-59	30	TSTM	6	1801	5,511	6	Prod.
F-30	1019	5	983	400	964-973	9-8-59	5	67	5	161	1,527	5	Prod.
F-31	1056	5	1050	450	1012-1022	10-18-59	3	337	5	344	782	5	Inj.
F-32	1076	5	1073	475	1040-1050	9-5-59	6	200	2	516	958	2	Inj.
F-33	1075	5	1071	400	1034-1044	7-19-59	55	100	6	201	10,666	5	Inj.
F-34	1058	5	1053	400	1014-1021	8-7-59	28	353	14	76	5,934	14	Inj.
F-35	1140	5	1137	475	1085-1095	8-27-59	2	TSTM	5	355	893	5	Prod.
F-36	1022	5	1018	400	981-988	8-26-59	SI	-	-	-	-	-	Inj.
F-37	1156	-	-	-	-	-	Dry, Plugged and Abandoned			-	-	-	Dry
F-38	1125	4-1/2	1122	600	1069-1077	9-16-59	SI	-	-	-	-	-	Inj.
F-39	950	4-1/2	937	514	883-914	9-13-59	70	TSTM	60	83	13,656	61	Prod.
F-40	911	4-1/2	907	320	851-856	9-8-59	75	173	22	2411	10,040	39*	Inj.
F-41	915	4-1/2	904	300	872-882	8-26-59	160	-	5	27077	5,730	5	Prod.
F-42	1117	-	-	-	-	-	Dry, Plugged and Abandoned			-	-	-	Dry
F-43	1068	4-1/2	1064	668	1005-1010	9-16-59	SI	-	-	-	-	-	Inj.
F-44	-	-	-	-	-	-	Proposed Inj. Well Location			-	-	-	Inj.
G-1	1010	4	1005	400	971-83	5-11-59	104	427	9	87	8,736	16	Prod.
G-2	930	5	927	300	899-911	5-19-59	100	TSTM	2	45	7,990	2	Prod.
G-3	992	4-1/2	988	687	932-942	9-28-59	SI	-	-	-	-	-	Inj.
G-4	958	4-1/2	951	200	905-920	8-17-59	106	3325	20	973	5,901	20	Inj.
G-5	1065	4-1/2	1050	465	1005-1010	9-5-59	SI	-	-	-	-	-	Inj.
G-6	972	4-1/2	969	430	917-927	9-14-59	8	20	6	104	1,612	10	Inj.
										Totals:	484,076	112	

EXHIBIT "C"