MALJAMAR COOPERATIVE REPRESSURING AGREEMENT

ARTESIA, NEW MEXICO

November 30, 1944

Oil Conservation Commission,
Santa Fe, New Mexico.

Gentlemen:

We are enclosing the original and one copy of Petition of Operators' Committee under Maljamar Cooperative Repressuring Agreement for an Allocation of Oil Production Plan for the Maljamar Cooperative Repressuring Area.

This plan is based on Gas Oil Ratios and Bottom Hole Pressures, and we request that you give the plan some study and any suggestions that you care to make and / or revision will be considered by the Committee of the Maljamar Cooperative Repressuring Agreement.

We trust that you will be able to set an early date for a hearing on this matter.

Very truly yours,

MALJAMAR COOPERATIVE
REPRESSURING AGREEMENT.

Emery Carper
Chairman-

BEFORE THE OIL CONSERVATION COMMISSION OF THE STATE OF NEW MEXICO

TO THE OIL CONSERVATION COMMISSION
OF THE STATE OF NEW MEXICO
SANTA FE, NEW MEXICO:

PETITION OF OPERATORS' COMMITTEE UNDER
MALJAMAR COOPERATIVE REPRESSURING AGREEMENT
FOR AN ALLOCATION OF OIL PRODUCTION PLAN FOR
THE MALJAMAR COOPERATIVE REPRESSURING AREA

Comes now the Operators' Committee acting under and pursuant to the Maljamar Cooperative Repressuring Agreement and respectfully shows:

1. That a copy of the Agreement dated August 5, 1941, forming the Maljamar Cooperative Repressuring Agreement has heretofore been filed with the Oil Conservation Commission of the State of New Mexico and for all purposes reference is hereby made to the copy of said Agreement in the files of the Oil Conservation Commission.

That the Cooperative Area subject to the Maljamar Cooperative Repressuring Agreement hereinabove referred to consists of Sections 14 to 23, inclusive, and Sections 26 to 35, inclusive, in Township 17 South, Range 32 East, N.M.P.M., in Lea County, State of New Mexico. That the lands situated within the boundaries of said cooperative area and actually committed to said Maljamar Cooperative Repressuring Agreement by the parties thereto are described as follows:

> E/2 of Section 14; E/2 of Section 16; all of Sections 17, 18, 19, 20, 21, 22, 27, 28, 29 and 30; the N/2, N/2 SE/4, NE/4 SW/4, and S/2 SW/4 of Section 23; S/2 NW/4 and SW/4 of Section 26; N/2 and W/2 SE/4 of Section 31; N/2 and SE/4 of Section 33; NE/4 and W/2 NW/4 of Section 34; and W/2 of Section 35, all in Township 17 South, Range 32 East, N.M.P.M.

That the lands situated within the boundaries of said cooperative area not originally committed, but now in the process of being committed, to said Maljamar Cooperative Repressuring Agreement by instrument entitled "Supplement to Maljamar Cooperative Repressuring Agreement", are described as follows:

> SW/4 SW/4 of Section 15; S/2 SW/4 of Section 16; S/2 SE/4 of Section 23; N/2 NW/4 and E/2 of Section 26; and E/2 NW/4 of Section 34, all in Township 17 South, Range 32 East, N.M.P.M.

That all of the above described lands are under oil and gas lease; that all of the leases except the leases embracing the E/2 and the S/2 of the SW/4 of Section 16, Township 17 South, Range 32 East, N.M.P.M., were issued by the United States of America under and pursuant to the Act of Congress, approved February 25, 1920; that the leases covering and embracing the E/2 and the S/2 of the SW/4 of Section 16, Township 17 South, Range 32 East, N.M.P.M., were issued by the State of New Mexico acting by and through its Commissioner of Public Lands, and that all of said lands are in the Area now known and referred to as the Maljamar Repressuring Project.

3. That pursuant to the provisions contained in the Maljamar Cooperative Repressuring Agreement dated August 5, 1941, the Operators' Committee therein provided for caused to be constructed a Pressure Maintenance Plant in the Area for the primary purpose of maintaining reservoir pressures within the Grayburg and San Andres producing zones through the compression and distribution of high pressure gas into selected gas injection wells. During this operation the plant has been so designed as to permit the processing and extraction of natural gasoline and associated hydrocarbons from the produced gas. Said Pressure Maintenance Plant was placed in operation on the 10th day of April, 1942, and has been in continuous operation since that date. From the commencement of plant operations and the inception of the Pressure Maintenance Program in the Area there has been processed through this plant slightly less than three billion cubic feet of casinghead gas and during the same period of time there has been returned through gas injection wells to the Grayburg and San Andres formations a little more than two billion cubic feet of gas, or approximately 60 percent of the produced gas in the Area has been returned to the Grayburg

and San Andres formations. At the present time approximately 60 percent of the produced gas is being returned to the producing formations. Engineering observations and studies during the past two and one-half years of pressure maintenance operations, however, strongly indicate that this project will prove even more successful and that a far greater ultimate recovery of oil will be obtained if a larger volume of gas is returned to the producing formations. Plans are now being made by the Operators' Committee of the Maljamar Cooperative Repressuring Agreement to enlarge and expand the facilities of the Pressure Maintenance Plant, which will permit the injection of a larger percentage of the produced casinghead gas.

4. That by order entered by the Oil Conservation Commission of the State of New Mexico, in Case No. 36, Order No. 485, on November 14, 1942, it was provided that proration units within the committed area should not exceed the production of 44 barrels of oil daily. That by subsequent order of the Oil Conservation Commission the daily oil allowable per proration unit within the committed area was reduced to 34 barrels and is now 34 barrels of oil per proration unit per day. Since the inception of this project and up to the present time the Operators' Committee has been able to control the volume of gas injected into the producing formations, but has not at any time had sufficient and adequate control over the oil and gas withdrawals from the pool. As time goes on it becomes imperative that the Operators' Committee have control over both the volume of gas injected and the daily withdrawal of oil and gas from each well in the Maljamar Repressuring Project in order to continue the success of this Pressure Maintenance Project and obtain the greatest ultimate recovery of oil from the Area.

5. That sometime ago the Operators' Committee requested the Engineering Committee of the Maljamar Cooperative Repressuring Agreement to make a thorough study of the subject and submit to it an Allocation of Oil Production Plan for the Maljamar Repressuring Project. That its Engineering Committee thereafter made a thorough and exhaustive study of the Maljamar Repressuring Project and submitted to the Operators' Committee an Allocation of Oil Production Plan which has as its basis

the volumetric control of oil and gas withdrawals from individual wells through the use of gas-oil ratio and bottom hole pressure tests to be taken at fixed intervals. The benefits to be derived from the application and administration of this Allocation of Oil Production Plan are dependent upon rigid control of both oil and gas withdrawals from the individual wells. Said Allocation of Oil Production Plan for the Maljamar Repressuring Project has been unanimously approved by the Operators' Committee of the Maljamar Cooperative Repressuring Agreement and is attached hereto, marked "Exhibit A", and by reference made a part hereof.

WHEREFORE, the Operators' Committee under the Maljamar Cooperative Repressuring Agreement hereby respectfully petitions the Oil Conservation Commission of the State of New Mexico to call a hearing as provided by law and the rules and regulations of the Commission for the purpose of approving the Allocation of Oil Production Plan attached hereto, marked "Exhibit A", in its entirety, and such other matters and things incident thereto as may be required by law to be approved by the Oil Conservation Commission. Said Allocation of Oil Production Plan for the Maljamar Repressuring Project to be ordered to become effective as of 7:00 o'clock A.M., on the first day of the calendar month following the date of approval of said Allocation of Oil Production Plan by the Oil Conservation Commission.

Respectfully submitted,

OPERATORS' COMMITTEE, ACTING
UNDER MALJAMAR COOPERATIVE
REPRESSURING AGREEMENT

By: Emery Carper
Chairman.

STATE OF NEW MEXICO)
) ss.
COUNTY OF EDDY)

EMERY CARPER, being first duly sworn upon his oath states: That he is the Chairman of the Operators' Committee, acting under and pursuant to the Maljamar Cooperative Repressuring Agreement of August 5, 1941, and has been duly authorized by said Committee to execute the above and foregoing petition for and on behalf of said Committee, and that he has read said petition and exhibits attached hereto and to the best of his knowledge and belief all of the statements therein contained are true and correct.

Emery Carper
Emery Carper

SUBSCRIBED AND SWORN TO BEFORE ME this 29th day of November, 1944.

Teresa Goehring
Notary Public.

My commission expires:
April 21, 1948

ENGINEERING REPORT ON THE ALLOCATION OF OIL PRODUCTION WITHIN THE MALJAMAR COOPERATIVE REPRESSURING AGREEMENT

EXHIBIT "A"

CONCLUSIONS

I

The rate of oil and gas withdrawal from the individual wells is the most important single controllable factor governing the efficiency of oil recovery from the Maljamar Field.

II

A plan for the allocation of oil production to the individual well is not only feasible but is highly recommended by your appointed committee.

III

The allocation plan should be developed on a basis of sound legal and engineering concepts, and should embody the following specific principles:

1. Physical waste should be kept at a minimum.

2. Each operator should be afforded a reasonable opportunity to produce the recoverable oil or its equivalent from under his own property.

3. No undue hardship should be imposed upon any operator by reason of the administration of the allocation plan.

4. Such allocation plan should be simple and direct, using as few reservoir factors as possible.

5. The allocation plan should contain sufficient flexibility to correct within reasonable limits any discrimination, injustice, or inequality that may be imposed upon any one operator through the strict administration of such plan.

IV

Benefits to be derived from the application of the allocation plan within the Maljamar Field are as follows:

1. Volumetric control of the reservoir, as provided for through the application of an allocation plan, would further enhance the benefits of the pressure maintenance program in the Maljamar Field and substantially increase the ultimate recovery therefrom.

2. The flowing life of the individual well would be further prolonged resulting in increased savings in both lifting and operating expense.

3. More efficient operation of the pressure maintenance plant would be achieved through increased gasoline recoveries, and lower future investments.

4. Reduce the venting of gas both in the field and at the pressure maintenance plant.

5. Promote a more equitable recovery of oil to each operator by preventing adverse drainage of oil across property lines.

6. The allocation plan will offer the immediate result of increasing the present gas injection rate by 12-1/2 per cent or approximately nine million cubic feet of gas per month.

7. The migration of reservoir oil into gas cap areas from which a substantial part of the oil cannot be recovered will be held to a minimum through the use of an allocation plan.

8. The ultimate recovery of oil from the Maljamar Field will be greatly increased by virtue of the following fundamental principles upon which the allocation plan has been constructed:

    a. Any plan of allocation or operation that will tend to check reservoir pressure decline and thereby prevent the shrinkage of reservoir oil through the loss of solutional gas will, as a direct consequence, increase the oil recovery from the field.

    b. Any plan of allocation or operation that will reduce the release of solutional gas from the oil into the reservoir and thereby maintain as nearly as possible the original viscosity of the reservoir fluid will, as a direct consequence, increase the oil recovery from the field.

    c. Any plan of allocation or operation that will reduce the shrinkage of oil in the reservoir will insure the most effective use of the input gas and will, as a direct consequence, increase the oil recovery from the field.

RECOMMENDATIONS

I

That a plan of allocating oil production to the individual wells of the Maljamar Field, based upon gas-oil ratios and bottom hole pressures, be adopted.

II

That such a plan include all of the area previously designated and approved as bounds of the Maljamar Cooperative Repressuring Agreement and as set out in Exhibit IV herein attached.

III

That a daily field allowable of 4,500 barrels be allocated to the wells in the above designated area, and that such allowable be increased from time to time to include newly completed wells drilled within the area.

IV

That authority be requested from the New Mexico Oil and Gas Commission permitting the Project Engineer to determine at six months' intervals the gas-oil ratio and bottom-hole pressures on all producing wells directly offsetting the Cooperative Area; such information to be used in ascertaining and correcting drainage or interference across property lines.

V

That for the application of this plan the following determinations be made:

1. Bottom hole pressures be taken at each six months interval, either with pressure bomb or echo meter on each individual well; each well to be closed in 24 hours but not to exceed 48 hours prior to taking bottom hole pressure.

2. All wells to be tested at lease once over each three months period at its production rate as allocated to determine its gas-oil ratio and production. During such test no flowing well shall produce through a choke larger than 3/4 of an inch nor shall it produce in excess of three hours, continuous flow, or four

hours, intermittent flow, over a 24 hour period. A pumping well shall not produce over a period longer than seven hours after fluid has been pumped up. All wells shall be produced at their allocated rate the day preceding the test.

3. See amendment dated 1-4-45

VI

That following completion of the above mentioned tests, at the close of each three months interval, the total field allowable will be allocated to the individual wells on the following basis:

1. Each well in the field will be assigned a basic allowable of 15 barrels per day. In the event a well is unable to produce this amount its basic allowable shall be the same as its production test.

2. Wells producing from the Red Sand and Yates Sand shall not be prorated under this plan other than they shall not produce at a rate in excess of State Allowable.

3. Those wells capable of producing the basic allowable of 20 barrels per day but unable to produce the additional allowable assigned to them through use of the bottom hole pressure--gas-oil ratio factor should be termed "Intermediate Wells" and shall be assigned an allowable equal to that shown on their production test.

4. The additional remaining field allowable shall be allocated to the various wells on the basis of their bottom hole pressures and gas-oil ratios as reflected in the above referred to tests.

5. For simplicity of administration, this additional allowable shall be allocated by use of the bottom hole pressure--gas-oil ratio factors provided by the Core Laboratories following their analysis of the bottom hole oil sample from the Maljamar Field. These factors as shown on the attached table represent the barrels of reservoir space voided in producing one barrel of stock tank oil under varying gas-oil ratios and bottom hole pressures. Each individual well will share in the allocation of this additional allowable in inverse proportion to the amount of reservoir space voided as reflected by its production test.

6. Individual well allowables shall be adjusted quarterly and shall prevail for a three months period.

7. Newly completed or reconditioned wells shall be assigned the average gas-oil ratios and bottom hole pressure of the field until such time as proper tests can be taken.

8. Only the current allowable for any given month plus storage from the preceding month shall be run by the pipe line companies.

9. The individual well and lease allowable shall be computed by the Project Engineer of the Maljamar Cooperative Repressuring Agreement and submitted to the New Mexico Oil and Gas Commission on the 25th of each month to be entered on the following month's allowable distribution.

EXHIBITS

I

Barrels of reservoir space voided by one barrel of stock tank oil at given gas-oil ratios, and bottom hole pressures as prepared by Core Laboratories, Incorporated.

II

Barrels of reservoir space voided in producing one barrel of stock tank oil, and the reciprocal factors thereof at given gas-oil ratios and bottom hole pressures.

III

Maljamar Field production allocation schedule.

IV

Map of Maljamar Area.

CORE LABORATORIES, INC.
Petroleum Engineering Service
DALLAS

Company	MALJAMAR COOPERATIVE REPRESSURING AGREEMENT	Date	July 2, 1943
Well	CARPER-SIMON 3R	File	BHT 1-131
Field	MALJAMAR	Depth	3600
County	LEA	State	NEW MEXICO

BARRELS OF RESERVOIR SPACE VOIDED BY ONE BARREL STOCK TANK OIL WHEN PRODUCING GAS/OIL RATIO =

PRESSURE: Pounds Per Square Inch Gauge	"Z"	2000	1500	1000	500	392
1200	.480	2.9614	2.4195	1.8775	1.3355	1.2134
1000	.550	3.6115	2.8681	2.1247	1.3813	1.2207
862	.627	4.3770	3.3961	2.4153	1.4345	1.2226
800	.665	4.8518	3.7324	2.6130	1.4936	1.2518
600	.766	6.9257	5.2169	3.5081	1.7994	1.4303
400	.845	10.8381	8.0447	5.2513	2.3579	1.8545
200	.922	22.1481	16.3648	10.3815	4.4982	3.2274

BARRELS OF RESERVOIR SPACE VOIDED IN PRODUCING ONE BARREL OF STOCK TANK-OIL, AND THE RECIPROCAL FACTOR THEREOF, AT GIVEN GAS OIL RATIOS AND RESERVOIR PRESSURES

Reservoir Pressures	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000	3200	3400	3600	3800	4000	4200	4400	4600	4800	5000
1300	1.21	1.40	1.58	1.75	1.93	2.11	2.28	2.45	2.62	2.80	3.09	3.27	3.46	3.64	3.83	4.02	4.20	4.39	4.57	4.76	4.95	5.13	5.32	5.51
	.826	.714	.633	.571	.518	.474	.439	.408	.382	.345	.324	.306	.289	.274	.261	.249	.238	.228	.219	.210	.202	.195	.188	.182
1250	1.21	1.42	1.61	1.81	2.01	2.20	2.40	2.60	2.79	3.03	3.23	3.43	3.63	3.83	4.04	4.24	4.44	4.64	4.84	5.04	5.24	5.44	5.64	5.84
	.826	.704	.621	.552	.498	.455	.417	.385	.358	.330	.309	.291	.275	.261	.248	.236	.225	.215	.206	.198	.190	.183	.177	.171
1200	1.22	1.44	1.65	1.87	2.09	2.30	2.52	2.74	2.96	3.18	3.39	3.61	3.83	4.04	4.26	4.48	4.69	4.91	5.13	5.34	5.56	5.78	5.99	6.21
	.820	.694	.606	.535	.478	.435	.397	.365	.338	.315	.294	.277	.261	.247	.235	.223	.213	.204	.194	.186	.179	.172	.166	.160
1150	1.22	1.46	1.70	1.94	2.18	2.41	2.64	2.88	3.12	3.33	3.57	3.80	4.03	4.27	4.50	4.74	4.97	5.21	5.44	5.66	5.91	6.14	6.38	6.61
	.820	.685	.588	.515	.459	.415	.379	.347	.321	.300	.280	.263	.248	.234	.222	.211	.201	.192	.183	.176	.169	.162	.156	.151
1100	1.22	1.49	1.75	2.00	2.26	2.51	2.77	3.02	3.28	3.51	3.77	4.01	4.27	4.53	4.78	5.03	5.29	5.54	5.79	6.05	6.30	6.55	6.80	7.06
	.820	.671	.571	.500	.442	.398	.361	.331	.305	.286	.266	.249	.234	.221	.209	.199	.189	.181	.172	.165	.158	.152	.146	.141
1050	1.22	1.51	1.80	2.06	2.35	2.62	2.89	3.16	3.44	3.70	3.97	4.25	4.52	4.80	5.07	5.34	5.62	5.89	6.17	6.44	6.72	6.99	7.26	7.54
	.820	.663	.556	.485	.426	.382	.346	.316	.291	.270	.252	.235	.221	.209	.197	.187	.178	.170	.162	.155	.148	.143	.137	.132
1000	1.22	1.53	1.84	2.12	2.43	2.72	3.01	3.31	3.61	3.91	4.21	4.51	4.80	5.10	5.40	5.70	5.99	6.29	6.59	6.88	7.18	7.48	7.78	8.07
	.820	.654	.543	.472	.412	.368	.332	.302	.277	.256	.238	.222	.208	.196	.185	.176	.167	.159	.151	.145	.139	.133	.128	.123
950	1.22	1.57	1.92	2.24	2.59	2.92	3.25	3.58	3.92	4.19	4.52	4.85	5.18	5.51	5.84	6.17	6.50	6.82	7.15	7.48	7.81	8.14	8.47	8.80
	.820	.637	.521	.446	.386	.342	.308	.279	.255	.238	.221	.206	.193	.182	.171	.162	.154	.147	.139	.133	.128	.122	.118	.113
900	1.23	1.62	2.00	2.37	2.75	3.12	3.48	3.86	4.23	4.61	4.88	5.24	5.61	5.97	6.34	6.70	7.06	7.43	7.79	8.16	8.52	8.38	9.25	9.61
	.813	.617	.500	.422	.364	.321	.287	.259	.236	.222	.205	.191	.178	.167	.158	.149	.142	.135	.128	.122	.117	.112	.108	.104
850	1.24	1.66	2.08	2.49	2.90	3.31	3.72	4.13	4.54	4.87	5.28	5.38	6.09	6.49	6.89	7.30	7.90	8.10	8.51	8.91	9.31	9.72	10.12	10.53
	.806	.602	.481	.402	.345	.302	.269	.242	.220	.205	.189	.176	.164	.154	.145	.137	.130	.123	.117	.112	.107	.102	.098	.094
800	1.25	1.71	2.16	2.61	3.06	3.51	3.96	4.40	4.85	5.30	5.75	6.20	6.65	7.10	7.54	7.99	8.44	8.89	9.34	9.78	10.23	10.68	11.13	11.58
	.800	.585	.463	.383	.327	.285	.253	.227	.206	.189	.174	.161	.150	.141	.133	.125	.118	.113	.107	.102	.097	.093	.089	.086
750	1.29	1.81	2.32	2.83	3.34	3.85	4.35	4.86	5.37	5.76	6.26	6.75	7.25	7.74	8.24	8.73	9.23	9.72	10.22	10.71	11.21	11.70	12.20	12.69
	.775	.552	.431	.353	.299	.260	.230	.206	.186	.174	.160	.148	.138	.129	.121	.115	.108	.103	.097	.093	.089	.085	.081	.078
700	1.34	1.92	2.48	3.06	3.62	4.19	4.75	5.32	5.88	6.28	6.84	7.39	7.94	8.48	9.03	9.58	10.13	10.68	11.23	11.78	12.33	12.88	13.43	13.97
	.746	.521	.403	.327	.276	.239	.211	.188	.170	.159	.146	.135	.126	.118	.111	.104	.099	.094	.089	.084	.081	.077	.074	.071
650	1.38	2.02	2.65	3.28	3.90	4.53	5.15	5.78	6.40	6.90	7.51	8.12	8.73	9.34	9.95	10.56	11.17	11.79	12.40	13.01	13.62	14.23	14.84	15.45
	.725	.496	.377	.306	.256	.221	.194	.173	.156	.145	.133	.123	.115	.107	.100	.095	.089	.085	.080	.076	.073	.070	.067	.064
600	1.43	2.13	2.82	3.50	4.18	4.87	5.55	6.24	6.92	7.62	8.30	8.99	9.67	10.35	11.04	11.72	12.40	13.09	13.77	14.46	15.14	15.82	16.51	17.19
	.699	.469	.355	.286	.239	.205	.180	.160	.145	.131	.120	.111	.103	.097	.091	.085	.081	.076	.072	.069	.066	.063	.060	.058
550	1.53	2.33	3.14	3.94	4.73	5.52	6.31	7.11	7.90	8.40	9.16	9.93	10.69	11.45	12.22	12.98	13.74	14.51	15.27	16.03	16.79	17.56	18.32	19.08
	.654	.429	.318	.254	.211	.181	.158	.141	.127	.119	.109	.101	.094	.087	.082	.077	.073	.068	.065	.062	.059	.056	.054	.052
500	1.64	2.53	3.45	4.38	5.28	6.18	7.07	7.97	8.87	9.35	10.21	11.07	11.92	12.79	13.65	14.50	15.36	16.22	17.08	17.94	18.80	19.65	20.51	21.37
	.610	.395	.290	.228	.189	.162	.141	.125	.113	.107	.098	.090	.084	.078	.073	.069	.065	.061	.058	.055	.053	.050	.048	.046
450	1.74	2.73	3.77	4.82	5.83	6.83	7.84	8.84	9.85	10.50	11.48	12.45	13.42	14.39	15.37	16.34	17.31	18.29	19.26	20.23	21.21	22.18	23.15	24.13
	.575	.366	.265	.207	.172	.146	.128	.113	.102	.095	.087	.080	.075	.069	.065	.061	.058	.054	.051	.049	.047	.045	.043	.041
400	1.85	2.93	4.09	5.25	6.37	7.48	8.60	9.71	10.83	11.97	13.09	14.21	15.33	16.44	17.56	17.68	19.80	20.92	22.03	23.15	24.27	25.39	26.51	27.62
	.541	.341	.244	.190	.157	.134	.116	.103	.092	.084	.076	.070	.065	.061	.057	.054	.051	.047	.045	.043	.041	.039	.037	.036