

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

1666

November 7, 1962

Sunray DX Oil Company
101 University Boulevard
Denver 6, Colorado

Attention: Mr. A. E. Maissner

Re: Plan of Development
(Fourth Year) Central
Bisti Lower Gallup Sand
Unit, San Juan County,
New Mexico.

Gentlemen:

This is to advise that the New Mexico Oil Conservation Commission has this date approved the Plan of Development (Fourth Year) which proposes that the second modification of plan of development be continued for the fourth year for the Central Bisti Lower Gallup Sand Unit, San Juan County, New Mexico, subject to like approval by the United States Geological Survey and the Commissioner of Public Lands of the State of New Mexico.

One approved copy of the plan is returned herewith.

Very truly yours,

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

ALP/JEK/lq

cc: United States Geological Survey
Roswell, New Mexico

Commissioner of Public Lands
Santa Fe, New Mexico

Drawer 1857
Roswell, New Mexico

August 10, 1962

Sunray DX Oil Company
101 University Boulevard
Denver 6, Colorado

Attention: Mr. A. E. Meissner

Gentlemen:

Your third supplemental plan of development and operation dated July 25, 1962, for the Central Bisti unit area, San Juan County, New Mexico, which proposes that the second supplemental plan of development be continued for the fourth year of unitized operations has been approved on this date subject to like approval by the appropriate State officials.

One approved copy of the plan is enclosed.

Very truly yours,

Orig. Sgd.) CARL C. TRAYWICK

for JOHN A. ANDERSON

Copy to: Washington (w/cy of plan)
Farmington (w/cy of plan)
NMOCC-Santa Fe (ltr. only)
Com. of Pub. Lands-Santa Fe (ltr. only)

Sunray DX Oil Company

101 University Blvd.

Albuquerque, New Mexico

AUG 1 1962

Western Division



A. E. Meissner
Production Manager

July 25, 1962

The Oil and Gas Supervisor
U. S. Geological Survey
Roswell, New Mexico

Commissioner of Public Lands
State Land Office
Santa Fe, New Mexico

The New Mexico Oil Conservation Commission
State Land Office
Santa Fe, New Mexico

Re: Central Bisti Lower Gallup Sand Unit Area
San Juan County, New Mexico
PLAN OF DEVELOPMENT - (Fourth Year)

Gentlemen:

The operation of the Central Bisti Unit Area, San Juan County, New Mexico, is being conducted in accordance with the Second Modification of Plan of Development and Operation submitted as of March 7, 1962, which was duly approved by the Regional Oil and Gas Supervisor, U. S. Geological Survey, the Commissioner of Public Lands of the State of New Mexico, and the New Mexico Oil Conservation Commission. Sunray DX Oil Company (formerly named Sunray Mid-Continent Oil Company) as Unit Operator is requesting that the Second Modification of Plan of Development and Operation be approved for the fourth year of the Unit, subject to being modified as authorized by Section 10 of the Unit Agreement.

Accordingly, it is respectfully requested that the adoption of the Second Modification of Plan of Development and Operation be approved as the Plan of Operation for the fourth year of the Unit pursuant to Section 10 of the Unit Agreement, subject to being modified from time to time with the approval of the Regional Oil and Gas Supervisor, U. S. Geological Survey, the Commissioner of Public Lands of the State of New Mexico, and the New Mexico Oil Conservation Commission.

Approved Nov 7, 1962

Respectfully submitted,

SUNRAY DX OIL COMPANY

NEP:JD

Secretary-Director

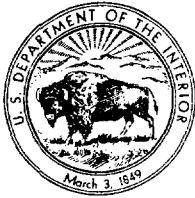
By

A. E. Meissner
A. E. Meissner

Division Production Manager

NEW MEXICO OIL CONSERVATION COMMISSION

UNIT OPERATOR



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

Drawer 1857
Roswell, New Mexico

May 7, 1962

Sunray Mid-Continent Oil Company
101 University Boulevard
Denver 6, Colorado

Attention: Mr. A. E. Meissner

Gentlemen:

Your second supplemental plan of development and operation dated March 7, 1962, for the Central Bisti Lower Gallup Sand Unit, San Juan County, New Mexico, has been approved on this date subject to like approval by the appropriate State officials.

One approved copy of the plan is enclosed.

Very truly yours,

(Orig.Sgd.) CARL C. TRAYWICK

CARL C. TRAYWICK
Acting Regional Oil and Gas Supervisor

Copy to: Washington (w/cy of plan)
Farmington (w/cy of plan)
NMOCC-Santa Fe (ltr only) ✓
Com. of Pub. Lands-Santa Fe (ltr only)

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

4528
1666

March 26, 1962

C
O
P
Y
Sunray Mid-Continent Oil Co.
101 University Boulevard
Denver 6, Colorado

Attention: Mr. A. E. Weissner

Re: Plan of Operation, Third
Year, Central Bisti Lower
Gallup Sand Unit, San Juan
County, New Mexico

Gentlemen:

This is to advise that the New Mexico Oil
Conservation Commission has this date approved the Second
Modification of Original Plan of Development and Operation
as the Plan of Operation for the Third Year of the Central
Bisti Lower Gallup Sand Unit, San Juan County, New Mexico,
subject to like approval by the United States Geological
Survey and the Commissioner of Public Lands of the State
of New Mexico.

One approved copy of the plan is returned here-
with.

Very truly yours,

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

ALP/JEK/eg

cc: U. S. Geological Survey - Roswell
Commissioner of Public Lands - Santa Fe

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

March 26, 1962

C
O
P
Y

Sunray Mid-Continent Oil Co.
101 University Boulevard
Denver 6, Colorado

Attention: Mr. A. E. Meissner

Re: Plan of Operation, Third
Year, Central Bisti Lower
Gallup Sand Unit, San Juan
County, New Mexico

Gentlemen:

This is to advise that the New Mexico Oil
Conservation Commission has this date approved the Second
Modification of Original Plan of Development and Operation
as the Plan of Operation for the Third Year of the Central
Bisti Lower Gallup Sand Unit, San Juan County, New Mexico,
subject to like approval by the United States Geological
Survey and the Commissioner of Public Lands of the State
of New Mexico.

One approved copy of the plan is returned here-
with.

Very truly yours,

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

ALP/JEK/eg

cc: U. S. Geological Survey - Roswell
Commissioner of Public Lands - Santa Fe

March 15, 1962

C
O
P
Y

Sunray Mid-Continent Oil Company
101 University Blvd.
Devner 6, Colorado

Re: Second Modification of
Original Plan of Develop-
ment and Operation, Central
Bisti Lower Gallup Sand Unit
Area, San Juan County, New
Mexico.

Attention: Mr. Norbert E. Proctor

Gentlemen:

The Commissioner of Public Lands by this letter approves your Second Modification of Original Plan of Development and Operation for Central Bisti Lower Gallup Sand Area, San Juan County, New Mexico.

This plan covers the period representing the Third year of Operation of the unit.

The Commissioner approval is subject to like approval by the United States Geological Survey and the Oil Conservation Commission.

Enclosed is Official Receipt No. F-87486 which covers the filing fee.

Very truly yours,

E. S. JOHNNY WALKER
COMMISSIONER OF PUBLIC LANDS

ESW/mmr
cc: Oil Conservation Commission
Santa Fe, New Mexico

United States Geological Survey
Roswell, New Mexico

1962 MAR 8 11 23
CLARK OFFICE CCC
CENTRAL BISTI LOWER GALLUP SAND UNIT AREA

SAN JUAN COUNTY, NEW MEXICO

SECOND MODIFICATION OF ORIGINAL PLAN OF DEVELOPMENT AND OPERATION

TO: THE OIL AND GAS SUPERVISOR
UNITED STATES GEOLOGICAL SURVEY
ROSWELL, NEW MEXICO

TO: THE COMMISSIONER OF PUBLIC LANDS
STATE LAND OFFICE
SANTA FE, NEW MEXICO

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

In compliance with Section 10 of the Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit, San Juan County, New Mexico, Sunray Mid-Continent Oil Company, as Unit Operator designated thereunder, does hereby submit for your approval the Second Modification of Original Plan of Development and Operation for the unitized land for the period representing the third year of operation of the Unit.

I. Summary of Second Modification of Original Plan
of Development and Operation

A description of the Second Modification of Original Plan of Development and Operation for the Central Bisti Lower Gallup Sand Unit is presented. Briefly, the second modification incorporates the conversion of the three remaining gas injection wells, GI-1, GI-2 and GI-20 to water injection or combination gas-water injection. In addition the nine remaining LPG-Gas injection wells, GI-3-L, GI-4-L, GI-5-L, GI-6-L, GI-7-L, GI-8-L, GI-12-L, GI-13-L and GI-14-L will be converted to water injection or combination gas-water injection wells. These wells are depicted on Figure 1.

The purpose of converting the three remaining gas injection wells to water injection or combination gas-water injection is to improve the sweep efficiency thereby increasing oil displacement in the northern edge of the Unit Area. The nine remaining LPG-Gas injection wells are also to be converted to water injection or combination gas-water injection to improve the sweep efficiency and ultimate oil recovery from the central portion of the Unit.

II. Proposed Development Program for The Second Modification of the Original Plan of Development and Operation

In order to put into effect the Second Modification of the Original Plan of Development and Operation outlined above, the following plan of development will be undertaken commencing with approval of the Oil and Gas Supervisor, Commissioner of Public Lands and Oil Conservation Commission.

1. Original Gas Injection Wells to be converted to Water or Combination Gas-Water Injection Wells.

- (a) GI-1 SW SE Sec. 31-26N-12W
- (b) GI-2 SW NE Sec. 5-25N-12W
- (c) GI-20 SW SW Sec. 32-26N-12W

Conversion of the above three wells to water or combination gas-water injection wells is consistent with the First Modification of the Original Plan of Development and Operation dated December 15, 1960. The conversion of these wells to water injection or combination gas-water injection will result in additional oil displacement in the Northern Flank Area of the Unit. The amount of additional gas to be injected into these wells depends upon the future performance of the offset producing wells.

2. Original LPG Injection Wells to be converted to Water or Combination Gas-Water Injection Wells.

- (a) GI-3-L SW NW Sec. 5-25N-12W
- (b) GI-4-L SW NE Sec. 6-25N-12W
- (c) GI-5-L SW SE Sec. 6-25N-12W
- (d) GI-6-L SW SW Sec. 5-25N-12W
- (e) GI-7-L SW SE Sec. 5-25N-12W
- (f) GI-8-L SW SW Sec. 4-25N-12W
- (g) GI-12-L SW NE Sec. 9-25N-12W
- (h) GI-13-L SW NW Sec. 9-25N-12W
- (i) GI-14-L SW NE Sec. 8-25N-12W

The conversion of the above nine LPG-Gas injection wells to water or combination gas-water injection wells will achieve improved aerial and vertical sweep efficiencies thereby improving the ultimate oil recovery from the miscible displacement area of the Central Bisti Unit. The future volumes of gas to be injected into these wells will depend upon the future performance of the offset producing wells.

III. Summary of Performance Based on the First Modification of Original Plan of Development and Operation Dated December 15, 1960.

The First Modification of Original Plan of Development and Operation was placed into effect in early 1961. The overall plan of

converting from gas injection to water or combination gas-water injection in the southern and northeastern edge portions of the Unit Area to improve oil displacement has been achieved. Most of the high gas-oil ratio wells in these areas have responded satisfactorily to the modified program in which the oil productivity has increased while the gas productivity has decreased considerably.

One original LPG-Gas injection well, GI-18-L, was also converted to water injection under the first modification. As a result, the offset producing wells to GI-18-L are demonstrating improved sweep efficiencies by their favorable response manifested by increased oil productivity and decreased gas-oil ratios.

CBU-44 (WI-9) was converted from a limited producer to a combination gas-water injection well. Approximately twenty (20) million cubic feet of gas was injected from May 27, 1961 to October 2, 1961 at which time water injection was initiated. The reservoir pressure of the offset producing wells had increased approximately 100 pounds per square inch as reflected by the August, 1961 pressure survey.

As authorized by the First Modification of Plan of Operation, water injection will be initiated into CBU-45 (WI-8), SW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 15, T. 25 N., R. 12 W., at the time Shell Oil Company as Operator of lands adjoining the Central Bisti Unit initiates water injection in a comparable well in the same vicinity. The conversion of these two wells will supplement the East water barrier.

IV. Modifications.

Although this Second Modification and Plan of Operation will permit upgrading the Central Bisti Unit operation, additional modifications may be necessary before depletion of the hydrocarbon reserves is accomplished. Accordingly, it is respectfully requested that the adoption of this Second Modification of Original Plan of Development and Operation be approved as the Plan of Operation for the Third Year of the Unit pursuant to Section 10 of the Unit Agreement, subject to being modified from time to time if needed, with the approval of the Regional Oil and Gas Supervisor, the United States Geological Survey, the Commissioner of Public Lands of the State of New Mexico, and the New Mexico Oil Conservation Commission.

Submitted this 7th day of March, 1962.

SUNRAY MID-CONTINENT OIL COMPANY

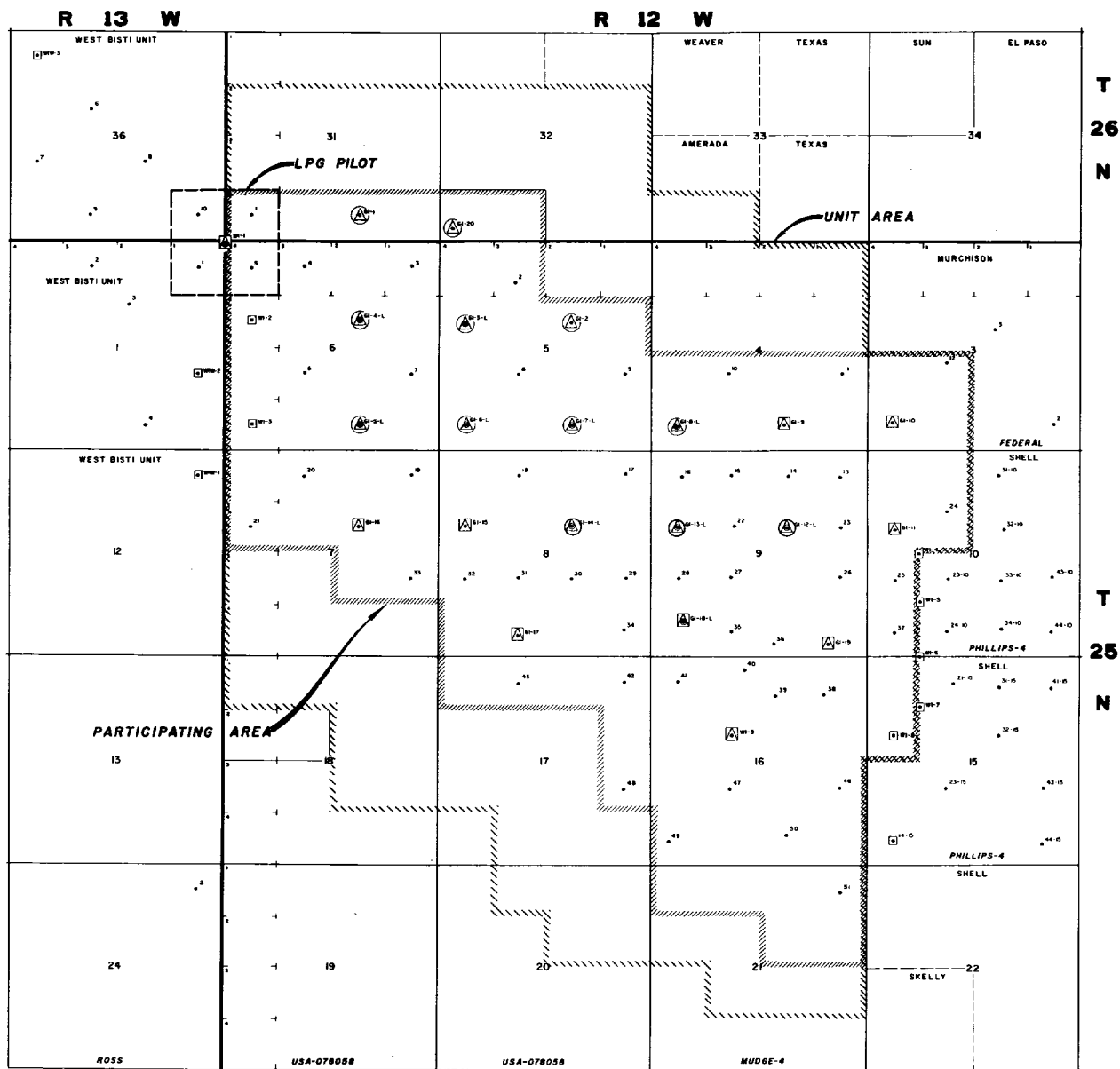
101 University Boulevard
Denver 6, Colorado

By A. E. Meissner
A. E. Meissner
Division Production Manager

Approved March 28, 1962

[Signature]
Secretary-Director

UNIT OPERATOR



**SECOND MODIFICATION
TO ORIGINAL PLAN OF DEVELOPMENT AND OPERATION**

CENTRAL BISTI LOWER GALLUP SAND UNIT

San Juan County, New Mexico

- LEGEND**
- LPG INJECTION WELL
 - △ GAS INJECTION WELL
 - PRODUCING WELL
 - WATER INJECTION WELL
 - ⊠ GAS AND WATER INJECTION WELL
 - ⊡ LPG, GAS, AND WATER INJECTION WELL
 - ⊢ ORIG. GAS INJ. WELLS TO BE CONVERTED TO COMBINATION GAS-WATER INJ.
 - ⊣ ORIG. LPG INJ. WELLS TO BE CONVERTED TO COMBINATION GAS-WATER INJ.

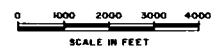


FIG-1

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

Case 111066

July 28, 1961

**Sunray Mid-Continent Oil Company
101 University Boulevard
Denver 6, Colorado**

Attention: Mr. A. E. Meissner

**Re: Plan of Development (Third Year)
Central Bisti Lower Gallup Sand
Unit San Juan County, New Mexico**

Gentlemen:

This is to advise that the New Mexico Oil Conservation Commission has this date approved the Plan of Development (Third Year) for the Central Bisti Lower Gallup Sand Unit San Juan County, New Mexico, subject to like approval by the United States Geological Survey and the Commissioner of Public Lands of the State of New Mexico.

One approved copy of the plan is returned herewith.

Very truly yours,

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

ALP/JEK/19

**cc: U. S. Geological Survey - Roswell
State Land Office - Santa Fe**

C
O
P
Y

In Reply: Refer
to Unit Division

June 27, 1961

C
O
P
Y

Sunray Mid-Continent Oil Company
101 University Boulevard
Denver 6, Colorado

Re: Central Bisti Lower Gallup
Sand Unit Area, San Juan
County, New Mexico
Plan of Development - (Third Year)

Attention: A. E. Meissner

Gentlemen:

Your plan of development dated June 14, 1961, covering the third year of operation for the Central Bisti Lower Gallup Sand Unit Area, has been approved by the Commissioner of Public Lands as of June 26, 1961.

This plan of development consists of the First Modification of Plan of Operation, subject to being modified as authorized by Sec. 10 of the Unit Agreement/

The Commissioner's approval is subject to like approval by the U. S. Geological Survey and the Oil Conservation Commission.

One approved copy is enclosed herewith.

Very truly yours,

E. S. JOHNNY WALKER
COMMISSIONER OF PUBLIC LANDS

ESJ/mmr/v

cc: U. S. Geological Survey
Roswell, New Mexico

Oil Conservation Commission
Santa Fe, New Mexico

Drawer 1857
Roswell, New Mexico

July 21, 1961

Sunray Mid-Continent Oil Company
101 University Boulevard
Denver 6, Colorado

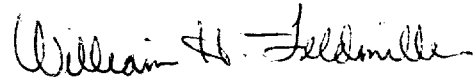
Attention: Mr. A. E. Weissner

Gentlemen:

Your plan of operation dated June 14, 1961, for the third year, Central Bisti Lower Gallup Sand unit, San Juan County, New Mexico, has been approved on this date subject to like approval by the appropriate State officials.

One approved copy of the plan is enclosed.

Very truly yours,


WILLIAM H. FELDMILLER
Acting Oil and Gas Supervisor

Enclosure

Copy to: Washington (w/cy of plan)
Farmington (w/cy of plan)
NMOCC, Santa Fe (ltr only) ✓
Com. of Pub. Lands, Santa Fe (ltr only)



Sunray Mid-Continent Oil Company

1001 West Broadway, Boulevard Santa Fe, New Mexico

Oil and Gas Supervisor
U. S. Geological Survey
Roswell, New Mexico

June 14, 1961

Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

Per # 1666

New Mexico Oil Conservation Commission
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

Re: Central Bisti Lower Gallup Sand Unit Area
San Juan County, New Mexico
PLAN OF DEVELOPMENT - (Third Year)

Gentlemen:

The operation of the Central Bisti Unit Area, San Juan County, New Mexico, is being conducted in accordance with the First Modification of Plan of Operation submitted as of December 15, 1960. Studies are presently being made to the end that the existing pressure maintenance program may be improved and it is possible that in the near future certain modifications to the existing Plan of Operation may be submitted. However, in the meantime, Sunray Mid-Continent Oil Company as Unit Operator is requesting that the First Modification of Plan of Operation be approved for the third year of the Unit subject to being modified as authorized by Section 10 of the Unit Agreement.

Accordingly, it is respectfully requested that the adoption of the First Modification of Plan of Operation be approved as the Plan of Operation for the third year of the Unit pursuant to Section 10 of the Unit Agreement, subject to being modified from time to time with the approval of the Regional Oil and Gas Supervisor, U. S. Geological Survey, the Commissioner of Public Lands of the State of New Mexico, and the New Mexico Oil Conservation Commission.

Respectfully submitted,

SUNRAY MID-CONTINENT OIL COMPANY

NEP:JD

Approved.....

July 28

1961

A. L. Porter
Secretary-Director

By

A. E. Meissner

A. E. Meissner

Division Production Manager

UNIT OPERATOR

NEW MEXICO OIL CONSERVATION COMMISSION

In reply refer to:
Unit Division

Case #11616

January 4, 1961

Sunray Mid-Continent Oil Company
P. O. Box 2692
Denver 1, Colorado

Re: Central Bisti Lower Gallup
Sand Unit Area,
San Juan County, New Mexico

Attention: Mr. O. A. Graybeal

Gentlemen:

Your first modification of Plan of Operation dated December 15, 1960, for the Central Bisti Lower Gallup Sand Unit Area, San Juan County, New Mexico, has been approved on this date by the Commissioner of Public Lands.

This approval is subject to like approval by the Oil and Gas Supervisor, United States Geological Survey and the Director of the Oil Conservation Commission.

Very truly yours,

E. S. Walker
Commissioner of Public Lands

MEM/umt/s

cc: United States Geological Survey
Roswell, New Mexico

New Mexico Oil Conservation Commission
Santa Fe, New Mexico

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

December 19, 1960

C
Sunray Mid-Continent Oil Company
P. O. Box 8692
Denver 1, Colorado

O
Attention: Mr. O. A. Graybeal

Re: Plan of Development
(Second Year) Central
Bisti-Lower Gallup Sand
Unit San Juan County,
New Mexico.

P
Gentlemen:

Y
This is to advise that the New Mexico Oil Conservation Commission has this date approved your plan of development dated November 16, 1960 for the Central Bisti Lower Gallup Sand Unit San Juan County, New Mexico, subject to like approval by the United States Geological Survey and the Commissioner of Public Lands of the State of New Mexico.

One approved copy of the plan is returned herewith.

Very truly yours,

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

ALP/JEK/lq

cc: Commissioner of Public Lands - Santa Fe, New Mexico

US Geological Survey - Roswell, New Mexico



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 6721
Roswell, New Mexico

December 27, 1960

Sunray Mid-Continent Oil Company
P. O. Box 2692
Denver 1, Colorado

Attention: Mr. O. A. Graybeal

Gentlemen:

Your first modification of plan of operation dated December 15, 1960, for the Central Bisti Lower Gallup Sand unit area, San Juan County, New Mexico, has been approved on this date subject to like approval by the appropriate State officials.

Very truly yours,

(Sgd.) CARL C. TRAYWICK

CARL C. TRAYWICK
Acting Regional Oil and Gas Supervisor

Copy to: Washington (w/cy of plan)
Farmington (w/cy of plan)
- NMOCC, Santa Fe (ltr. only)



UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

P. O. Box 6721
Roswell, New Mexico

November 28, 1960

Sunray Mid-Continent Oil Company
P. O. Box 2692
Denver 1, Colorado

Attention: Mr. O. A. Graybeal

Gentlemen:

Your plan of development dated November 16, 1960, covering the second year of operations for the Central Bisti Lower Gallup Sand unit area, San Juan County, New Mexico, has been approved on this date subject to like approval by the appropriate State officials.

Very truly yours,

EDWIN M. THOMASSON
Acting Oil and Gas Supervisor

Copy to: Washington (w/cy of plan)
7 NMOC-Santa Fe (ltr. only)



Sunray Mid-Continent Oil Company

Western Division

P. O. Box 2692

Denver 1, Colorado

November 16, 1960

Oil and Gas Supervisor
U. S. Geological Survey
Roswell, New Mexico

Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

New Mexico Oil Conservation Commission
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

Re: Central Bisti Lower Gallup Sand Unit Area
San Juan County, New Mexico -
Plan of Development (Second Year)

Gentlemen:

The operation of the Central Bisti Unit Area, San Juan County, New Mexico, has been conducted to date in accordance with the initial Plan of Development and Operation submitted as of June 11, 1959. The Engineering Committee of the Central Bisti Unit is now and has for some time past been engaged in studies to the end that the existing pressure maintenance program may be improved, and it is anticipated that in the very near future certain modifications to the existing Plan of Operation will be submitted, supported by a comprehensive report of the operations to date and the proposed changes in the Plan of Operation. It is expected that such a modified Plan of Operation will be ready for submission not later than January, 1961; however, in the meantime, Sunray Mid-Continent Oil Company, as Unit Operator, is requesting that the initial Plan of Operation be approved for the second year of the Unit subject to being modified as authorized by Section 10 of the Unit Agreement.

Accordingly, it is respectfully requested that the adoption of the initial Plan of Operation be approved as the Plan of Operation for the second year of the Unit pursuant to Section 10 of the Unit Agreement subject to being modified from time to time with the approval of the Regional Oil and Gas Supervisor, U. S. Geological Survey, the Commissioner of Public Lands of the State of

Oil and Gas Supervisor
Commissioner of Public Lands
New Mexico Oil Conservation Commission

-2-

November 16, 1960

New Mexico, and the New Mexico Oil Conservation Commission.

Respectfully submitted,

SUNRAY MID-CONTINENT OIL COMPANY

NEP:JD

By



E. A. Graybeal

Division Production Manager

UNIT OPERATOR

Received 12-19 1960



A. H. Porter, Jr.

ENVIRONMENTAL PROTECTION AGENCY

Case "1666"

CENTRAL BISTI LOWER GALLUP SAND UNIT
SAN JUAN COUNTY, NEW MEXICO

REVIEW OF UNIT PERFORMANCE

DECEMBER 7, 1960

RESERVOIR ENGINEERING SECTION
SUNRAY MID-CONTINENT OIL COMPANY
TULSA, OKLAHOMA

TABLE OF CONTENTS

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- IV. Stock Tank Oil in Place
- V. Production History
- VI. Injection History
- VII. Unit Performance
 - A. Reservoir Pressure
 - B. Miscible Displacement

FIGURES

- 1. Map of Central Bisti Lower Gallup Sand Unit
- 2. Central Bisti Unit Reservoir Performance
- 3. Central Bisti Unit Isobaric Map - October, 1960, Survey

I. Object of Report

The object of this report is to give a resume of the Central Bisti Lower Gallup Sand Unit performance from date of unitization, July 1, 1959, to November 1, 1960.

II. Summary and Conclusions

The performance of the Central Bisti Unit Lower Gallup Sand Unit reveals that the miscible phase oil displacement process is performing as anticipated, the reservoir pressure has been restored to a value above miscibility and the reservoir fluid is being contained within the unit boundary along the east and west water barriers.

Three of the ten peripheral gas injection wells have performed satisfactorily although the remaining seven gas injection wells have reflected inferior oil displacement and pressure maintenance characteristics; thus, the inferior performance of these latter seven gas injection wells have caused excessively higher producing gas-oil ratios than anticipated. It is believed that the performance of the seven inferior gas injection wells can be improved by converting to water injection or combination gas-water injection.

III. General Field Information

A. Location of Field and Unit

The Bisti Lower Gallup Oil Pool is located approximately twenty miles south of Farmington in San Juan County, New Mexico. The pool covers approximately 25,000 surface acres having a northwest to southeast trend. The pool is approximately 30 miles long and has a width varying from one-half to three miles.

The Central Bisti Lower Gallup Sand Unit is located in the central portion of the pool in parts of Township 25 North, Range 12 West, and Township 26 North, Range 12 West, as outlined in Figure No. 1

B. Geology

The Lower Gallup Sandstone of the Mesa Verde Group is of Upper Cretaceous Age and found at a depth of approximately 4900 feet in the Bisti Pool. The sand has an average gross thickness of 130 feet which consists of alternating layers of sand, sandy shale and shale with only

ten to twenty percent having permeability greater than one millidarcy. This more permeable portion is encountered near the top of the Lower Gallup Sand section and is commonly referred to as a series of productive stringers or benches.

C. Development History

The Bisti Lower Gallup reservoir was discovered in December, 1955, by the recompletion of El Paso Natural Gas Company's Kelly State No. 1 (now Central Bisti Unit Well No. 38) for an initial potential of 646 barrels of oil per day. A majority of the wells in the Central Bisti Unit were drilled and completed by the end of 1956 with potentials ranging from 100 to 700 barrels of oil per day after fracture treatment.

D. Reservoir Fluid Characteristics

Bottom hole fluid samples were analyzed from British American Oil Company's Marye No. 1 and Sunray Mid-Continent Oil Company's Federal "C" No. 21. The average bubble point properties of the two samples are as follows:

Bubble Point Pressure at 145° F - PSIA	1207
Solution gas content, Cu. Ft./Bbl.	406
Formation Volume Factor, R.B./S.T.B.	1.260
Oil Viscosity - Centipoises	0.830

E. Reservoir Rock Characteristics

The Upper productive stringer (Bench 1) of the Lower Gallup Sand is a light gray, medium grained, clean, well sorted sandstone while Bench 2 and Bench 3 are described as a silty, fine-grained sandstone with irregular dark gray, micaceous shale inclusions and partings. The productive portion of the Lower Gallup Sand as described above had an average permeability of 9.05 millidarcys, porosity of 14.43 percent and water saturation of 24.5% based on capillary pressure data, or 28.6% based on electric log interpretations.

IV. Stock Tank Oil in Place

The stock tank oil in place in the Central Bisti Unit was calculated by two methods, i.e., (1) Acre feet of pay as determined by positive microlog separation and (2) Feet of pay calculated by determining the area under the S P Curves in millivolt feet divided by the static S P in millivolts. The oil in place at the bubble point by these two methods is as follows:

Micro Log, - S. T. Bbls.	39,285,456
Electric Log (SP), - S. T. Bbls.	64,797,366

V. Production History

The Central Bisti Unit produced approximately 2.5 million barrels of stock tank oil and 3.5 billion cubic feet of gas during the period from discovery to date of unitization. Maximum oil production rate was achieved in May, 1958, at 4600 barrels per day.

Oil production from the unit was voluntarily restricted to approximately 1300 barrels per day from the date of unitization, July 1, 1959, to February, 1960. This permitted the restoration of the reservoir pressure to a value above miscibility. After the pressure was restored, the oil production rate was incrementally increased and reached 4570 barrels per day average in June, 1960, (Figure No. 2). The oil production rate has been restricted since June, 1960, to prevent waste of gas due to flaring since the gas gathering facilities of El Paso Natural Gas Company are temporarily limited in the Central Bisti Unit Area.

Cumulative production from date of unitization to November 1, 1960, has been 1,267,464 barrels of stock tank oil, 2,097,063 MCF gas and 33,127 barrels of water.

VI. Injection History

A total of 939,951 barrels of LPG was injected into the ten LPG injection wells to December 14, 1959. In addition, a total of 3,345,363 MCF gas has been injected into the ten LPG injection wells (following the LPG slug) and ten peripheral gas injection wells.

A total of 510,673 barrels of water has been injected into the four east water barrier wells and a total of 748,471 barrels of water have been injected into the three Central Bisti Unit water injection wells in the west water barrier. There has been an additional 518,509 barrels of water injected into the West Bisti Unit WI-1 and WI-2 wells which complement and are an integral part of the west water barrier.

VII. Unit Performance

A. Reservoir Pressure

The Central Bisti Unit volumetric average bottom hole pressure in June, 1959, just prior to unitization was 813 pounds per square inch.

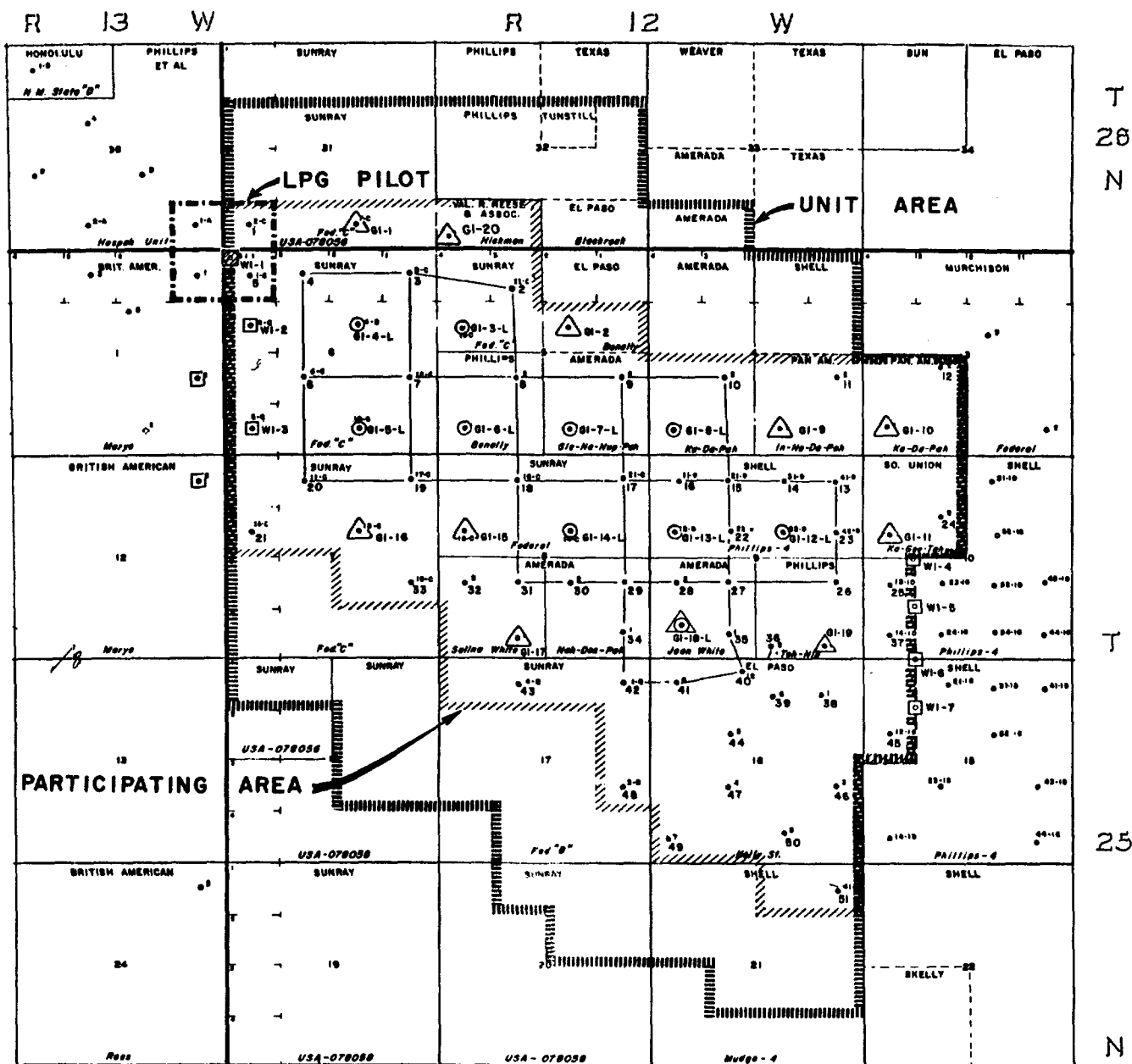
Since unitization the reservoir pressure has been increased to 1296 psi (Figure No. 2) as reflected by the October, 1960, survey. As noted on the October, 1960, isobaric map (Figure No. 3) the pressure in the miscible flood area ranges from approximately 1250 to 1500 psi

which is above the 1150 psia miscibility pressure. In contrast the gas injection areas in the northeast and southern parts of the unit reflect a lower reservoir pressure history. In addition, the reservoir pressure along the east water barrier is approximately 1900 psi and the pressure along the west barrier is approximately 2000 psi. Both barriers are keeping the reservoir pressure at the unit boundaries sufficiently high to prevent net fluid migration at these boundaries.

B. Miscible Displacement

Based on production and pressure performance since unitization, miscibility has been obtained in the Central Bisti Unit LPG miscible flood area and this oil displacement process is performing as anticipated. This is confirmed by detailing the oil production by allocating produced oil from within the individual 160 acre 5-spot patterns and extrapolating this recovery performance to the end of the displacement period, i.e., limiting gas-oil ratio. Reserves defined in this manner yield values comparable to those reflected in the Engineering Study dated May 5, 1959.


Thos. W. Brinkley

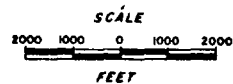


CENTRAL BISTI LOWER GALLUP SAND UNIT
San Juan County, New Mexico

Figure 1

LEGEND

- ⊙ LPG INJECTION WELL
- △ GAS INJECTION WELL
- DRILLED AFTER UNITIZATION
- WATER INJECTION WELL



PRODUCING GAS-OIL RATIO, MCF/BBL.

SECTION VOLUME / PRODUCED VOLUME

GAS PRODUCTION RATE MMCF/DAY

RESERVOIR BBL. / RESERVOIR BBL.

RESERVOIR PERFORMANCE
CENTRAL BISTI UNIT
San Juan Co., New Mexico
Figure No. 2

INJECTED PRODUCTS /
RESERVOIR VOIDAGE RATIO

VOLUMETRIC AVERAGE
BOTTOM HOLE PRESSURE

AVERAGE GAS - OIL RATIO

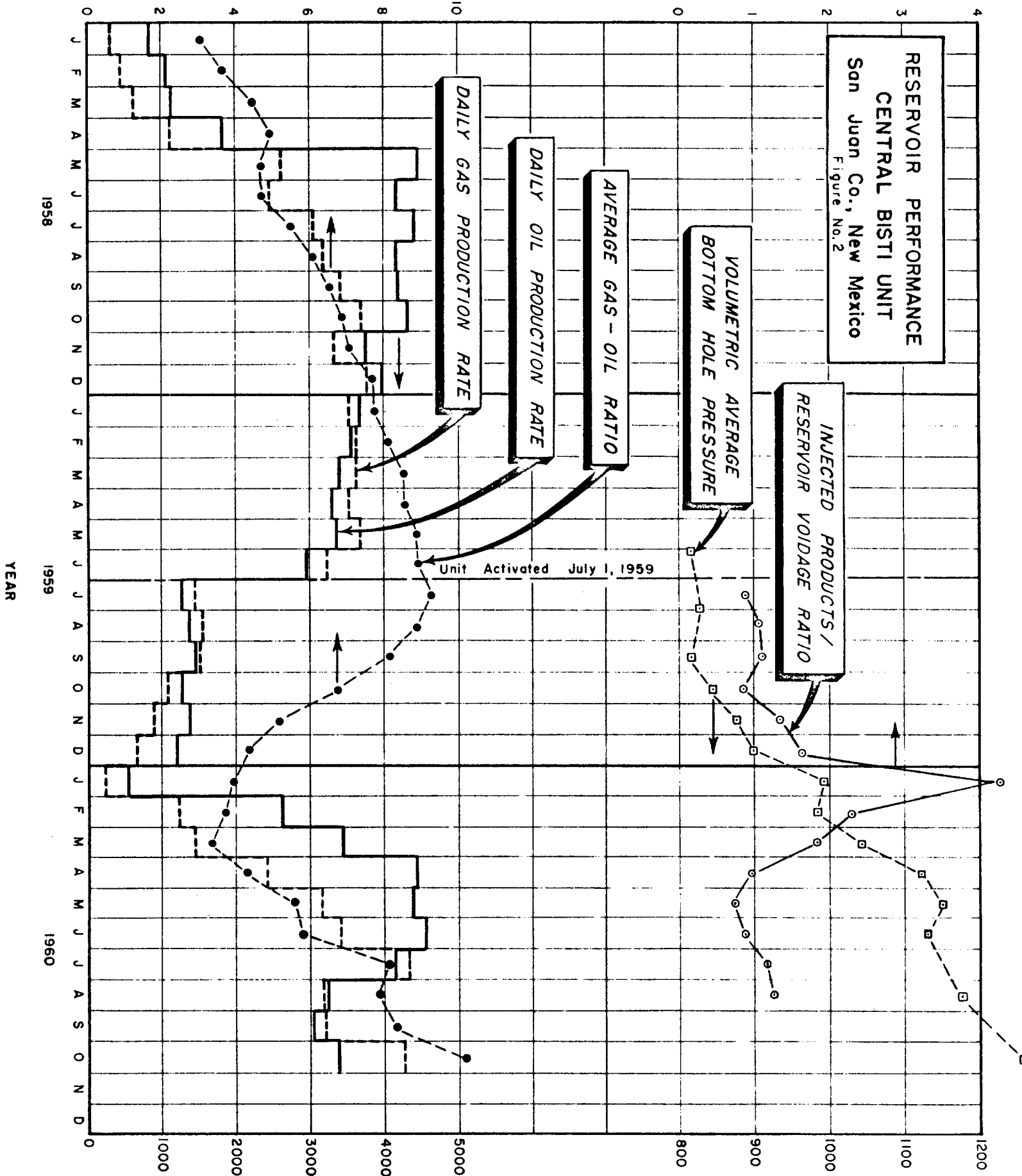
DAILY OIL PRODUCTION RATE

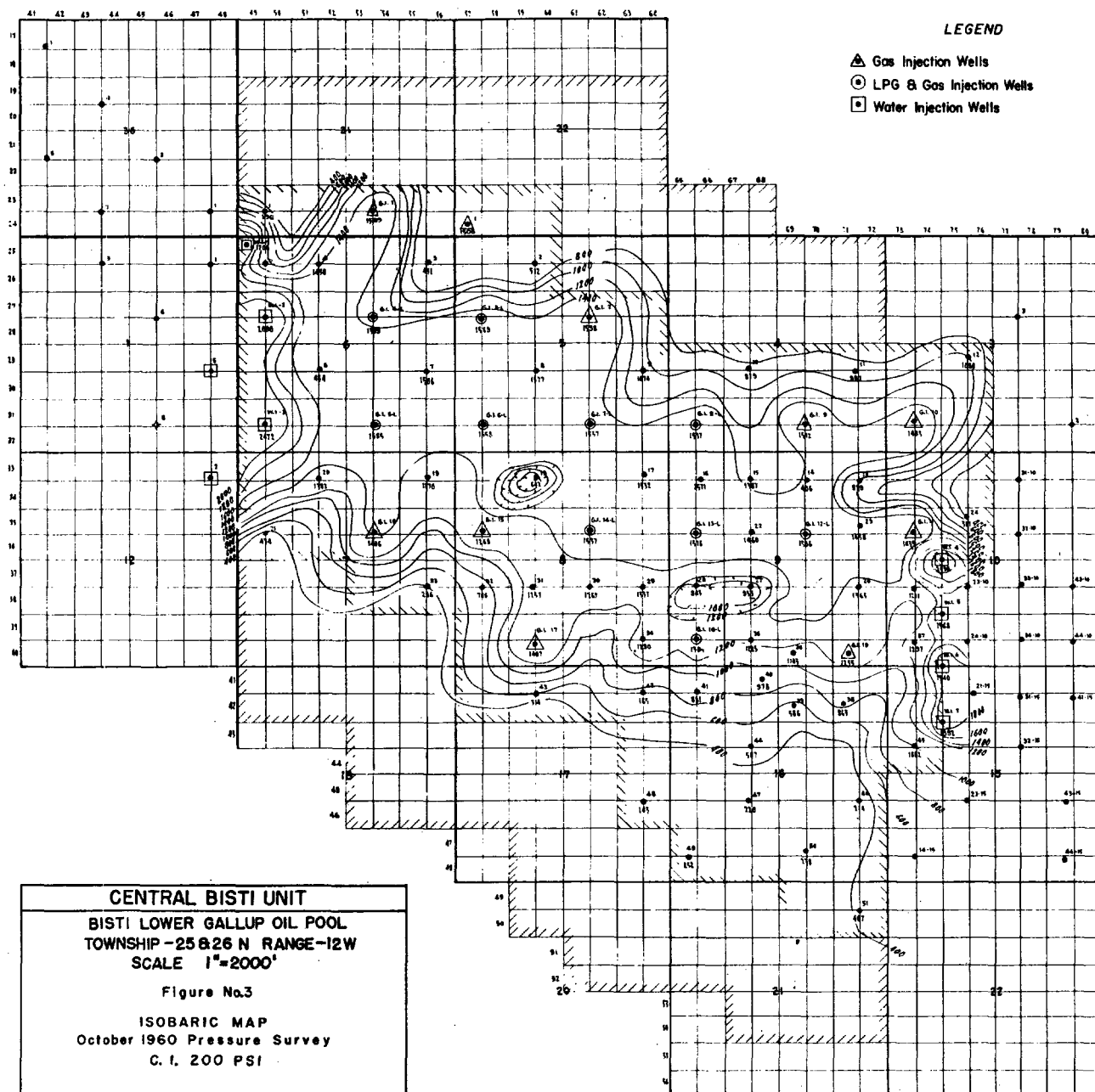
DAILY GAS PRODUCTION RATE

Unit Activated July 1, 1959

OIL PRODUCTION RATE, BBL / DAY

RESERVOIR PRESSURE, PSIA





Case #1666

CENTRAL BISTI LOWER GALLUP SAND UNIT
SAN JUAN COUNTY, NEW MEXICO

REVIEW OF UNIT PERFORMANCE

DECEMBER 7, 1960

RESERVOIR ENGINEERING SECTION
SUNRAY MID-CONTINENT OIL COMPANY
TULSA, OKLAHOMA

TABLE OF CONTENTS

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- II. Summary and Conclusions
- III. General Field Information
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 - B. Geology
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 - E. Reservoir Rock Characteristics
- IV. Stock Tank Oil in Place
- V. Production History
- VI. Injection History
- VII. Unit Performance
 - A. Reservoir Pressure
 - B. Miscible Displacement

FIGURES

- 1. Map of Central Bisti Lower Gallup Sand Unit
- 2. Central Bisti Unit Reservoir Performance
- 3. Central Bisti Unit Isobaric Map - October, 1960, Survey

I. Object of Report

The object of this report is to give a resume of the Central Bisti Lower Gallup Sand Unit performance from date of unitization, July 1, 1959, to November 1, 1960.

II. Summary and Conclusions

The performance of the Central Bisti Unit Lower Gallup Sand Unit reveals that the miscible phase oil displacement process is performing as anticipated, the reservoir pressure has been restored to a value above miscibility and the reservoir fluid is being contained within the unit boundary along the east and west water barriers.

Three of the ten peripheral gas injection wells have performed satisfactorily although the remaining seven gas injection wells have reflected inferior oil displacement and pressure maintainance characteristics; thus, the inferior performance of these latter seven gas injection wells have caused excessively higher producing gas-oil ratios than anticipated. It is believed that the performance of the seven inferior gas injection wells can be improved by converting to water injection or combination gas-water injection.

III. General Field Information

A. Location of Field and Unit

The Bisti Lower Gallup Oil Pool is located approximately twenty miles south of Farmington in San Juan County, New Mexico. The pool covers approximately 25,000 surface acres having a northwest to southeast trend. The pool is approximately 30 miles long and has a width varying from one-half to three miles.

The Central Bisti Lower Gallup Sand Unit is located in the central portion of the pool in parts of Township 25 North, Range 12 West, and Township 26 North, Range 12 West, as outlined in Figure No. 1

B. Geology

The Lower Gallup Sandstone of the Mesa Verde Group is of Upper Cretaceous Age and found at a depth of approximately 4900 feet in the Bisti Pool. The sand has an average gross thickness of 130 feet which consists of alternating layers of sand, sandy shale and shale with only

ten to twenty percent having permeability greater than one millidarcy. This more permeable portion is encountered near the top of the Lower Gallup Sand section and is commonly referred to as a series of productive stringers or benches.

C. Development History

The Bisti Lower Gallup reservoir was discovered in December, 1955, by the recompletion of El Paso Natural Gas Company's Kelly State No. 1 (now Central Bisti Unit Well No. 38) for an initial potential of 646 barrels of oil per day. A majority of the wells in the Central Bisti Unit were drilled and completed by the end of 1956 with potentials ranging from 100 to 700 barrels of oil per day after fracture treatment.

D. Reservoir Fluid Characteristics

Bottom hole fluid samples were analyzed from British American Oil Company's Marye No. 1 and Sunray Mid-Continent Oil Company's Federal "C" No. 21. The average bubble point properties of the two samples are as follows:

Bubble Point Pressure at 145° F - PSIA	1207
Solution gas content, Cu. Ft./Bbl.	406
Formation Volume Factor, R.B./S.T.B.	1.260
Oil Viscosity - Centipoises	0.830

E. Reservoir Rock Characteristics

The Upper productive stringer (Bench 1) of the Lower Gallup Sand is a light gray, medium grained, clean, well sorted sandstone while Bench 2 and Bench 3 are described as a silty, fine-grained sandstone with irregular dark gray, micaceous shale inclusions and partings. The productive portion of the Lower Gallup Sand as described above had an average permeability of 9.05 millidarcys, porosity of 14.43 percent and water saturation of 24.5% based on capillary pressure data, or 28.6% based on electric log interpretations.

IV. Stock Tank Oil in Place

The stock tank oil in place in the Central Bisti Unit was calculated by two methods, i.e., (1) Acre feet of pay as determined by positive microlog separation and (2) Feet of pay calculated by determining the area under the S P Curves in millivolt feet divided by the static S P in millivolts. The oil in place at the bubble point by these two methods is as follows:

Micro Log, - S. T. Bbls.	39,285,456
Electric Log (SP), - S. T. Bbls.	64,797,366

V. Production History

The Central Bisti Unit produced approximately 2.5 million barrels of stock tank oil and 3.5 billion cubic feet of gas during the period from discovery to date of unitization. Maximum oil production rate was achieved in May, 1958, at 4600 barrels per day.

Oil production from the unit was voluntarily restricted to approximately 1300 barrels per day from the date of unitization, July 1, 1959, to February, 1960. This permitted the restoration of the reservoir pressure to a value above miscibility. After the pressure was restored, the oil production rate was incrementally increased and reached 4570 barrels per day average in June, 1960, (Figure No. 2). The oil production rate has been restricted since June, 1960, to prevent waste of gas due to flaring since the gas gathering facilities of El Paso Natural Gas Company are temporarily limited in the Central Bisti Unit Area.

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A. Reservoir Pressure

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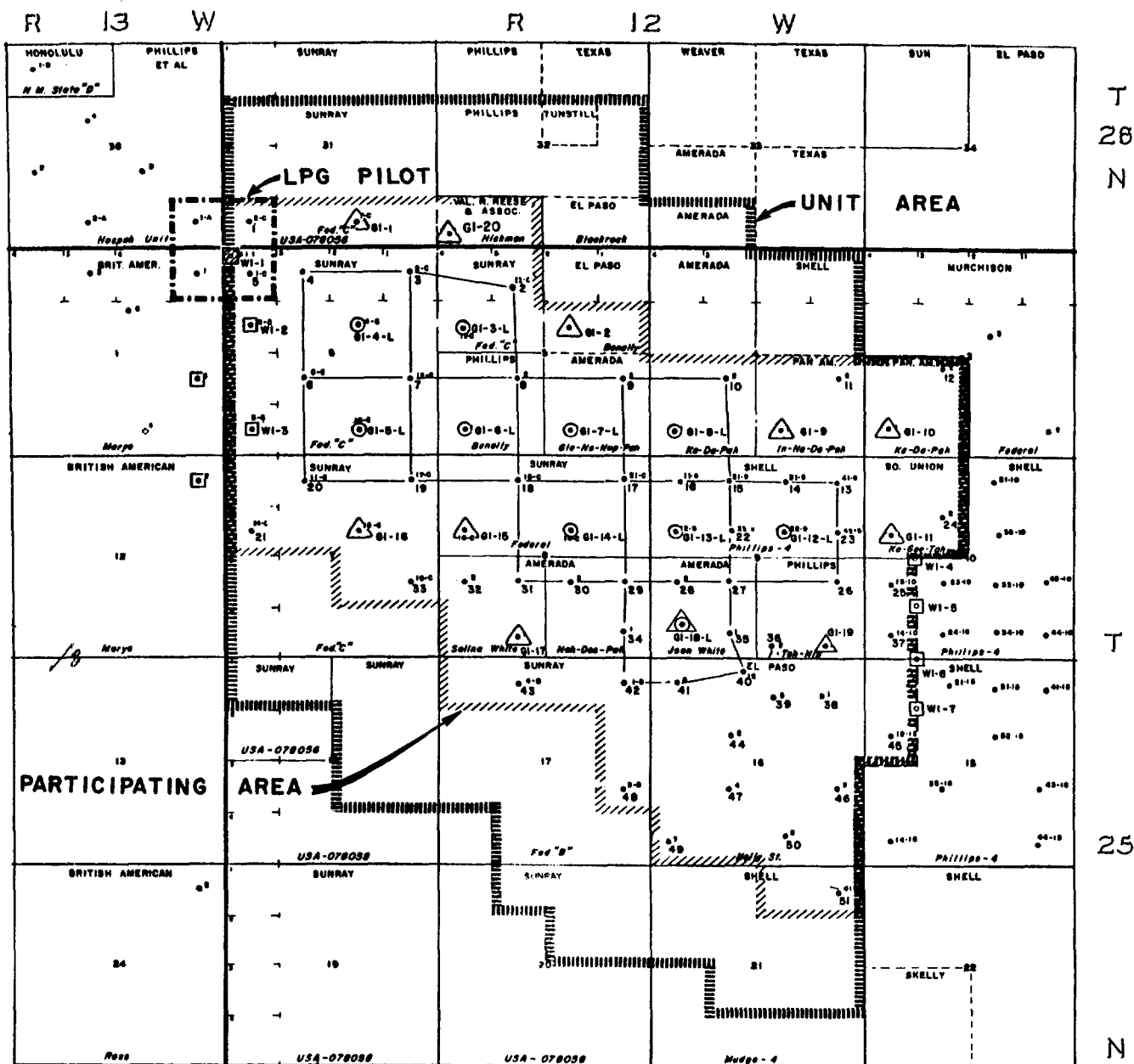
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Thos. W. Brinkley

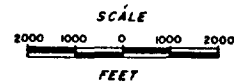


CENTRAL BISTI LOWER GALLUP SAND UNIT
San Juan County, New Mexico

Figure 1

LEGEND

- ⊙ LPG INJECTION WELL
- △ GAS INJECTION WELL
- DRILLED AFTER UNITIZATION
- WATER INJECTION WELL



PRODUCING GAS-OIL RATIO, MCF/BBL.

SECTION VOLUME / PRODUCED VOLUME

GAS PRODUCTION RATE MMCF/DAY

RESERVOIR BBL. / RESERVOIR BBL.

RESERVOIR PERFORMANCE
CENTRAL BISTI UNIT
San Juan Co., New Mexico
Figure No. 2

INJECTED PRODUCTS /
RESERVOIR VOIDAGE RATIO

VOLUMETRIC AVERAGE
BOTTOM HOLE PRESSURE

AVERAGE GAS - OIL RATIO

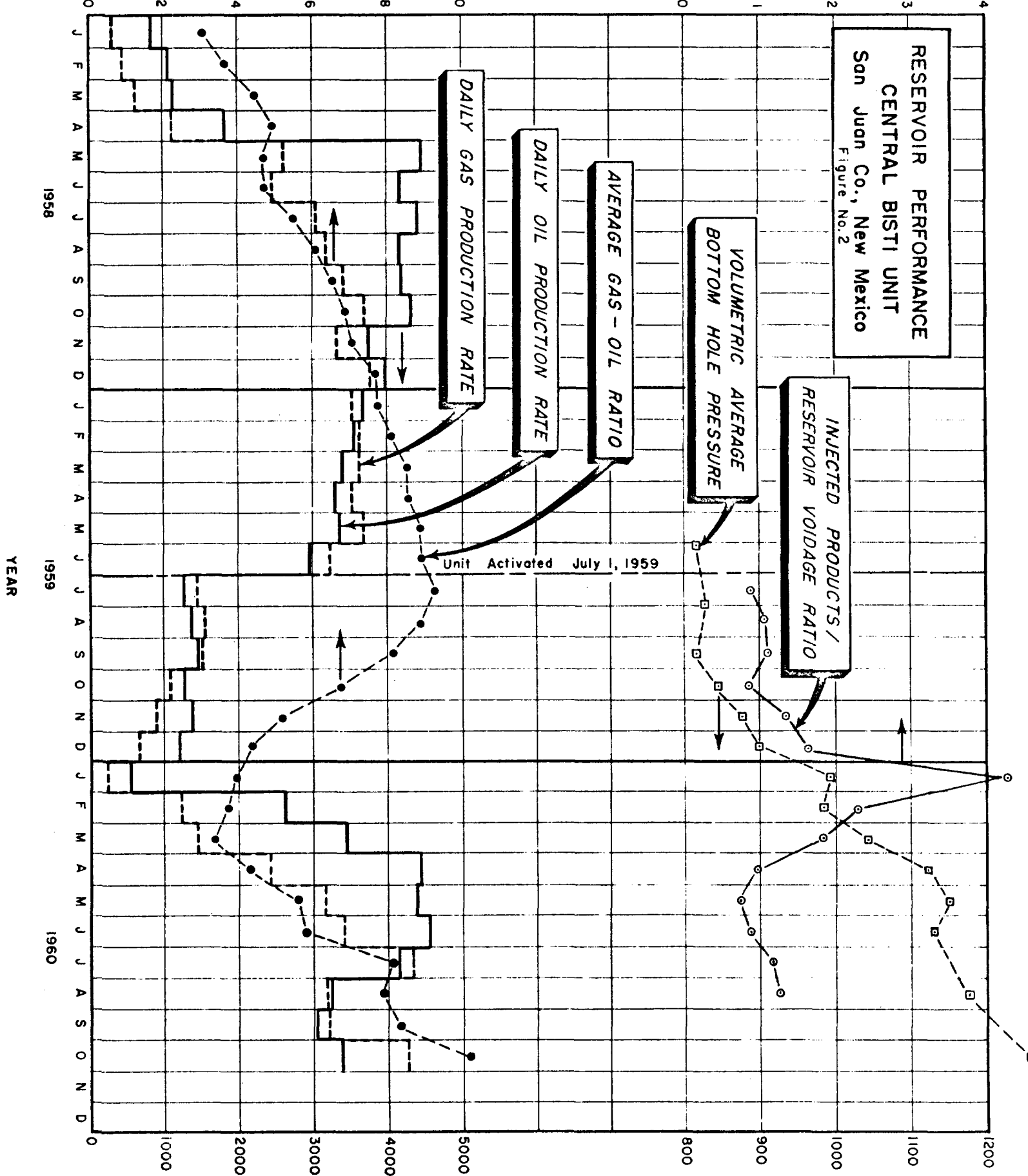
DAILY OIL PRODUCTION RATE

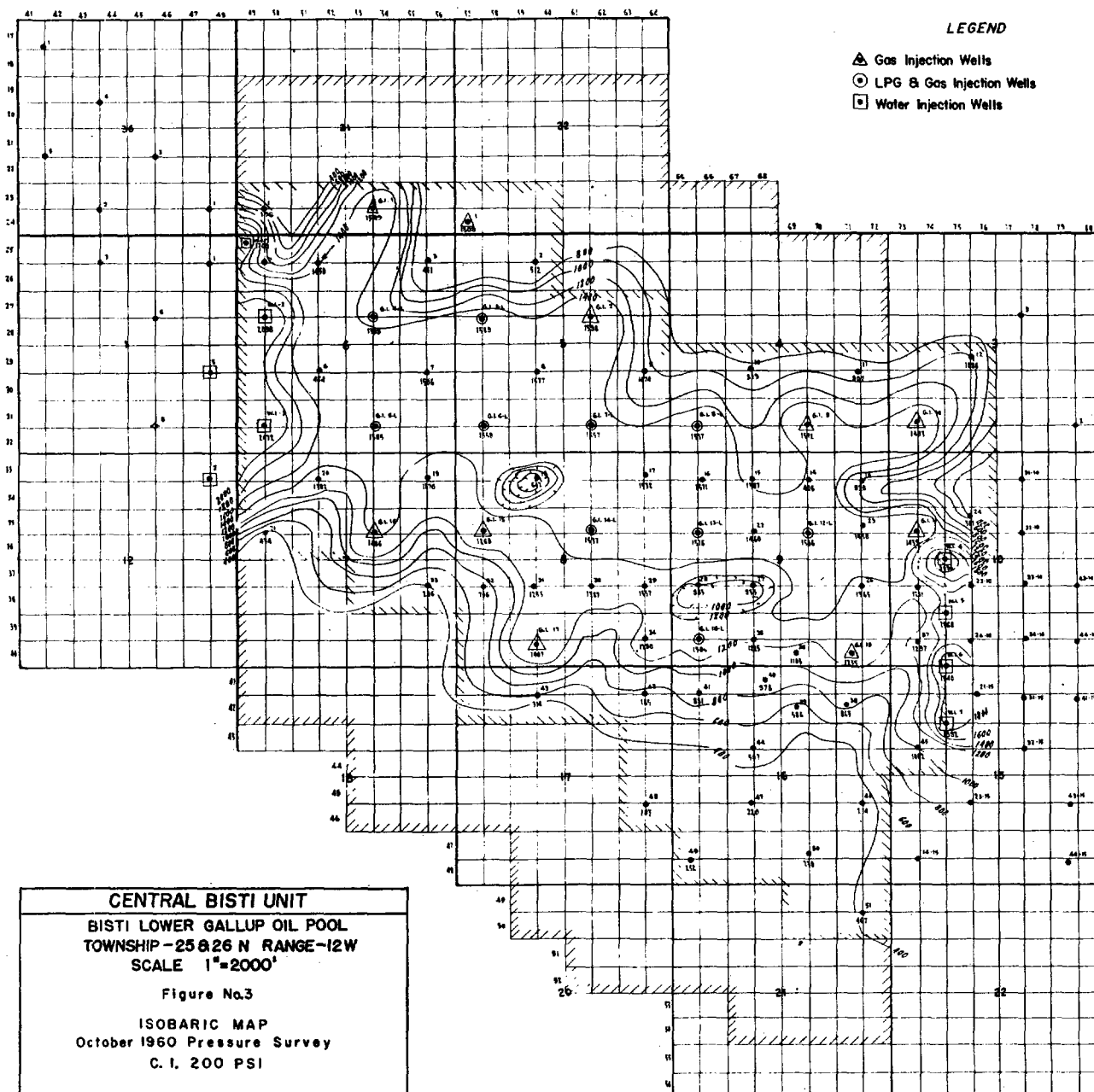
DAILY GAS PRODUCTION RATE

Unit Activated July 1, 1959

OIL PRODUCTION RATE, BBL / DAY

RESERVOIR PRESSURE, PSIA





OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

June 30, 1960

Sunray Mid-Continent Oil Company
P. O. Box 2692
Denver 1, Colorado

Attention: Mr. Norbert E. Proctor

Re: Tract Number 10, Central
Bisti Lower Gallup Sand
Unit, San Juan County,
New Mexico.

Gentlemen:

This is to advise that the New Mexico Oil Conservation Commission has this date approved the commitment of Tract Number Ten (10) and the revised Exhibits "A", "B", and "C" of the Unit Agreement for the Central Bisti Lower Gallup Sand Unit, San Juan County, New Mexico, subject to like approval by the United States Geological Survey and the Commissioner of Public Lands of the State of New Mexico.

Six approved copies of the application are being forwarded to the United States Geological Survey at Roswell, New Mexico.

Very truly yours,

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

ALP/JEK/jar

cc: United States Geological Survey - Roswell

Commissioner of Public Lands - Santa Fe

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IN REPLY REFER TO:
UNIT DIVISION

JUNE 29, 1960

Sunray Mid-Continent Oil Co.
P.O. Box 2692
Denver 1, Colorado

Re: Tract No. 10
Central Bisti Lower Gallup
Sand Unit Area,
San Juan County, New Mexico

Attention: Mr. Norbert E. Proctor

Gentlemen:

We are handing to Mr. Pete Porter, Director of the New Mexico Oil Conservation Commission seven certificates of approval for the commitment of Tract No. 10 to the Central Bisti Lower Gallup Sand Unit Area. These were approved by the Commissioner of Public Lands June 29, 1960, said commitment to become effective April 1, 1960.

We are requesting Mr. Porter to approve this certificate and transmit six of the certificates directly to Mr. John Anderson, Supervisor, United States Geological Survey at Roswell, New Mexico.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

By: 
Ted Bilberry, Supervisor
Oil and Gas Division

MEM/AMR/1

cc: Oil Conservation Commission
Santa Fe, New Mexico
Enclosure: 7

United States Geological Survey
Roswell, New Mexico

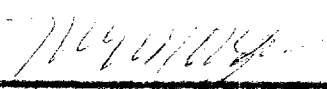
CERTIFICATE OF APPROVAL

FOR SUBSEQUENT JOINDERS AND COMMITMENT OF TRACT NO. 10
TO THE UNIT AGREEMENT FOR THE CENTRAL BISTI LOWER GALLUP
SAND UNIT AREA, SAN JUAN COUNTY, NEW MEXICO, AND FOR APPROVAL
OF REVISED EXHIBITS "A", "B" AND "C" OF THE UNIT AGREEMENT.

WHEREAS, THE COMMISSIONER OF PUBLIC LANDS has received
complete and effective commitment of Tract number ten(10) to
the Central Bisti Lower Gallup Sand Unit Agreement.


NOW, THEREFORE, the application for the commitment of
Tract number ten(10) and for the revised Exhibits "A", "B"
and "C" of said Unit Agreement are herewith approved to be
effective as of April 1, 1960.

IN WITNESS WHEREOF, this Certificate of Approval is
executed with seal affixed, this 29 day of June
19 60.



Commissioner of Public Lands
of the State of New Mexico

Approved

June 30, 60


MAIN OFFICE OCC

1960 MAY 24 AM 8:11

In reply refer to:
Unit Division

6/1/60

May 23, 1960

United States Geological Survey
P. O. Box 6721
Roswell, New Mexico

Re: State of New Mexico
Tract No. 10,
Central Dist Lower Gallup
Sand Unit Agreement, San Juan
County, New Mexico

Dear Mr. Thomasson:

We have received a copy of your letter dated May 17, 1960 to Sunray Mid-Continent Oil Company, Attention: Mr. R. L. Proctor, Jr., in which you state by virtue of the full royalty interests and working interests having committed their interests to the unit, although, Mr. Hickman has not committed as owner of record to our lease, you consider this tract fully committed.

I am enclosing a copy of our letter to Sunray Mid-Continent dated May 16, 1960 and until such time as we receive a commitment from Mr. Hickman as the owner of record we will not consider this tract committed to this unit agreement.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
Marian M. Rhea, Supervisor
Unit Division

C
O
P
Y

MAIN OFFICE OCC

1960 MAY 24 AM 8:11

In reply refer to:
Unit Division

Case #1646

May 23, 1960

United States Geological Survey
P. O. Box 6721
Roswell, New Mexico

Re: State of New Mexico
Tract No. 10,
Central Bisti Lower Gallup
Sand Unit Agreement, San Juan
County, New Mexico

Dear Mr. Thomassen:

We have received a copy of your letter dated May 17, 1960 to Sunray Mid-Continent Oil Company, Attention: Mr. N.E. Proctor, Jr., in which you state by virtue of the full royalty interests and working interests having committed their interests to the unit, although, Mr. Hickman has not committed as owner of record to our lease, you consider this tract fully committed.

I am enclosing a copy of our letter to Sunray Mid-Continent dated May 16, 1960 and until such time as we receive a commitment from Mr. Hickman as the owner of record we will not consider this tract committed to this unit agreement.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
Marian M. Rhea, Supervisor
Unit Division

ILLEGIBLE

C
O
P
Y

United States Geological Survey
P. O. Box 6721
Roswell, New Mexico

May 23, 1960
(Page 2.)

MEM/PMR/m

cc:

Oil Conservation Commission
P. O. Box 871
Santa Fe, New Mexico

Sunray Mid-Continent Oil Company
P. O. Box 2039
Tulsa 2, Oklahoma

C
O
P
Y

SUNRAY MID-CONTINENT OIL COMPANY

P. O. BOX 2039

TULSA 2, OKLAHOMA

May 10, 1960

The Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

Attention Mr. Ted Bilberry
Supervisor
Oil and Gas Division

Re: Central Bisti Lower Gallup Sand Unit Area,
San Juan County, New Mexico.

Dear Sir:

In response to your letter dated April 27, 1960,
there is submitted herewith the following:

1. Subsequent Joinder and commitment by Sunray, et al. of Tract 10 to the Unit Agreement for the Central Bisti Lower Gallup Sand Unit Area, as enlarged, executed by Shell Oil Company.
2. Subsequent Joinder and commitment by Sunray, et al. of Tract 10 to the Unit Operating Agreement for the Central Bisti Lower Gallup Sand Unit Area, as enlarged, executed by Shell Oil Company.

It is believed that the application for approval of subsequent joinders and commitment of Tract No. 10 to the captioned unit is now complete in all respects. By copy of this letter, we are also forwarding an executed counterpart of each of the above instruments to the New Mexico Oil Conservation Commission and eight (8) executed counterparts of same to the Regional Supervisor of the United States Geological Survey at Roswell, New Mexico.

ILLEGIBLE

The Commissioner of
Public Lands

May 10, 1960

It will be greatly appreciated if your approval of our application dated March 24, 1960, to be effective April 1, 1960, is evidenced by formal Certificate of Approval executed by both the Commissioner of Public Lands and the New Mexico Oil Conservation Commission, and it is requested that six (6) copies of such Certificate of Approval be transmitted to Mr. John Anderson, Supervisor, United States Geological Survey at Roswell, New Mexico. We, of course, will remit immediately upon receipt of bill covering the fee and other charges for such certificates.

Very truly yours,

SUNRAY MID-CONTINENT OIL COMPANY

Original Signed By
Norbert E. Prector

By _____
Norbert E. Prector, Jr.
Attorney for Applicant

NEP/s
Enclosures

cc: Mr. John Anderson
Regional Supervisor
United States Geological Survey
Roswell, New Mexico

cc: The New Mexico Oil Conservation
Commission
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

ILLEGIBLE

SUBSEQUENT JOINDER AND COMMITMENT BY
SUNRAY MID-CONTINENT OIL COMPANY, ET AL.
OF TRACT NO. 10 TO THE UNIT OPERATING
AGREEMENT FOR THE CENTRAL BISTI LOWER
GALLUP SAND UNIT AREA, AS ENLARGED,
SAN JUAN COUNTY, NEW MEXICO.

KNOW ALL MEN BY THESE PRESENTS:

THAT, WHEREAS, heretofore an agreement entitled "Unit Operating Agreement for the Development and Operation of the Central Bisti Lower Gallup Sand Unit Area, County of San Juan, State of New Mexico," has been executed by various persons, firms and corporations, referred to collectively in said agreement as "Working Interest Owners", which agreement provides for the operation and development of said unit, including (but not limited to) the secondary recovery operations in the Unit Area as delineated in the Unit Agreement and the exhibits attached thereto which are referred to and made a part of said Unit Operating Agreement; and

WHEREAS, reference is made for all purposes to said Unit Operating Agreement dated the 2d day of April, 1959 executed by the undersigned; and

WHEREAS, the undersigned, Sunray Mid-Continent Oil Company, Amerada Petroleum Corporation, El Paso Natural Gas Products Company, Pan American Petroleum Corporation, Phillips Petroleum Company, Southern Union Gas Company and Shell Oil Company are the Working Interest Owners under New Mexico Oil and Gas Lease No. B-11370 covering the following described lands situated in San Juan County, New Mexico, to-wit:

South Half ($S\frac{1}{2}$) of Southwest Quarter ($SW\frac{1}{4}$)
Section Thirty-Two (32), Township Twenty-Six
(26) North, Range Twelve (12) West

which lands are situated within the Unit Area of the Central Bisti Lower Gallup Sand Unit Area and are identified on revised Exhibit "B" of the Unit Agreement as Tract No. 10; and

WHEREAS, the undersigned as Working Interest Owners within the meaning of said Unit Operating Agreement desire to commit to the Unit Operating Agreement by subsequent joinder (pursuant to Section 28 of said Unit Agreement) all of the undersigned's interest in and to the lands above described and referred to as Tract No. 10 in revised Exhibit "B" of the Unit Agreement, and to ratify and become bound by said Unit Operating Agreement.

NOW, THEREFORE, for the consideration and purposes stated in said Unit Operating Agreement, the undersigned do hereby commit to the Unit Operating Agreement all of the undersigned's right, title and interest in and to the lands described as the South Half ($S\frac{1}{2}$) of Southwest Quarter ($SW\frac{1}{4}$), Section Thirty-Two (32), Township Twenty-Six (26) North, Range Twelve (12) West, San Juan County, New Mexico, which lands are identified as Tract No. 10 on

Revised Exhibit "B" of the Unit Agreement and do hereby adopt, ratify and confirm said Unit Operating Agreement, all of the terms and provisions of which are hereby incorporated herein by reference. Without limitation upon the foregoing, the undersigned do hereby commit all of the rights and interests of the undersigned in and to the lands of the Unit Area as originally delineated in said Unit Agreement, and as enlarged, and the exhibits made a part thereof in the same manner and to the same extent as provided in the Unit Operating Agreement, subject to all of the terms and provisions of the said Unit Operating Agreement.

This instrument may be executed in any number of counterparts and each executed counterpart shall have the same force and effect as an original instrument and as if all of the parties to the aggregate counterparts had signed the same instrument.

WORKING INTEREST OWNERS

SUNRAY MID-CONTINENT OIL COMPANY

ATTEST:

By _____
Vice President

Secretary

Date of Signature:

Address

PHILLIPS PETROLEUM COMPANY

ATTEST:

By _____
Vice President

Secretary

Date of Signature:

Address

WORKING INTEREST OWNERS

AMERADA PETROLEUM CORPORATION

ATTEST:

By _____
Vice President

Secretary

Date of Signature:

Address

SOUTHERN UNION GAS COMPANY

ATTEST:

By _____
Vice President

Secretary

Date of Signature:

Address

SHELL OIL COMPANY

ATTEST:

By M. W. Sheppard
~~Vice President~~
Manager, Land Department

~~Secretary~~

Date of Signature:

May 3, 1960

1008 W. 6th St.

Los Angeles, Calif.
Address

WORKING INTEREST OWNERS

PAN AMERICAN PETROLEUM CORPORATION

ATTEST:

By _____
Attorney-in-Fact

Assistant Secretary

Date of Signature:

Address

EL PASO NATURAL GAS PRODUCTS COMPANY

Date of Signature:

By _____
Attorney-in-Fact

Address

STATE OF _____)
COUNTY OF _____) SS.

On this _____ day of _____, 19____, before me
appeared _____, to me personally known,
who, being by me duly sworn, did say that he is _____
of _____, a _____
corporation, and that said instrument was signed and sealed in behalf of said
corporation by authority of its Board of Directors and said _____
acknowledged said instrument to be the free act and deed of said corporation.

Notary Public

My commission expires:

STATE OF _____)
COUNTY OF _____) SS.

On this _____ day of _____, 19____, before me
appeared _____, to me personally known,
who, being by me duly sworn, did say that he is _____
of _____, a _____
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corporation, and that said instrument was signed and sealed in behalf of said
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acknowledged said instrument to be the free act and deed of said corporation.

Notary Public

My commission expires:

SUBSEQUENT JOINDER AND COMMITMENT
BY SUNRAY MID-CONTINENT OIL COMPANY,
ET AL. OF TRACT NO. 10 TO THE UNIT
AGREEMENT FOR THE CENTRAL BISTI LOWER
GALLUP SAND UNIT AREA, AS ENLARGED,
SAN JUAN COUNTY, NEW MEXICO.

KNOW ALL MEN BY THESE PRESENTS:

THAT, WHEREAS, heretofore an agreement entitled "Unit Agreement for the Development and Operation of the Central Bisti Lower Gallup Sand Unit Area, County of San Juan, State of New Mexico" has been executed by various persons, firms, and corporations, some styled "Working Interest Owners" and other styled "Royalty Interest Owners" and "Overriding Royalty Owners", which affects lands, mineral leases and mineral, royalty and overriding royalty and other similar interests in the Unit Area as delineated in said agreement and exhibits attached thereto; and

WHEREAS, reference is made for all purposes to said Unit Agreement dated April 2, 1959 and approved by the Commissioner of Public Lands of the State of New Mexico on June 18, 1959, by the Acting Assistant Area Director, Gallup Area Office, Bureau of Indian Affairs on June 22, 1959 and approved by the Acting Director of the United States Geological Survey on June 26, 1959, designated No. 14-08-001-6090; and

WHEREAS, the undersigned, Sunray Mid-Continent Oil Company, Amerada Petroleum Corporation, El Paso Natural Gas Products Company, Pan American Petroleum Corporation, Phillips Petroleum Company, Southern Union Gas Company and Shell Oil Company are the Working Interest Owners under New Mexico Oil and Gas Lease No. B-11370 covering the following described lands situated in San Juan County, New Mexico, to-wit:

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(26) North, Range Twelve (12) West

which lands are situated within the Unit Area of the Central Bisti Lower Gallup Sand Unit Area and are identified on revised Exhibit "B" of the Unit Agreement as Tract No. 10; and

WHEREAS, the undersigned as Working Interest Owners within the meaning of said Unit Agreement desire to commit to the Unit Agreement by subsequent joinder (pursuant to Section 28 of said Unit Agreement) all of the undersigned's interest in and to the lands above described and referred to as Tract No. 10 in Revised Exhibit "B" of the Unit Agreement and to ratify and become bound by said agreement.

NOW, THEREFORE, for the consideration and purposes stated in said Unit Agreement the undersigned do hereby commit to the Unit Agreement all of the undersigned's right, title and interest in and to the lands described as the $S\frac{1}{2}$ $SW\frac{1}{4}$ Sec. 32, T. 26 N., R. 12 W., San Juan County, New Mexico.

which lands are identified as Tract No. 10 on Revised Exhibit "B" of the Unit Agreement, and do hereby adopt, ratify and confirm said Unit Agreement all of the terms and provisions which are hereby incorporated herein by reference. Without limitation upon the foregoing, the undersigned do hereby unitize the rights and interests of the undersigned in and to the lands within the Unit Area as originally delineated in said agreement, and as enlarged, and the exhibits made a part thereof in the same manner and to the same extent as provided in said agreement, subject to all of the terms and provisions thereof.

The undersigned further hereby consent to the joinder by all Overriding Royalty Owners and other owners of interest, if any, in said Tract No. 10.

This instrument may be executed in any number of counterparts and each executed counterpart shall have the same force and effect as an original instrument and as if all of the parties to the aggregate counterparts had signed the same instrument.

WORKING INTEREST OWNERS
SUNRAY MID-CONTINENT OIL COMPANY

ATTEST: By _____
Vice President

Secretary

Date of Signature: _____
Address

PHILLIPS PETROLEUM COMPANY

ATTEST: By _____
Vice President

Secretary

Date of Signature: _____
Address

WORKING INTEREST OWNERS

AMERADA PETROLEUM CORPORATION

ATTEST:

By _____
Vice President

Secretary

Date of Signature:

Address

SOUTHERN UNION GAS COMPANY

ATTEST:

By _____
Vice President

Secretary

Date of Signature:

Address

SHELL OIL COMPANY

ATTEST:

By W. W. Sheppard
~~Vice President~~
Manager, Land Department

Secretary

Date of Signature:

May 3, 1960

1008 W 6th St.

Los Angeles, 54 Calif
Address

WORKING INTEREST OWNERS

PAN AMERICAN PETROLEUM CORPORATION

ATTEST:

By _____
Attorney-in-Fact

Assistant Secretary

Date of Signature:

Address

EL PASO NATURAL GAS PRODUCTS COMPANY

Date of Signaure:

By _____
Attorney-in-Fact

Address

STATE OF _____)
COUNTY OF _____) SS.

On this _____ day of _____, 19____, before me
appeared _____, to me personally known,
who, being by me duly sworn, did say that he is _____
of _____, a _____
corporation, and that said instrument was signed and sealed in behalf of said
corporation by authority of its Board of Directors and said _____
acknowledged said instrument to be the free act and deed of said corporation.

Notary Public

My commission expires:

STATE OF _____)
COUNTY OF _____) SS.

On this _____ day of _____, 19____, before me
appeared _____, to me personally known,
who, being by me duly sworn, did say that he is _____
of _____, a _____
corporation, and that said instrument was signed and sealed in behalf of said
corporation by authority of its Board of Directors and said _____
acknowledged said instrument to be the free act and deed of said corporation.

Notary Public

My commission expires:

STATE OF _____)
COUNTY OF _____) SS.

On this _____ day of _____, 19____, before me
appeared _____, to me personally known,
who, being by me duly sworn, did say that he is _____
of _____, a _____
corporation, and that said instrument was signed and sealed in behalf of said
corporation by authority of its Board of Directors and said _____
acknowledged said instrument to be the free act and deed of said corporation.

Notary Public

My commission expires:



Sunray Oil Company

Legal Department

March 2, 1960

File 1-1-1-1-1

March 2, 1960

The Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

✓ The New Mexico Oil Conservation Commission
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

Re: Central Bisti Lower Gallup
Sand Unit Area, San Juan County,
New Mexico

Gentlemen:

There is enclosed for your files a copy of "Certification Approval" dated February 8, 1960 signed by the Acting Director, United States Geological Survey, together with a letter from the Survey dated February 12, 1960 addressed to this company evidencing approval of the enlargement of the subject Unit, effective as of October 1, 1959, pursuant to application filed by this company as Unit Operator dated November 5, 1959.

As you know, such application for enlargement has heretofore been approved by the Commissioner of Public Lands of New Mexico and the New Mexico Oil Conservation Commission.

Yours very truly,

Norbert E. Proctor

NEP/s

Enclosures: 2



IN REPLY REFER TO:

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WASHINGTON 25, D. C.

FEB 12 1960

Sunray Mid-Continent Oil Company
Post Office Box 2039
Tulsa 2, Oklahoma

Gentlemen:

On February 8, 1960, Arthur A. Baker, Acting Director of the Geological Survey, approved the application dated November 5, 1959, filed by your company as unit operator requesting the expansion of the Central Bisti Lower Gallup Sand unit area, San Juan County, New Mexico, No. 14-08-001-6090, approved June 26, 1959.

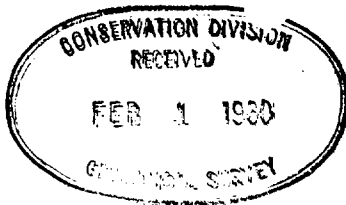
Approval of the expansion, effective October 1, 1959, increases the unit area by the addition of 160 acres, making a total of 7,548.46 acres, more or less, in the unit area.

Enclosed are two copies of the approved application for your records. It is requested that you furnish the State of New Mexico and any other interested principal with whatever evidence of this approval is deemed appropriate.

Very truly yours,

For the Director

Enclosures 2



CERTIFICATION APPROVAL

Pursuant to the authority vested in the Secretary of Interior, under the Act approved February 25, 1920, 41 Stat 437, 30 Secs. 181, et seq., as amended and delegated to the Director of the Geological Survey, the foregoing application for expansion of the Central Bisti Lower Gallup Sand unit area and participating area is hereby approved. Such expansion shall be effective October 1, 1959.

FEB 8 - 1960

Date

A handwritten signature in cursive script, appearing to read "Arthur D. Baker".

Acting Director, U. S. Geological Survey

SUNRAY MID-CONTINENT OIL COMPANY

P. O. BOX 2039

TULSA 2, OKLAHOMA

December 17, 1959

VIA AIR MAIL

Mr. John Anderson
Regional Supervisor
United States Geological Survey
Roswell, New Mexico

Re: Unit Agreement for the development and operation
of the Central Bisti Lower Gallup Sand Unit Area,
San Juan County, New Mexico

Dear Sir:

Sunray Mid-Continent Oil Company, as Unit Operator under the subject Unit Agreement, has heretofore filed, in conjunction with its application for enlargement of the subject unit dated November 5, 1959, certain joinders (classified as "Subsequent Joinders") by Overriding Royalty Owners under Tracts Nos. 3 and 4A of the Unit Area, and also certain joinders by Overriding Royalty Interest Owners under Tract No. 7 of said Unit Area. In support of such subsequent joinders and as requested by your office, there is submitted herewith, pursuant to Section 28 of the Unit Agreement, the following:

1. Consent to Subsequent Joinders executed by Shell Oil Company as the owner of working interests in Tracts Nos. 3 and 4A dated December 8, 1959.
2. Consent to Subsequent Joinders executed by Laurence C. Kelly, Trustee, as Working Interest Owner in Tract No. 7 dated November 30, 1959.

It is believed that all requirements for approval of such subsequent joinders, pursuant to Section 28 of the Unit Agreement, have now been met.

Yours very truly,

Norbert E. Proctor

NEP/s

cc: see next page

cc: Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

cc: New Mexico Oil Conservation Commission ✓
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

CONSENT TO SUBSEQUENT JOINDERS

WHEREAS, J. D. MIDDLETON, Overriding Royalty Owner in Tract No. 7 of the Central Bisti Lower Gallup Sand Unit Area, on July 16, 1959 executed that certain Ratification and Joinder to the Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, County of San Juan, State of New Mexico, dated April 2, 1959; and

WHEREAS, LAURENCE C. KELLY, Trustee, Overriding Royalty Owner in Tract No. 7 of the Central Bisti Lower Gallup Sand Unit Area, on July 6, 1959 executed that certain Ratification and Joinder to the Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, County of San Juan, State of New Mexico, dated April 2, 1959; and

WHEREAS, the above mentioned Ratification and Joinders were not filed prior to the final approval of the Unit Agreement and under the provisions of Section 28 of said Unit Agreement, the commitment of said overriding royalty interests requires the consent in writing by the Working Interest Owner responsible for the payment of any benefits that may accrue under the Unit Agreement in behalf of such Overriding Royalty Owners; and

WHEREAS, LAURENCE C. KELLY, Trustee, is also the owner of a working interest (the working interest being owned jointly by EL PASO NATURAL GAS PRODUCTS COMPANY and LAURENCE C. KELLY, Trustee) in said Tract No. 7 of the Central Bisti Lower Gallup Sand Unit Area.

NOW, THEREFORE, in consideration of the premises, the undersigned LAURENCE C. KELLY, Trustee, does hereby consent to the Subsequent Joinder to the Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, San Juan County, New Mexico, dated April 2, 1959 by the parties signatory to the above described Ratifications and Joinders.

DATED this 30th day of November, 1959.

Laurence C. Kelly
LAURENCE C. KELLY, TRUSTEE

ORIGINAL FILED
FEB 11 1960

CONSENT TO SUBSEQUENT JOINDERS

WHEREAS, the following Ratifications and Joinders to the Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, County of San Juan, State of New Mexico, dated April 2, 1959, have been executed by Overriding Royalty Owners in Tracts Nos. 3, 4, 4-A and 24 of said Unit Area, to-wit:

- (a) Ratification and Joinder dated October 14, 1959, executed by Marie Helene Weill;
- (b) Ratification and Joinder dated July 21, 1959, executed by J. Ralph Stewart and Viola Stewart;
- (c) Ratification and Joinder dated June 29, 1959, executed by John A. Pace, Wroe Owens and Betty Jean Stahl;
- (d) Ratification and Joinder dated July 22, 1959, executed by Ralph Lowe and Erma Lowe;
- (e) Ratification and Joinder dated June 23, 1959, executed by W. Benton Harrison and Mildred P. Harrison;
- (f) Ratification and Joinder dated August 3, 1959, executed by Albert B. Wilkes and Tekla Wilkes;
- (g) Ratification and Joinder dated August 8, 1959, executed by Georges Bigar;
- (h) Ratification and Joinder dated August 8, 1959, executed by William Dubilier and Florence Dubilier;
- (i) Ratification and Joinder dated June 17, 1959, executed by Lewis Cowan Morrill;
- (j) Ratification and Joinder dated June 17, 1959, executed by William V. Licht;
- (k) Ratification and Joinder dated June 18, 1959, executed by Murray Langfelder;
- (l) Ratification and Joinder dated June 17, 1959, executed by Sam Kirschenbaum and Sarah Ada Kirschenbaum;
- (m) Ratification and Joinder dated June 17, 1959, executed by Leonard Bluestone;
- (n) Ratification and Joinder dated June 17, 1959, executed by Frank Jensis and Margaret Jensis;

- (o) Ratification and Joinder dated June 12, 1959, executed by Guy A. Weill, Individually and as Custodian, and by Marianne Weill Lester;
- (p) Ratification and Joinder dated June 5, 1959, executed by Leo A. Achtschin and Mary Jane Achtschin and Jan H. Westerman and Gauthers A. Westerman;
- (q) Ratification and Joinder dated June 19, 1959, executed by Sid Weiss, Rosaline F. Weiss, Harry Lipsky, Tillie Swartz Lipsky, Lewis Freed and Ethel Freed;
- (r) Ratification and Joinder dated June 19, 1959, executed by William Levine, Edith Levine, Morris Levine and Ida Levine;

and

WHEREAS, the above mentioned Ratifications and Joinders were not filed prior to the final approval of the Unit Agreement and under the provisions of Section 28 of said Unit Agreement, the commitment of said Overriding Royalty Interests requires the consent in writing by the Working Interest Owners responsible for the payment of any benefit that may accrue under the Unit Agreement in behalf of such Overriding Royalty Owners; and

WHEREAS, SHELL OIL COMPANY is the owner of working interests in Tracts Nos. 3 and 4-A of the Central Bisti Lower Gallup Sand Unit Area.

NOW, THEREFORE, in consideration of the premises, the undersigned, SHELL OIL COMPANY, does hereby consent to the subsequent Joinder to the Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, San Juan County, New Mexico, dated April 2, 1959, by the parties signatory to the above Ratifications and Joinders.

DATED this 8th day of December, 1959.

SHELL OIL COMPANY

By

M. W. Sheppard
Vice President
Manager, Land Department

ATTEST:

Secretary

- NEW MEXICO

STATE OF _____ }
COUNTY OF _____ } ss.

The foregoing instrument was acknowledged before me this _____ day of _____
_____, 19____ by _____
_____.

Notary Public in and for said
County and State

My Commission expires _____

STATE OF _____ }
COUNTY OF _____ } ss.

The foregoing instrument was acknowledged before me this _____ day of _____
_____, 19____, by _____

(name of officer), _____ (title of officer or
agent), of _____ (name of corpo-
ration), a _____ (State or County of incorporation)
corporation, on behalf of said corporation.

Notary Public in and for said
County and State

My Commission expires _____

STATE OF CALIFORNIA }
COUNTY OF LOS ANGELES } ss.

The foregoing instrument was acknowledged before me this 8th day of December, 1959, by M. W. SHEPPARD, JR., Manager, Land
Department, Los Angeles Office of Shell Oil Company, a Delaware corporation, on behalf
of said corporation.

Mildred M. Crawford
Mildred M. Crawford Notary Public in and for said
County and State

December 11, 1959
My Commission expires _____

In reply refer to:
Unit Division

January 14, 1960

C
O
P
Y

Sunray Mid-Continent Oil Company
P. O. Box 2039
Tulsa 2, Oklahoma

ATTENTION: Mr. Norbert E. Proctor

Re: Central Bisti Lower
Gallup Sand Unit Area
San Juan County, New Mexico

Gentlemen:

We are sending four copies of certificates for the approval of the enlargement of the Central Bisti Lower Gallup Sand Unit Area to Mr. John Anderson, Supervisor, United States Geological Survey, Roswell, New Mexico.

These certificates were drawn up by this office at the request of Mr. Proctor and the signatures of Mr. Morgan and of Mr. A. L. Porter, Jr, Secretary-Director of the Oil Conservation Commission are affixed thereto.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
Ted Bilberry, Supervisor
Oil and Gas Division

MEM/MMR/m

cc:

Mr. John Anderson, Supervisor
United States Geological Survey
Roswell, New Mexico

Oil Conservation Commission
Santa Fe, New Mexico

CENTRAL BISTI LC ER GALLUP SAND UNIT / EA---NEW MEXICO

(Federal, State, & Indian Alloted Lands)

No. 14-08-001-6090 Approved June 26, 1959 & Effective July 1, 1959 - 7,388.46 Acres

OFFICE 000 — 0 —

Ts. 25-26 N. R. 12 W., N.M.P.M.
NOV 1959 3:42

Case # 16610

RECEIVED

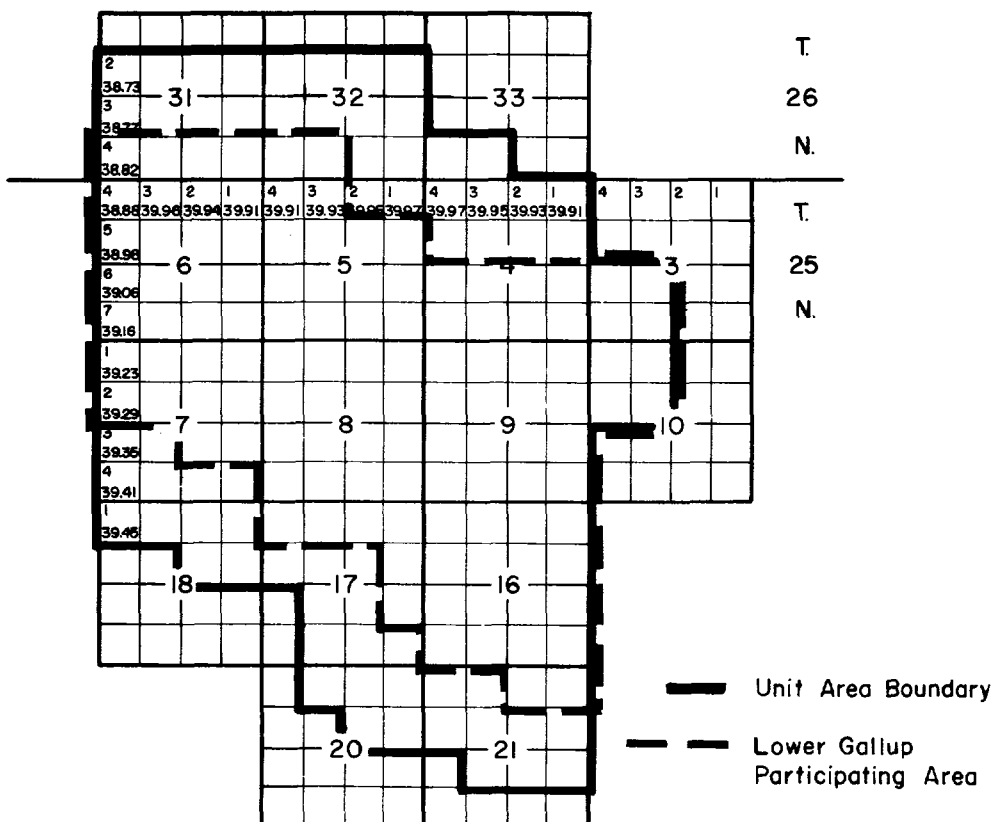
NOV 19 1959

U. S. GEOLOGICAL SURVEY
ROSWELL, NEW MEXICO

Participating Area

Zone	Approved Date	Effective Date	Area	Total
Lower Gallup	June 26, 1959	July 1, 1959	4,713.07	

R. 12 W.



In reply refer to:
Unit Division

October 6, 1959

C
O
P
Y

Sunray Mid-Continent Oil Company
P. O. Box 2039
Tulsa 2, Oklahoma

ATTENTION: Mr. R. W. Griffith

Re: Central Bisti Lower Gallup Sand
Unit Area,
San Juan County, New Mexico

Gentlemen:

We have received your notice of Proposed Enlargement of the Central Bisti Lower Gallup Sand Unit Area, San Juan County, New Mexico, which was dated September 29, 1959.

This notice is in compliance with Section 2 , subsection (b) of the unit agreement and said enlargement will become effective as of October 1, 1959, upon further compliance with the requirement of section 2 and upon approval by the Director, Commissioner and the Commission.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
Ted Bilberry, Supervisor
Oil and Gas Division

MEM/nmr/m
cc:

Oil Conservation Commission
Santa Fe, New Mexico

United States Geological Survey
Roswell, New Mexico

OIL CONSERVATION COMMISSION

P. O. BOX 871
SANTA FE, NEW MEXICO

File 1085
16 4 16

August 11, 1959

C
O
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Y

Sunray Mid-Continent Oil Company
Tulsa, Oklahoma

Re: First Year Plan of development for the Central Bisti Lower Gallup Sand Unit, San Juan County, New Mexico.

Gentlemen:

This is to advise that the New Mexico Oil Conservation Commission has this date approved the First Year Plan of Development as a general plan for the operation and development of the Central Bisti Lower Gallup Sand Unit, San Juan County, New Mexico. However, approval of this general plan of development shall not be construed as approval of the various individual wells for injection as each must be approved in accordance with the appropriate rules and orders.

If you wish a signed copy of the application, please submit another to us as we are keeping the one copy already sent for our files.

Very truly yours,

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

ALP/RLS/pj

US 85
Land office

No. A. T. 10

File

Case # 1666

In reply refer to:
Unit Division

August 11, 1959

Sunray Mid-Continent Oil Company
P. O. Box 2039
Tulsa 2, Oklahoma

Re: Central Bisti Lower
Gallup Sand Unit Area,
San Juan County, New Mexico

Gentlemen:

We are enclosing one copy of a "Plan of Development for the First Year From the Effective Date of Unitization" for the above designated Unit Area. This was approved by the Commissioner of Public Lands August 10, 1959.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
Ted Bilberry, Supervisor
Oil and Gas Division

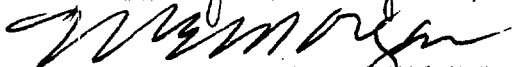
MEM/MMR/m
cc:

OCC- Santa Fe
USGS- Roswell

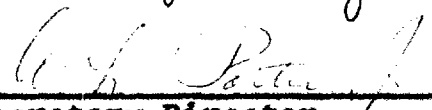
C
O
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**CERTIFICATE OF APPROVAL OF THE
ENLARGEMENT OF THE UNIT AREA AND
PARTICIPATING AREA, CENTRAL BISTI
LOWER GALLUP SAND UNIT AREA, SAN
JUAN COUNTY, NEW MEXICO.**

SUNRAY MID-CONTINENT OIL COMPANY, a Delaware Corporation of Tulsa, Oklahoma, as Unit Operator under that certain Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area approved by the Commissioner of Public Lands of the State of New Mexico on June 18, 1959; by the Acting Assistant Area Director, Gallup Area Office, Bureau of Indian Affairs on June 22, 1959; and approved by the Acting Director of the United States Geological Survey on June 26, 1959 (No. 14-08-001-6090); and, pursuant to the provisions of Section 2 thereof providing for the enlargement or contraction of the Unit Area therein described wherever necessary or desirable to conform to the purposes of the Agreement, respectfully requests the approval of the Director, United States Geological Survey, the Commissioner of Public Lands of the State of New Mexico, and the Oil Conservation Commission of the State of New Mexico, for the enlargement of the Unit by application dated November 5, 1959.

Approved January 14, 1960


Commissioner of Public Lands State of
New Mexico

Approved January 14, 1960


Secretary-Director
New Mexico Oil Conservation Commission

CENTRAL BISTI LOWER GALLUP SAND UNIT AREA

SAN JUAN COUNTY, NEW MEXICO

PLAN OF DEVELOPMENT FOR THE FIRST YEAR
FROM THE EFFECTIVE DATE OF UNITIZATION

TO: THE OIL AND GAS SUPERVISOR
UNITED STATES GEOLOGICAL SURVEY
ROSWELL, NEW MEXICO

TO: THE COMMISSIONER OF PUBLIC LANDS
STATE LAND OFFICE
CAPITOL BUILDING
SANTA FE, NEW MEXICO

TO: THE NEW MEXICO OIL CONSERVATION COMMISSION
125 MABRY HALL
CAPITOL BUILDING
SANTA FE, NEW MEXICO

IN COMPLIANCE WITH SECTION 10 OF THE UNIT AGREEMENT FOR THE DEVELOPMENT AND OPERATION OF THE CENTRAL BISTI LOWER GALLUP SAND UNIT AREA, SAN JUAN COUNTY, NEW MEXICO, SUNRAY MID-CONTINENT OIL COMPANY, AS UNIT OPERATOR DESIGNATED THEREUNDER, DOES HEREBY SUBMIT FOR YOUR APPROVAL A PLAN OF DEVELOPMENT AND OPERATION FOR THE UNITIZED LAND FOR THE PERIOD OF ONE YEAR COMMENCING WITH THE EFFECTIVE DATE OF THE UNITIZATION.

1. SUMMARY OF PROPOSED PLAN OF OPERATION.

A DESCRIPTION OF THE PROPOSED PLAN OF OPERATION FOR THE CENTRAL BISTI LOWER GALLUP SAND UNIT, IS PRESENTED. VERY BRIEFLY, THE PLAN FOR UNITIZED OPERATIONS INCORPORATES THE INJECTION OF LPG (FOLLOWED BY GAS INJECTION) IN TEN 160-ACRE 5-SPOT PATTERNS LOCATED IN THE "FAIRWAY" PORTIONS OF THE RESERVOIR AND GAS INJECTION ONLY IN THE EDGE PORTIONS OF THE RESERVOIR. CONTAINMENT OF THE

RESERVOIR FLUIDS DURING PRESSURE MAINTENANCE OPERATIONS IS ACCOMPLISHED BY WATER INJECTION WELLS ALONG THE WESTERN AND EASTERN UNIT BOUNDARIES. EXHIBIT 1 ATTACHED HERETO REPRESENTS A MAP OF THE AREA SHOWING THE UNIT BOUNDARY, THE GAS INJECTION WELLS, AND THE TEN 160-ACRE 5-SPOT PATTERNS FOR LPG INJECTIONS. THE WATER BARRIER ON THE WESTERN AND EASTERN BOUNDARIES OF THE UNIT IS ALSO SHOWN.

THE OVER-ALL PLAN OF OPERATION CONSISTS OF:

1. LPG-MISCIBLE FLOOD OF TEN 160-ACRE 5 SPOTS.
2. MAINTAIN RESERVOIR PRESSURE AT 1400 PSI BY PATTERN GAS INJECTION AND WATER INJECTION ON THE WESTERN AND EASTERN UNIT BOUNDARY.

THE MISCIBLE PHASE PROGRAM WILL BE ACCOMPLISHED BY:

- A. CONTAINMENT OF THE RESERVOIR FLUID.
- B. PRESSURE RESTORATION TO MISCIBLE PRESSURE.
- C. DISPLACEMENT OF RESERVOIR OIL AT MISCIBLE PRESSURE.

EACH OF THE ABOVE THREE STAGES OF THE PLAN OF DEVELOPMENT IS DISCUSSED MORE FULLY IN THE SUCCEEDING PARAGRAPHS.

II. CONTAINMENT OF RESERVOIR FLUIDS.

THE WESTERN BOUNDARY OF THE CENTRAL BISTI UNIT, THE COMMON 12-13 RANGE LINE, CONSTITUTES A COMMON BOUNDARY WITH THE PROPOSED WESTERN UNIT OPERATED BY THE BRITISH-AMERICAN OIL PRODUCING COMPANY. AN EFFECTIVE BARRIER SEPARATING THE TWO UNITS AND PREVENTING NET LATERAL MIGRATION OF RESERVOIR HYDROCARBONS ACROSS THE COMMON LINE CAN BE CREATED BY INJECTING WATER INTO EXISTING WELLS ALONG THE COMMON RANGE LINE. THESE WELLS, SHOWN ON EXHIBIT 1, WILL PERMIT THE PLACING OF A WATER BLOCK ACROSS THE "FAIRWAY" OF THE RESERVOIR WHERE LATERAL MIGRATION COULD OCCUR. THE EASTERN BOUNDARY OF THE CENTRAL BISTI UNIT WILL REQUIRE A LINE OF WATER INJECTION WELLS TO PREVENT NET LATERAL MIGRATION IN THAT AREA. THE PROPOSED LOCATION FOR THIS WATER BLOCK IS ALSO SHOWN IN EXHIBIT 1.

WITH THE TWO WATER BLOCKS THUS FORMED, THE RESERVOIR HYDROCARBONS IN PLACE WITHIN THE CENTRAL BISTI UNIT WILL BE ADEQUATELY CONTAINED FOR THE ENTIRE OPERATING LIFE. WATER INJECTION IS EXPECTED TO BE CONTINUAL DURING THE OPERATIONS PRIOR TO BLOW DOWN. WATER SUPPLY WILL BE ACHIEVED IN THE CHACO SAND AT APPROXIMATELY 2000 FEET AND AMPLE SUPPLY IS AVAILABLE.

III. PRESSURE RESTORATION TO MISCIBLE PRESSURE.

LPG-MISCIBLE PHASE FLOODING AT BISTI WILL REQUIRE AN OPERATING RESERVOIR PRESSURE OF A MINIMUM OF 1150 PSI. THIS MINIMUM PRESSURE REPRESENTS MISCIBILITY PRESSURE BETWEEN THE LPG AND INJECTED GAS AT RESERVOIR TEMPERATURE,

AND PERMITS HIGH OIL DISPLACEMENT EFFICIENCY WITH A MINIMUM VOLUME OF LPG. IT IS EXPECTED THAT THE AVERAGE RESERVOIR PRESSURE IN THE CENTRAL BISTI UNIT WILL BE IN THE ORDER OF 800 TO 900 PSI AT THE TIME WHEN LPG INJECTION IS INITIATED. THE RESERVOIR PRESSURE MUST BE RAISED TO A MINIMUM OF 1150 PSI AT THE GAS-LPG INTERFACE TO ASSURE MISCIBILITY AND PROPER DISPLACEMENT OF THE LPG SLUG.

IT IS FURTHER EXPECTED THAT OIL PRODUCTION WILL BE RESTRICTED TO APPROXIMATELY 1250 BBLS/DAY DURING THE LPG INJECTION PERIOD TO ASSURE PRESSURE RESTORATION IN THE RESERVOIR. DURING THIS PERIOD THE COMBINED INJECTION OF LPG AND WATER IN THE EAST AND WEST LINE BARRIERS AND GAS INJECTION IN THE EDGE AREAS, TOGETHER WITH THE RESTRICTED PRODUCTION IS EXPECTED TO ACHIEVE THE NECESSARY PRESSURE RESTORATION.

IV. DISPLACEMENT OF RESERVOIR OIL AT MISCIBILITY PRESSURE.

IMPROVED RECOVERY OF OIL IN THE LPG-MISCIBLE PHASE FLOODING WILL BE OBTAINED BY THE SLUG OF LPG DISPLACING OIL FROM THE SAND AS THE LPG SLUG IS DRIVEN AWAY FROM THE INJECTION WELL TOWARD THE ADJACENT PRODUCING OIL WELLS. THE PLAN OF OPERATION DURING THIS STAGE INCORPORATES THE INJECTION OF APPROXIMATELY 935,000 BBLS. OF LPG INTO TEN 160-ACRE 5-SPOT PATTERNS FOLLOWED BY INJECTED GAS. THE LOCATION OF THE LPG-INJECTION WELLS, THE TEN 160-ACRE 5-SPOT PATTERNS AND THE GAS INJECTION WELLS ARE SHOWN ON EXHIBIT 1. THE PLAN OF OPERATION CONTEMPLATES THAT RAW SEPARATOR GAS WILL BE PICKED UP AT THE TANK BATTERIES PROCESSED THROUGH A PLANT AND PLANT RESIDUE GAS WILL BE INJECTED BACK INTO THE RESERVOIR. ALSO, MAKE-UP GAS WILL BE PURCHASED FOR INJECTION.

V. PROPOSED DEVELOPMENT PROGRAM FOR THE FIRST YEAR OF UNITIZATION.

IN ORDER TO PUT INTO EFFECT THE PRESSURE MAINTENANCE PROGRAM OUTLINED ABOVE, THE FOLLOWING PLAN OF DEVELOPMENT WILL BE UNDERTAKEN COMMENCING WITH THE EFFECTIVE DATE OF THE UNITIZATION:

1. NEW OIL WELLS TO BE DRILLED:

- (A) NE $\frac{1}{4}$ NW $\frac{1}{4}$ SEC. 6, T. 25N., R. 12W.
- (B) NE $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 8, T. 25N., R. 12W.
- (C) NE $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 8, T. 25N., R. 12W.
- (D) NE $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 9, T. 25N., R. 12W.
- (E) NE $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 9, T. 25N., R. 12W.

THESE FIVE NEW OIL WELLS ARE NECESSARY TO COMPLETE 5-SPOT PATTERN DEVELOPMENT FOR LPG-MISCIBLE PHASE FLOODING.

2. LPG-GAS INJECTION WELLS:

- (A) SW $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 6, T. 25N., R. 12W.
- (B) SW $\frac{1}{4}$ NW $\frac{1}{4}$ SEC. 5, T. 25N., R. 12W.
- (C) SW $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 6, T. 25N., R. 12W.
- (D) SW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 5, T. 25N., R. 12W.
- (E) SW $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 5, T. 25N., R. 12W.
- (F) SW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 4, T. 25N., R. 12W.
- (G) SW $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 8, T. 25N., R. 12W.

- (H) SW $\frac{1}{4}$ NW $\frac{1}{4}$ SEC. 9, T. 25N., R. 12W.
- (I) SW $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 9, T. 25N., R. 12W.
- (J) SW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 9, T. 25N., R. 12W.

THE ABOVE TEN WELLS WILL BE USED FOR INJECTING LPG FOLLOWED BY GAS INJECTION FOR DRIVING THE LPG SLUG DURING THE MISCIBLE PHASE FLOODING. THE WELL "(J)" IS TO BE NEWLY DRILLED WHEREAS THE REMAINING NINE WELLS ABOVE LISTED REPRESENT PRESENT OIL WELLS TO BE CONVERTED TO INJECTION DUTY.

3. GAS INJECTION WELLS:

- (A) SW $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 31, T. 26N., R. 12W.
- (B) SW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 32, T. 26N., R. 12W.
- (C) SW $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 5, T. 25N., R. 12W.
- (D) SW $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 4, T. 25N., R. 12W.
- (E) SW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 3, T. 25N., R. 12W.
- (F) SW $\frac{1}{4}$ NW $\frac{1}{4}$ SEC. 10, T. 25N., R. 12W.
- (G) SE $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 9, T. 25N., R. 12W.
- (H) SE $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 8, T. 25N., R. 12W.
- (I) SW $\frac{1}{4}$ NW $\frac{1}{4}$ SEC. 8, T. 25N., R. 12W.
- (J) SW $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 7, T. 25N., R. 12W.

THE ABOVE TEN WELLS WILL BE USED FOR GAS INJECTION DURING THE MISCIBLE PHASE FLOODING. THESE WELLS REPRESENT OIL WELLS TO BE CONVERTED TO GAS INJECTION DUTY. THE LAST WELL "(J)" IS BEING USED AS A GAS INJECTION WELL FOR THE RETURN OF PRODUCED GAS CONSISTENT WITH THE NEW MEXICO OIL CONSERVATION COMMISSION ORDER #R-1315 DATED DECEMBER 31, 1958.

4. WATER INJECTION WELLS:

(A) WEST BARRIER

- (1) NW CORNER OF NW $\frac{1}{4}$ SEC. 6, T. 25N., R. 12W.
- (2) SW $\frac{1}{4}$ NW $\frac{1}{4}$ SEC. 6, T. 25N., R. 12W.
- (3) SW $\frac{1}{4}$ SW $\frac{1}{4}$ SEC. 6, T. 25N., R. 12W.

THE ABOVE THREE WELLS WILL BE CONVERTED TO WATER INJECTION. IN ADDITION THE BRITISH-AMERICAN #5 MARYE NE $\frac{1}{4}$ SE $\frac{1}{4}$ SEC. 1, T. 25N., R. 13W AND #2 MARYE NE $\frac{1}{4}$ NE $\frac{1}{4}$ SEC. 12, T. 25N., R. 13W WILL BE CONVERTED TO WATER INJECTION DUTY. THESE FIVE WELLS WILL SERVE TO FORM A COMMON WATER BARRIER SEPARATING THE BRITISH-AMERICAN OPERATED WESTERN UNIT FROM THE SUNRAY MID-CONTINENT OPERATED CENTRAL UNIT.

(B) EASTERN BARRIER

- (1) 1315' EAST AND 2635' NORTH OF SW CORNER SEC. 10, T. 25N., R. 12W.
- (2) 1315' EAST AND 1320' NORTH OF SW CORNER SEC. 10, T. 25N., R. 12W.
- (3) 1315' EAST AND 0' NORTH OF SW CORNER SEC. 10, T. 25N., R. 12W.

(4) 1315' EAST AND 1320' SOUTH OF NW CORNER
SEC. 15, T. 25N., R. 12W.

THE ABOVE FOUR WELLS WILL BE NEWLY DRILLED WELLS COMPLETED FOR WATER INJECTION DUTY. THESE WATER INJECTION WELLS ARE TO BE LOCATED 5' FROM THE EASTERN LEASE LINE ON PROPERTY CURRENTLY OWNED BY PHILLIPS PETROLEUM COMPANY. THE TWO 80-ACRE TRACTS, I.E. $W\frac{1}{2}$ SW $\frac{1}{4}$ SEC. 10, AND $W\frac{1}{2}$ NW $\frac{1}{4}$ SEC. 15, WILL ALSO REPRESENT THE FIRST ENLARGEMENT OF THE UNIT AREA. THE WATER BARRIER CREATED BY THE FOUR PROPOSED WATER INJECTION WELLS WILL SEPARATE THE CENTRAL BISTI UNIT (AFTER ENLARGEMENT) FROM THE SHELL OIL COMPANY ACREAGE.

THE WATER BARRIER WELLS, HENCE, WILL EFFECTIVELY PERMIT THE UNIT TO MAINTAIN THE DESIRED PRESSURE WITHOUT NET TRANSFER OF HYDROCARBONS TO EITHER THE PROPOSED BRITISH-AMERICAN OPERATED UNIT ADJOINING ON THE WEST OR THE SHELL OIL COMPANY ACREAGE ADJOINING ON THE EAST. BY THUS CONTAINING THE RESERVOIR OIL WITHIN THE CENTRAL BISTI UNIT THE RESERVOIR PRESSURE CAN BE ADEQUATELY RESTORED AND MAINTAINED ABOVE MISCIBILITY PRESSURE.

THE ABOVE DEVELOPMENT IS EXPECTED TO REPRESENT ALL WORK NECESSARY IN THE FLOODING OPERATIONS IN THE CENTRAL BISTI UNIT.

VI. ENGINEERING STUDY.

IN SUPPORT OF THIS PLAN OF DEVELOPMENT AND OPERATION THERE IS ALSO SUBMITTED HERewith A COPY OF THE ENGINEERING STUDY PREPARED BY CENTRAL BISTI LOWER GALLUP SAND UNIT ENGINEERING COMMITTEE DATED MAY 5, 1959.

VII. MODIFICATIONS.

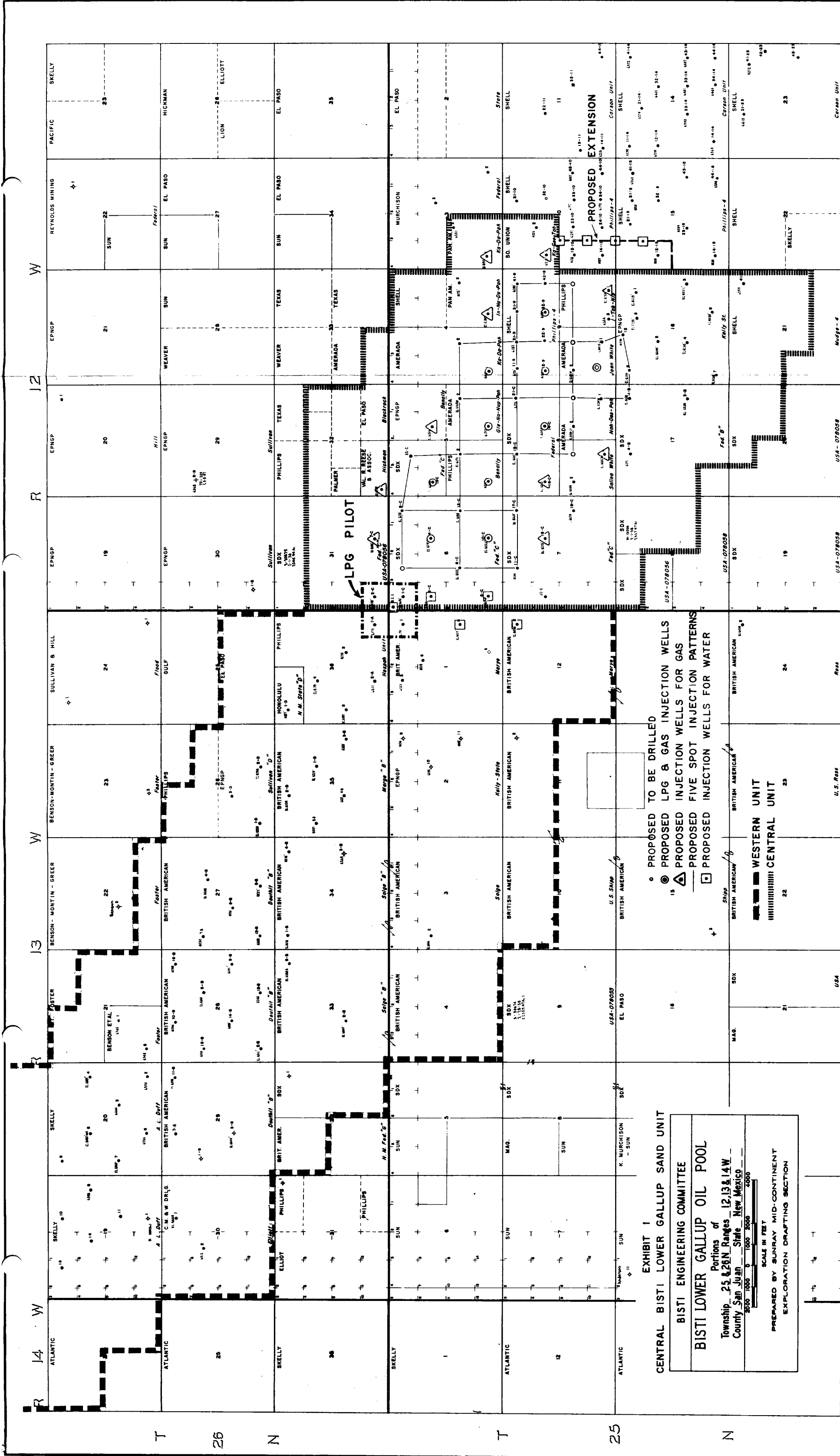
AS AUTHORIZED BY SECTION 10 OF THE UNIT AGREEMENT, THIS PLAN OF DEVELOPMENT MAY BE MODIFIED FROM TIME TO TIME WITH THE APPROVAL OF THE REGIONAL OIL AND GAS SUPERVISOR, UNITED STATES GEOLOGICAL SURVEY, THE COMMISSIONER OF PUBLIC LANDS OF THE STATE OF NEW MEXICO, AND THE NEW MEXICO OIL CONSERVATION COMMISSION, TO MEET CHANGING CONDITIONS.

SUBMITTED THIS 11TH DAY OF JUNE, 1959.

SUNRAY MID-CONTINENT OIL COMPANY

BY _____

UNIT OPERATOR



MAIN OFFICE CCC

1322 COT 1 PM 1 49

NOTICE OF PROPOSED ENLARGEMENT OF THE
CENTRAL BISTI LOWER GALLUP SAND UNIT AREA
SAN JUAN COUNTY, NEW MEXICO

June 16/66
W

TO WHOM IT MAY CONCERN:

The Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, San Juan County, New Mexico, was approved by the Commissioner of Public Lands of the State of New Mexico on June 18, 1959; by the Acting Assistant Area Director, Gallup Area Office, Bureau of Indian Affairs on June 2, 1959; and was approved by the Acting Director of the United States Geological Survey on June 26, 1959. Accordingly, the Central Bisti Lower Gallup Sand Unit Area became effective on July 1, 1959.

Section 2 of the Unit Agreement provides that the Unit Area shall be expanded or contracted whenever such action is necessary or advisable to conform with the purposes of the agreement. Section 2 also provides that the Unit Operator, with concurrence of at least 65 per cent of the voting interests and after preliminary concurrence by the Director of the United States Geological Survey, shall prepare a notice of proposed expansion or contraction describing the changes in the boundaries of the Unit Area and the proposed effective date thereof preferably the first day of a month subsequent to the date of notice.

The Unit Operator, having received concurrence of Working Interest Owners having voting interests in excess of 65 per cent, proposes to enlarge the Unit Area of the said Central Bisti Lower Gallup Sand Unit to incorporate therein the following described lands:

$W\frac{1}{2}$ of $SW\frac{1}{4}$ of Section 10 and the
 $W\frac{1}{2}$ of $NW\frac{1}{4}$ of Section 15, all in
Township 25 North, Range 12 West,
San Juan County, New Mexico

which lands will also be added to the participating area of the Unit as presently constituted.

All of the lands last described are productive from the same reservoir from which the Unit Area as presently constituted is producing and the inclusion of said land in the Unit Area is consistent with the present existing approved plan of development wherein provision is made for the completion of water injection wells on the lands last above described.

Attached is a map entitled "Revised Exhibit A" showing the Unit Area and participating area as proposed to be enlarged. There is also attached "Revised Exhibit B" showing a schedule of the percentage and kind of ownership of all lands within the Unit Area as enlarged and a "Second Revised Exhibit C" showing a Schedule of Tract Percentage Participation in the Unit Area as enlarged.

NOTICE IS HEREBY GIVEN, as provided in Section 2 of said agreement, that SUNRAY MID-CONTINENT OIL COMPANY, as Unit Operator, proposes to enlarge the said Unit Area and participating area as aforesaid and that the enlargement become effective as of October 1, 1959.

Section 2 of the said Unit Agreement further provides that you may, within 30 days from the receipt hereof, submit to SUNRAY MID-CONTINENT OIL COMPANY, P. O. Box 2039, Tulsa 2, Oklahoma, as Unit Operator, any objections you may have to this proposed enlargement.

DATED at Tulsa, Oklahoma, this 29th day of September, 1959.

SUNRAY MID-CONTINENT OIL COMPANY
"UNIT OPERATOR"

By


R. W. Griffith

Attachments

REVISED EXHIBIT "B"

SCHEDULE SHOWING THE PERCENTAGE AND KIND OF OWNERSHIP
OF ALL LANDS WITHIN THE CENTRAL HIST LOWER GALLUP SAND UNIT
TOWNSHIPS 25 AND 26 NORTH, RANGE 12 WEST, SAN JUAN COUNTY, NEW MEXICO

Tract Number	Description	No. of Acres	Serial No. and Date of Lease or Application	Basic Royalty & Percentage	Lessee of Record	Overriding Royalty & Percentage	Working Interest & Percentage
<u>FEDERAL LANDS</u>							
1	T26N, R12W Sec. 31: Lots 2, 3, 4 SE ¹ ₄ NW ¹ ₄ , S ¹ ₂ NE ¹ ₄ , SE ¹ ₄ , E ¹ ₂ SW ¹ ₄	2308.78	SF-078056 2-1-48 H.B.P.	USA 12 ¹ / ₂ %	Sunray Mid-Continent Oil Company	None	Sunray Mid-Continent Oil Company - All
<u>T25N, R12W</u>							
	Sec. 5: Lots 3 & 4, S ¹ ₂ NW ¹ ₄						
	Sec. 6: (ALL) Lots 1, 2, 3, 4, 5, 6 & 7 SE ¹ ₄ NW ¹ ₄ , S ¹ ₂ NE ¹ ₄ , E ¹ ₂ SW ¹ ₄ , SE ¹ ₄						
	Sec. 7: (ALL) Lots 1, 2, 3 & 4 E ¹ ₂ NW ¹ ₄ , E ¹ ₂ SW ¹ ₄ , E ¹ ₂ N ¹ ₂						
	Sec. 8: N ¹ ₂						
	Sec. 18: Lot 1 & NE ¹ ₄ NW ¹ ₄						
2	T25N, R12W	1040.00	SF-078058 2-1-48 H.B.P.	USA 12 ¹ / ₂ %	Sunray Mid-Continent Oil Company	None	Sunray Mid-Continent Oil Company - All
	Sec. 17: N ¹ ₂ , SE ¹ ₄ , NW ¹ ₄ SW ¹ ₄ , E ¹ ₂ SW ¹ ₄						
	Sec. 18: NE ¹ ₄ , N ¹ ₂ SE ¹ ₄						
	Sec. 20: NE ¹ ₄ , NE ¹ ₄ NW ¹ ₄						

REVISED EXHIBIT "B" (Continued)

3	<u>T25N, R12W</u> Sec. 21: $N\frac{1}{2}$, $N\frac{1}{2}$ $SE\frac{1}{4}$, $NE\frac{1}{4}$ $SW\frac{1}{4}$	440.00	SF-078065 2-1-48 H.B.P.	USA $12\frac{3}{4}\%$	Shell Oil Company	(Listed on Page 3 of this Exhibit.)	Shell Oil Company All
4	<u>T25N, R12W</u> Sec. 9: $N\frac{1}{2}$	320.00	NM-036254-A 2-1-48 H.B.P.	USA $12\frac{3}{4}\%$	Shell Oil Company	(Listed on Page 3 of this Exhibit.)	Phillips Petroleum Company - All
4A	<u>T25N, R12W</u> Sec. 4: Lots 1 & 2, $S\frac{1}{2}$ $NE\frac{1}{4}$	159.84	NM-036254-A 2-1-48 H.B.P.	USA $12\frac{3}{4}\%$	Shell Oil Company	(Listed on Page 3 of this Exhibit.)	Shell Oil Company All
5	<u>T26N, R12W</u> Sec. 32: $SW\frac{1}{4}$ $NE\frac{1}{4}$	40.00	SF-078248-A 3-1-48 Extended 1-31-60	USA $12\frac{3}{4}\%$	Jack C. Tunstall	C.H. Nye-2% of 8/8 W.J. Weaver- $\frac{1}{2}\%$ of 8/8	Texaco, Inc. - All (This lease held u option agreement.)
24	<u>T25N, R12W</u> Sec. 10: $W\frac{1}{2}$ $SW\frac{1}{4}$ Sec. 15: $W\frac{1}{2}$ $NW\frac{1}{4}$	160.00	NM-036254-A 2-1-48 H.B.P.	USA $12\frac{3}{4}\%$	Shell Oil Company	(Listed on Page 3 of this Exhibit.)	Phillips Petroleum Company - All

Seven Federal Tracts Containing 4468.62 Acres or 59.19910% of Unit Area

REVISED EXHIBIT "B" (Continued)
OVERRIDING ROYALTY & PERCENTAGE FOR
TRACTS 3, 4, 4A & 24

3 $\frac{1}{2}$ % of 8/8 divided as follows:

Lewis Cowan Merrill - 1/72
Ralph & Erma Lowe - 1/18
Hal C. & Alberta Peck - 1/18
J. F. Postelle - 1/18
J. R. & Lucille Martin - 1/18
J. Ralph & Viola Stewart - 1/18
C. B. Yarbrough - 1/36
Katherine B. Yarbrough - 1/36
J. Holt Jowell - 1/36
W. H. & Alberta Sloan - 1/18
Robert M. Faskin Estate - 1/18
Gerald & Elizabeth Fitzgerald - 1/36
Robert D. & Nancy Mae Duden - 1/18
Reese & Rozelle B. Cleveland - 1/18
Frank & Henrietta Schultz - 1/18
R. M. & Lucille C. Barron - 1/18
Kathryn D. & F. C. Ashby - 1/36
P. O. & Bertha K. Sill - 1/72
Lee Etta & H. A. Hedberg - 1/72
Olive Miller - 1/32 of 1/36
Thos. M. & Ninna Grodin - 3/32 of 1/36
Chas. D. & Lucy L. Karutz - 1/4 of 1/36
Georges Bigar - 3/8 of 1/36
Robert B. Aaronson - 1/2 of 1/36
Wm. & Florence Dubilier - 3/8 of 1/36
Wallace S. Karutz - 3/16 of 1/36
Lawrence L. Lavelle - 1/4 of 1/36
Myron & Nelly Lidell - 1/4 of 1/36
Marie Helene Weill - 1/8 of 1/36
Benj. J. & Helen G. Pienkowski -
1/8 of 1/36
Lewis Otersen - 3/16 of 1/36

Stanley & Ann Zarachek - 1/8 of 1/36
Albert & Tekla Wilkes - 3/16 of 1/36
Alexander S. Lo Re - 1/8 of 1/36
Daniel Alagna - 1/16 of 1/36
Mrs. L. B. Downey(widow) - 1/24
Connor Estate - 1/72
Sid Weiss(S.O. Weiss) & Rosaline F.
Weiss - 1/5 of 1/36
Morris & Ida Levine - 1/5 of 1/36
Wm. & Edith Levine - 1/5 of 1/36
Harry & Tillie Swartz Lipshy -
1/5 of 1/36
Lewis & Ethel Freed - 1/5 of 1/36
Marianne Weill Lester - 1/8 of 1/36
Guy A. Weill - 1/8 of 1/36
Guy A. Weill, Custodian - 1/4 of 1/36
W. Benton & Mildred P. Harrison -
1/8 of 1/36
Wm. V. Licht - 1/8 of 1/36
Murray Langfelder - 1/16 of 1/36
Frank Jensis - 1/8 of 1/36
Sam & Sarah Ada Kirschenbaum -
1/16 of 1/36
Leonard Bluestone - 1/4 of 1/36
Leo A. & Mary Jane Achtschin -
(Interest Unknown)
Ganthers & Jan H. Westerman -
(Interest Unknown)

\$100/acre out of 1 $\frac{1}{2}$ % of 8/8 as follows:

Robert Mims - 1/4
Betty Jean Mudge Stahl - 80% of 1/8
Wroe Owens - 10% of 1/8
John A. Pace - 10% of 1/8
E. W. Mudge, Jr. - 1/8
Gas Producers Corporation - 1/2

REVISED EXHIBIT "B" (Continued)

STATE LANDS

6	<u>T26N, R12W</u> Sec. 32: S $\frac{1}{2}$ SE $\frac{1}{4}$	80.00	E-3148-7 H.B.P.	State of New Mexico 12 $\frac{3}{4}$ %	El Paso Natural Gas Products Company	John Burroughs & Jean Burroughs 5% of 8/8	El Paso Natural Gas Products Company - All
7	<u>T25N, R12W</u> Sec. 16: All	640.00	E-6597-2 H.B.P.	State of New Mexico 12 $\frac{3}{4}$ %	Lawrence C. Kelly, Trustee 1/2 El Paso Natural Gas Products Company 1/2	As to N $\frac{1}{2}$ of Sec. 16 <u>T25N, R12W</u> Lawrence C. Kelly, Trustee, and Individually 4.75% of 8/8	Lawrence C. Kelly, Trustee - 1/2 El Paso Natural Gas Products Co. - 1/2
8	<u>T26N, R12W</u> Sec. 32: SE $\frac{1}{4}$ NE $\frac{1}{4}$, S $\frac{1}{2}$ NW $\frac{1}{4}$, NE $\frac{1}{4}$ SW $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$	240.00	E-9791 2-21-56	State of New Mexico 12 $\frac{3}{4}$ %	Phillips Petroleum Company	None	Phillips Petroleum Company - All
9	<u>T26N, R12W</u> Sec. 32: NW $\frac{1}{4}$ SW $\frac{1}{4}$	40.00	B-11370-43 8-3-44 H.B.P.	State of New Mexico 12 $\frac{3}{4}$ %	Phillips Petroleum Company	James Palmer 3% of 8/8	Phillips Petroleum Company - All

REVISED EXHIBIT "B" (Continued)

10	T26N, R12W Sec. 32: S $\frac{1}{2}$ SW $\frac{1}{4}$	80.00	B-11370-31 H.B.P.	State of New Mexico 12 $\frac{1}{2}$ %	J. Felix Hickman	J. Felix Hickman 7% of 8/8	Val R. Reese & Assoc. Inc. - 1/2
					First Nat'l Bank of Albuquerque as Trustee for Jeffery Leigh Hickman 2 $\frac{1}{2}$ % of 8/8		J. R. Modrall - 1
					Carol T. Payne 1 $\frac{1}{2}$ % of 8/8		John P. Vandenburg 1/8
					Merle Hickman 1 $\frac{1}{2}$ % of 8/8		E. R. Richardson 1/16
							Thomas W. Cabeen 1/16
							Oscar M. Love - 1
							Fred Luthy - 1/32
							James E. Sperling 1/32
							Ezra M. Thompson 1/32

Five State of New Mexico Tracts Containing 1080.00 Acres or 14.30755% of Unit Area

REVISED EXHIBIT "B" (Continued)

Tract Number	Description	No. of Acres	Contract Number and Date	Basic Royalty and Allotment Number	Overriding Royalty	Working Interest Percentage
<u>INDIAN LANDS</u>						
11	<u>T25N, R12W</u> Sec. 5: SW $\frac{1}{4}$	160.00	Navajo Allotted Contract No. 14-20-603-1292 3-21-56 H.B.P.	Hoska Da Wot (Jimmie) A/K/A Jim White A/K/A Jim White Benally - 12 $\frac{1}{2}$ % (059289)	None	Phillips Petroleum Company - All
12	<u>T25N, R12W</u> Sec. 9: SE $\frac{1}{4}$	160.00	Navajo Allotted Contract No. 14-20-603-1228 11-10-55 H.B.P.	I Tah Nip Pah (Mary) (Mary White) A/K/A Mary White Charley (Deceased) 12 $\frac{1}{2}$ % (059286)	None	Phillips Petroleum Company - All
13	<u>T25N, R12W</u> Sec. 5: Lots 1 & 2 S $\frac{1}{2}$ NE $\frac{1}{4}$ (NE $\frac{1}{4}$)	159.92	Navajo Allotted Contract No. 14-20-603-1448 12-26-56 H.B.P.	Total Basic Royalty 12 $\frac{1}{2}$ % divided as follows: Ka Da Pah A/K/A Mrs. Herbert Williams (059385) - 29/64 Gle Na Nup Pah A/K/A Mrs. Juan Devore 10/64 Hoska Da Wot (Jimmie) A/K/A Jim White (059289) - 5/64 Ah Ni Ne Pah A/K/A Salena White (059288) - 5/64 I Ni Pah A/K/A Joan White (059287) 5/64	None	El Paso Natural Gas Products Company - All

REVISED EXHIBIT "B" (Continued)

Sam Benally
5/64

I Tah Nip Pah (Mary White)
A/K/A Mary White Charley
(Deceased) (059286) -
5/64

14 T25N, R12W
Sec. 3: SW $\frac{1}{4}$

160.00 Navajo Allotted Contract
No. 14-20-603-1423
3-30-56
H.B.P.

Ka Da Pah A/K/A Mrs. Herbert
Williams (059285) -
12 $\frac{1}{2}$ %

Pan American Petroleum
Corporation - All

15 T25N, R12W
Sec. 4: SE $\frac{1}{4}$

160.00 Navajo Allotted Contract
No. 14-20-603-1424
4-20-56
H.B.P.

Total Basic Royalty 12 $\frac{1}{2}$ %
divided as follows:
Na Pah (John) A/K/A William
L. Benally (059292) -
104/896

Pan American Petroleum
Corporation - All

Hoska Da Wot A/K/A Jim White
(059289) -
132/896

Ah Ni Ne Pah A/K/A Salena
White (059288) -
132/896

I Ni Pah A/K/A Joan White,
A/K/A Mrs. Joan Harrison
(059287) -
132/896

I Tah Nip Pah (Mary White)
A/K/A Mary White Charley
(Deceased) (059286) -
132/896

Joe Blackie (Census #111118) -
38/896

Ushka Nah No Tah A/K/A
Ernest Blackie -
57/896

REVISED EXHIBIT "B" (Continued)

Mabel Blackie -
57/896

Gle Na Nup Pah A/K/A
Mrs. Juan Devore
56/896

Ka Da Pah A/K/A
Mrs. Herbert Williams
(059285) -
56/896

Total Basic Royalty 12 1/2%
divided as follows:
Gle Na Nup Pah A/K/A
Mrs. Juan Devore
2/8

Ka Da Pah A/K/A
Mrs. Herbert Williams
(059285) -
1/8

Hoska Da Wot (Jimmie) A/K/A
Jim White (059289) -
1/8

Ah Ni Ne Pah A/K/A
Selena White (059288) -
1/8

I Ni Pah A/K/A Joan White
(059287) -
1/8

I Tah Nip Pah (Marry White)
A/K/A Marry White Charley
(Deceased) (059286) -
1/8

Sam Benally -
1/8

16 T25N, R12W
Sec. 10: NW 1/4

160.00 Navajo Allotted Contract
No. 14-20-603-1449
4-10-56
H.B.P.

Southern
Company

REVISED EXHIBIT "B" (Continued)

17 T25N, R12W
Sec. 4: Lots 3 & 4
S $\frac{1}{2}$ NW $\frac{1}{4}$

159.92

Navajo Allotted Contract
No. 14-20-603-322
11-12-53

Total Basic Royalty 12 $\frac{1}{2}$ %
divided as follows:
Ka Da Pah A/K/A Mrs. Herbert
Williams (059285) -
43/64

None

Hoska Da Wot (Jimmie) A/K/A
Jim White (059289) -
3/64

Ah Ni Ne Pah A/K/A
Selena White (059288) -
3/64

I Ni Pah A/K/A Joan White
A/K/A Mrs. Joan Harrison
(059287) -
3/64

I Tah Nip Pah (Mary White)
A/K/A Mary White Charley
(Deceased) (059286) -
3/64

Sam Benally -
3/64

Gle Na Nup Pah -
6/64

18 T25N, R12W
Sec. 4: SW $\frac{1}{4}$

160.00

Navajo Allotted Contract
No. 14-20-603-321
11-12-53
H.B.P.

Ka Da Pah A/K/A Mrs. Herbert
Williams (059285) -
12 $\frac{3}{4}$ %

None

Lease Allotment No. 011670

19 T25N, R12W
Sec. 5: SE $\frac{1}{4}$

160.00

Navajo Allotted Contract
No. 14-20-603-323
11-12-53
H.B.P.

Total Basic Royalty 12 $\frac{1}{2}$ %
divided as follows:
Gle Na Nup Pah
A/K/A Mrs. Juan Devore
2/8

None

REVISED EXHIBIT "B" (Continued)

				Ka Da Pah A/K/A Mrs. Herbert Williams (059285) - 1/8	
				Hoska Da Wot (Jimmie) A/K/A Jim White (059289) - 1/8	
				Ah Ni Ne Pah A/K/A Salena White (059288) - 1/8	
				I Ni Pah A/K/A Joan White A/K/A Mrs. Joan Harrison (059287) - 1/8	
				I Tah Nip Pah (Mary White) A/K/A Mary White Charley (Deceased) (059286) - 1/8	
				Sam Benally 1/8	
20	<u>T25N, R12W</u> Sec. 8: SW $\frac{1}{4}$	160.00	Navajo Allotted Contract No. 14-20-603-324 11-12-53 H.B.P.	Ah Ni Na Pah A/K/A Salena White (059288) 12 $\frac{3}{4}$ %	None Amerada Petroleum Corporation - ALL
21	<u>T25N, R12W</u> Sec. 8: SE $\frac{1}{4}$	160.00	Navajo Allotted Contract No. 14-20-603-325 11-12-53 H.B.P.	Na Des Pah or Nah Des Pah Lease Allotment No. 011673 12 $\frac{3}{4}$ %	None Amerada Petroleum Corporation - ALL
22	<u>T25N, R12W</u> Sec. 9: SW $\frac{1}{4}$	160.00	Navajo Allotted Contract No. 14-20-603-326 11-12-53 H.B.P.	I Ni Pah A/K/A Joan White A/K/A Mrs. Joan Harrison (059287) - 12 $\frac{3}{4}$ %	None Amerada Petroleum Corporation - ALL

REVISED EXHIBIT "B" (Continued)

23	<u>T26N, R12W</u> Sec. 33: S $\frac{1}{2}$ SW $\frac{1}{4}$	80.00	Navajo Allotted Contract No. 14-20-603-327 12-10-53	Na Pah(John) A/K/A William L. Benally (059292) 12 $\frac{1}{2}$ %	None	Amerada Petroleum Corporation - All
----	--	-------	---	--	------	--

13 Tracts Indian Allotted Land Containing 1999.84 acres or 26.49335% of Unit Area

CENTRAL BISTT LOWER GALLUP SAND UNIT AREA

TOTALS:

7 Federal Tracts	4468.62 acres	59.19910%
5 State of New Mexico Tracts	1080.00 acres	14.30755%
13 Tracts Indian Allotted Land	1999.84 acres	26.49335%
	<u>7548.46 acres</u>	<u>100.00000%</u>

SECOND REVISED EXHIBIT C
(August 12, 1959)
SCHEDULE OF TRACT PERCENTAGE PARTICIPATION
CENTRAL BISTI LOWER GALLUP SAND UNIT
SAN JUAN COUNTY, NEW MEXICO

<u>Tract Number</u>	<u>Description</u>	<u>Serial No. and Date of Lease or Application</u>	<u>Percentage Participation</u>
<u>Federal Lands</u>			
1	T-26N, R-12W: Sec. 31; Lot 4, S $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$	SF-078056 2-1-48 H.B.P.	41.76861
	T-25N, R-12W: Sec. 5; Lots 3 and 4, S $\frac{1}{2}$ NW $\frac{1}{4}$ Sec. 6; (all) Lots 1, 2, 3, 4, 5, 6 & 7, SE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ Sec. 7; Lots 1, 2, E $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$ Sec. 8; N $\frac{1}{2}$		
2	T-25N, R-12W: Sec. 17; N $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$	SF-078058 2-1-48 H.B.P.	2.09137
3	T-25N, R-12W: Sec. 21; N $\frac{1}{2}$ NE $\frac{1}{4}$	SF-078065 2-1-48 H.B.P.	0.55787
4	T-25N, R-12W: Sec. 9; N $\frac{1}{2}$	NM-036254-A 2-1-48 H.B.P.	10.40892
24	T-25N, R-12W: Sec. 10; W $\frac{1}{2}$ SW $\frac{1}{4}$ Sec. 15; W $\frac{1}{2}$ NW $\frac{1}{4}$	NM-036254-A 2-1-48 H.B.P.	4.04359
<u>State Lands</u>			
7	T-25N, R-12W: Sec. 16; All	E-6597-2 H.B.P.	6.67053

File

Case # 1666

SUNRAY MID-CONTINENT OIL COMPANY
MAIN OFFICE OCC

P. O. BOX 2039

TULSA 2, OKLAHOMA

1959 AUG 3 AM 8:14

July 28, 1959

The Director
United States Geological Survey
Department of the Interior
Washington 25, D. C.

The Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

Through Mr. John Anderson
Regional Supervisor
U.S. Geological Survey
Roswell, New Mexico

The New Mexico Oil Conservation
Commission
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

Re: Unit Agreement for the Development and Operation
of the Central Bisti Lower Gallup Sand Unit Area,
San Juan County, New Mexico

Gentlemen:

On June 18, 1959, the Commissioner of Public Lands of the State of New Mexico approved the captioned Agreement. On June 22, 1959, said Agreement was approved by the Acting Assistant Area Director, Gallup Area Office, Bureau of Indian Affairs, and on June 26, 1959, said Agreement was approved by the Acting Director U.S. Geological Survey. Accordingly, the Central Bisti Lower Gallup Sand Unit became effective on July 1, 1959.

Section 11 of said Agreement provides that in the event less than all the tracts within the initial participating area are committed hereto as of the effective date of this Agreement, the Unit Operator shall file with the Supervisor, Commissioner and Commission, a schedule of those tracts within the initial participating area committed hereto as of the effective date of said unit, which schedule shall be designated Revised Exhibit "C".

The Working Interest Owners under Tract 10 on Exhibit "C" of said Agreement, being the S $\frac{1}{2}$ of SW $\frac{1}{4}$ of Section 32, T26N, R12W, did not join in the execution of said Agreement and therefore, Tract 10 was not committed to said Agreement. We are, therefore, enclosing herewith 8 copies of said Revised Exhibit "C" for the Supervisor and 2 copies each of said Revised Exhibit "C" for the Commissioner and the Commission. We are also enclosing the same number of copies of a detailed Calculation of Tract Participation which excludes Tract 10 from participation.



July 28, 1959

Under the provisions of Section 11 of the Unit Agreement, the Revised Exhibit "C" transmitted herewith shall supersede effective July 1, 1959, the percentage participations set forth in the original Exhibit "C" attached to said Unit Agreement unless disapproved by the Director, Commissioner or the Commission within 30 days after filing.

Very truly yours,

SUNRAY MID-CONTINENT OIL COMPANY



M. B. Penn

DGP/jv

Enc.

cc: Mr. J. C. Blackwood
Amerada Petroleum Corporation
P.O. Box 2040
Tulsa 2, Oklahoma

Mr. H. Arthur Nedom (Alternate)
Amerada Petroleum Corporation
P.O. Box 2040
Tulsa 2, Oklahoma

Mr. W. T. Hollis
El Paso Natural Gas Products Co.
P.O. Box 1161
El Paso, Texas

Mr. R. L. Hamblin (Alternate)
El Paso Natural Gas Products Co.
P.O. Box 1161
El Paso, Texas

Mr. Lawrence E. Brock
Pan American Petroleum Corp.
P.O. Box 1110
Ft. Worth 1, Texas

Mr. L. O. Speer (Alternate)
Pan American Petroleum Corp.
P.O. Box 487
Farmington, New Mexico

Mr. Jack Turner
Phillips Petroleum Company
Phillips Building
Bartlesville, Oklahoma

Mr. C. M. Boles (Alternate)
Phillips Petroleum Company
P.O. Box 548
Cortez, Colorado

Mr. A. M. Wiederkehr
Southern Union Gas Company
1001 Burt Building
Dallas, Texas

Mr. Paul J. Clote (Alternate)
Southern Union Gas Company
1001 Burt Building
Dallas, Texas

Mr. R. R. Robison
Shell Oil Company
705 West Municipal Drive
Farmington, New Mexico

REVISED EXHIBIT C
(JULY 1, 1959)
SCHEDULE OF TRACT PERCENTAGE PARTICIPATION
CENTRAL BISTI LOWER GALLUP SAND UNIT
SAN JUAN COUNTY, NEW MEXICO

<u>TRACT NUMBER</u>	<u>DESCRIPTION</u>	<u>SERIAL NO. AND DATE OF LEASE OR APPLICATION</u>	<u>PERCENTAGE PARTICIPATION</u>
<u>FEDERAL LANDS</u>			
1	T-26N, R-12W: SEC. 31, LOT 4, S $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$	SF-078056 2-1-48 H.B.P.	43.52343
	T-25N, R-12W: SEC. 5, LOTS 3 AND 4, S $\frac{1}{2}$ NW $\frac{1}{4}$ SEC. 6, (ALL) LOTS 1, 2, 3, 4, 5, 6 & 7, SE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SEC. 7, LOTS 1, 2, E $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$ SEC. 8, N $\frac{1}{2}$		
2	T-25N, R-12W: SEC. 17, N $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$	SF-078058 2-1-48 H.B.P.	2.17396
3	T-25N, R-12W: SEC. 21, N $\frac{1}{2}$ NE $\frac{1}{4}$	SF-078065 2-1-48 H.B.P.	0.57997
4	T-25N, R-12W: SEC. 9, N $\frac{1}{2}$	NM-036254 2-1-48 H.B.P.	10.84145
<u>STATE LANDS</u>			
7	T-25N, R-12W: SEC. 16, ALL	E-6597-2 H.B.P.	6.94914

<u>TRACT NUMBER</u>	<u>DESCRIPTION</u>	<u>NAVAJO ALLOTTED CONTRACT NO. AND DATE</u>	<u>PERCENTAGE PARTICIPATION</u>
<u>INDIAN ALLOTTED LANDS</u>			
11	T-25N, R-12W: SEC. 5; SW $\frac{1}{4}$	14-20-603-1292 H.B.P.	4.74659
12	T-25N, R-12W: SEC. 9; SE $\frac{1}{4}$	14-20-603-1228 H.B.P.	4.63473
13	T-25N, R-12W: SEC. 5; S $\frac{1}{2}$ NE $\frac{1}{4}$	14-20-603-1448 H.B.P.	0.84498
14	T-25N, R-12W: SEC. 3; SW $\frac{1}{4}$	14-20-603-1423 H.B.P.	0.93982
15	T-25N, R-12W: SEC. 4; SE $\frac{1}{4}$	14-20-603-1424 H.B.P.	2.19209
16	T-25N, R-12W: SEC. 10; NW $\frac{1}{4}$	14-20-603-1449 H.B.P.	3.92131
18	T-25N, R-12W: SEC. 4; SW $\frac{1}{4}$	14-20-603-321 10-7-53 H.B.P.	3.43283 *
19	T-25N, R-12W: SEC. 5; SE $\frac{1}{4}$	14-20-603-323 10-7-53 H.B.P.	4.37880
20	T-25N, R-12W: SEC. 8; SW $\frac{1}{4}$	14-20-603-324 10-7-53 H.B.P.	1.96196
21	T-25N, R-12W: SEC. 8; SE $\frac{1}{4}$	14-20-603-325 10-7-53 H.B.P.	4.11464
22	T-25N, R-12W: SEC. 9; SW $\frac{1}{4}$	14-20-603-326 H.B.P.	4.76430
TOTAL			100.00000

* BY AGREEMENT THE AMERADA KA-DA-PAH #1 WELL, SITUATED ON TRACT 18 WAS CREDITED WITH THE MAXIMUM PRODUCTION FACTOR IN COMPUTING "TOTAL TRACT OIL PRODUCTION DURING BASE PERIOD" WITH RESPECT TO TRACT 18 IN CONTEMPLATION OF THE USE OF SAID WELL AS AN INJECTION WELL.

REVISED EXHIBIT C
(JULY 1, 1959)
SCHEDULE OF TRACT PERCENTAGE PARTICIPATION
CENTRAL BISTI LOWER GALLUP SAND UNIT
SAN JUAN COUNTY, NEW MEXICO

<u>TRACT NUMBER</u>	<u>DESCRIPTION</u>	<u>SERIAL NO. AND DATE OF LEASE OR APPLICATION</u>	<u>PERCENTAGE PARTICIPATION</u>
<u>FEDERAL LANDS</u>			
1	T-26N, R-12W: SEC. 31; LOT 4, S $\frac{1}{2}$ SE $\frac{1}{4}$, SE $\frac{1}{4}$ SW $\frac{1}{4}$	SF-078056 2-1-48 H.B.P.	43.52343
	T-25N, R-12W: SEC. 5; LOTS 3 AND 4, S $\frac{1}{2}$ NW $\frac{1}{4}$ SEC. 6; (ALL) LOTS 1, 2, 3, 4, 5, 6 & 7, SE $\frac{1}{4}$ NW $\frac{1}{4}$, S $\frac{1}{2}$ NE $\frac{1}{4}$, E $\frac{1}{2}$ SW $\frac{1}{4}$, SE $\frac{1}{4}$ SEC. 7; LOTS 1, 2, E $\frac{1}{2}$ NW $\frac{1}{4}$ NE $\frac{1}{4}$, N $\frac{1}{2}$ SE $\frac{1}{4}$ SEC. 8; N $\frac{1}{2}$		
2	T-25N, R-12W: SEC. 17; N $\frac{1}{2}$ NW $\frac{1}{4}$, N $\frac{1}{2}$ NE $\frac{1}{4}$, SE $\frac{1}{4}$ NE $\frac{1}{4}$, NE $\frac{1}{4}$ SE $\frac{1}{4}$	SF-078058 2-1-48 H.B.P.	2.17396
3	T-25N, R-12W: SEC. 21; N $\frac{1}{2}$ NE $\frac{1}{4}$	SF-078065 2-1-48 H.B.P.	0.57997
4	T-25N, R-12W: SEC. 9; N $\frac{1}{2}$	NM-036254 2-1-48 H.B.P.	10.84145
<u>STATE LANDS</u>			
7	T-25N, R-12W: SEC. 16; ALL	E-6597-2 H.B.P.	6.94914

<u>TRACT NUMBER</u>	<u>DESCRIPTION</u>	<u>NAVAJO ALLOTTED CONTRACT NO. AND DATE</u>	<u>PERCENTAGE PARTICIPATION</u>
<u>INDIAN ALLOTTED LANDS</u>			
11	T-25N, R-12W: SEC. 5; SW $\frac{1}{4}$	14-20-603-1292 H.B.P.	4.74659
12	T-25N, R-12W: SEC. 9; SE $\frac{1}{4}$	14-20-603-1228 H.B.P.	4.63473
13	T-25N, R-12W: SEC. 5; S $\frac{1}{2}$ NE $\frac{1}{4}$	14-20-603-1448 H.B.P.	0.84498
14	T-25N, R-12W: SEC. 3; SW $\frac{1}{4}$	14-20-603-1423 H.B.P.	0.93982
15	T-25N, R-12W: SEC. 4; SE $\frac{1}{4}$	14-20-603-1424 H.B.P.	2.19209
16	T-25N, R-12W: SEC. 10; NW $\frac{1}{4}$	14-20-603-1449 H.B.P.	3.92131
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19	T-25N, R-12W: SEC. 5; SE $\frac{1}{4}$	14-20-603-323 10-7-53 H.B.P.	4.37880
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21	T-25N, R-12W: SEC. 8; SE $\frac{1}{4}$	14-20-603-325 10-7-53 H.B.P.	4.11464
22	T-25N, R-12W: SEC. 9; SW $\frac{1}{4}$	14-20-603-326 H.B.P.	4.76430
TOTAL			100.00000

* BY AGREEMENT THE AMERADA KA-DA-PAH #1 WELL, SITUATED ON TRACT 18 WAS CREDITED WITH THE MAXIMUM PRODUCTION FACTOR IN COMPUTING "TOTAL TRACT OIL PRODUCTION DURING BASE PERIOD" WITH RESPECT TO TRACT 18 IN CONTEMPLATION OF THE USE OF SAID WELL AS AN INJECTION WELL.

CALCULATION OF TRACT PARTICIPATION
 (EXCLUDING THE REESE HICKMAN LEASE)
 CENTRAL BISTI LOWER GALLUP SAND UNIT
 SAN JUAN COUNTY, NEW MEXICO

Operator	Lse	NL Oil in Place		SP Oil in Place		Current Oil prod.		* Formula	Operator	Lse
		Bbls.	Fraction	Bbls.	Fraction	Bbls.	Fraction			
AMRD	18	1,144,631	0.0301411	2,222,424	0.0359643	12,908	0.0368794	0.0343283	AMRD	18
AMRD	19	1,416,037	0.0372880	2,587,446	0.0418711	18,272	0.0522048	0.0437880	AMRD	19
AMRD	20	345,092	0.0090872	2,104,778	0.0340605	5,499	0.0157112	0.0196196	AMRD	20
AMRD	21	1,333,130	0.0351048	2,232,639	0.0361296	18,272	0.0522048	0.0411464	AMRD	21
AMRD	22	1,741,952	0.0458702	2,771,765	0.0448539	18,272	0.0522048	0.0476430	AMRD	22
		5,980,042*	0.1574913*	11,919,052*	0.1928794*	73,223*	0.2092050*	0.1865253*		
LPAS	7	2,199,770	0.0579257	6,039,752	0.0977380	18,484	0.0528105	0.0694914	LPAS	7
LPAS	13	207,931	0.0054754	796,263	0.0128855	2,446	0.0069885	0.0084498	LPAS	13
		2,407,701*	0.0634011*	6,836,015*	0.1106235*	20,930*	0.0597990*	0.0779412*		
PHIL	11	1,864,817	0.0491055	2,539,014	0.0410875	18,272	0.0522048	0.0474659	PHIL	11
PHIL	12	2,171,346	0.0571772	2,958,030	0.0478682	11,399	0.0339966	0.0463473	PHIL	12
		4,036,163*	0.1062827*	5,497,044*	0.0889557*	30,171*	0.0862014*	0.0938132*		
PNAM	14	105,274	0.0027721	1,194,585	0.0193313	2,132	0.0060913	0.0093982	PNAM	14
PNAM	15	600,294	0.0158073	1,693,457	0.0274043	7,893	0.0225510	0.0219209	PNAM	15
		705,568*	0.0185794*	2,888,042*	0.0467356*	10,025*	0.0286423*	0.0313191*		
SHEL	3	220,774	0.0058136	612,823	0.0099170	584	0.0016685	0.0057997	SHEL	3
SHEL	4	4,762,461	0.1255661	5,887,105	0.0952677	36,544	0.1044096	0.1084145	SHEL	4
		4,989,235*	0.1313797*	6,499,928*	0.1051847*	37,128*	0.1060781*	0.1142142*		
SNRY	1	17,977,471	0.4733940	23,588,839	0.3817252	157,707	0.4505837	0.4352343	SNRY	1
SNRY	2	911,750	0.0240088	2,096,362	0.0339243	2,550	0.0072857	0.0217396	SNRY	2
		18,889,221*	0.4974028*	25,685,201*	0.4156495*	160,257*	0.4578694*	0.4569739*		
SOUN	16	966,977	0.0254630	2,470,058	0.0399716	18,272	0.0522048	0.0392131	SOUN	16
		966,977*	0.0254630*	2,470,058*	0.0399716*	18,272*	0.0522048*	0.0392131*		
BIST		37,975,707	1.0000000	61,795,340	1.0000000	350,006	1.0000000	1.0000000	BIST	
		37,975,707*	1.0000000*	61,795,340*	1.0000000*	350,006*	1.0000000*	1.0000000*		

* 1/3 NL oil in place + 1/3 SP oil in place + 1/3 current oil production.

CALCULATION OF TRACT PARTICIPATION
(EXCLUDING THE REESE HICKMAN LEASE)
CENTRAL BISTI LOWER GALLUP SAND UNIT
SAN JUAN COUNTY, NEW MEXICO

Operator	Lse	ML Oil in Place		SP Oil in Place		Current Oil prod.		* Formula	Operator	Lse
		Bbls.	Fraction	Bbls.	Fraction	Bbls.	Fraction			
AMRD	18	1,144,631	0.0301411	2,222,424	0.0359643	12,908	0.0368794	0.0343283	AMRD	18
AMRD	19	1,416,037	0.0372880	2,587,446	0.0418711	18,272	0.0522048	0.0437880	AMRD	19
AMRD	20	345,092	0.0090872	2,104,778	0.0340605	5,499	0.0157112	0.0196196	AMRD	20
AMRD	21	1,333,130	0.0351048	2,232,639	0.0361296	18,272	0.0522048	0.0411464	AMRD	21
AMRD	22	1,741,952	0.0458702	2,771,765	0.0448539	18,272	0.0522048	0.0476430	AMRD	22
		5,980,342*	0.1574913*	11,919,052*	0.1928794*	73,223*	0.2092050*	0.1865253*		
LPAS	7	2,199,770	0.0579257	6,039,752	0.0977380	18,484	0.0528105	0.0694914	LPAS	7
LPAS	13	207,931	0.0054754	796,263	0.0128855	2,446	0.0069885	0.0084498	LPAS	13
		2,407,701*	0.0634011*	6,836,015*	0.1106235*	20,930*	0.0597990*	0.0779412*		
PHIL	11	1,864,817	0.0491055	2,539,014	0.0410875	18,272	0.0522048	0.0474659	PHIL	11
PHIL	12	2,171,346	0.0571772	2,958,030	0.0478682	11,399	0.0339966	0.0463473	PHIL	12
		4,036,163*	0.1062827*	5,497,044*	0.0889557*	30,171*	0.0862014*	0.0938132*		
PNAM	14	105,274	0.0027721	1,194,585	0.0193313	2,132	0.0060913	0.0093982	PNAM	14
PNAM	15	600,294	0.0158073	1,693,457	0.0274043	7,893	0.0225510	0.0219209	PNAM	15
		705,568*	0.0185794*	2,888,042*	0.0467356*	10,025*	0.0286423*	0.0313191*		
SHEL	3	220,774	0.0058136	612,823	0.0099170	584	0.0016685	0.0057997	SHEL	3
SHEL	4	4,762,461	0.1255661	5,887,105	0.0952677	36,544	0.1044096	0.1084145	SHEL	4
		4,989,235*	0.1313797*	6,499,928*	0.1051847*	37,128*	0.1060781*	0.1142142*		
SNRY	1	17,977,471	0.4733940	23,588,339	0.3817252	157,707	0.4505837	0.4352343	SNRY	1
SNRY	2	911,750	0.0240088	2,096,362	0.0339243	2,550	0.0072857	0.0217396	SNRY	2
		18,889,221*	0.4974028*	25,685,201*	0.4156495*	160,257*	0.4578694*	0.4569739*		
SOUN	16	966,977	0.0254630	2,470,058	0.0399716	18,272	0.0522048	0.0392131	SOUN	16
		966,977*	0.0254630*	2,470,058*	0.0399716*	18,272*	0.0522048*	0.0392131*		
3IST		37,975,707	1.0000000	61,795,340	1.0000000	350,006	1.0000000	1.0000000	3IST	
		37,975,707*	1.0000000*	61,795,340*	1.0000000*	350,006*	1.0000000*	1.0000000*		

* 1/3 ML oil in place + 1/3 SP oil in place + 1/3 current oil production.

SUNRAY MID-CONTINENT OIL COMPANY

MAIN OFFICE OCC

P. O. BOX 2039

TULSA 2, OKLAHOMA

1959 JUL 23 PM 1:13
CERTIFIED MAIL

JULY 20, 1959

OIL CONSERVATION COMMISSION OF THE
STATE OF NEW MEXICO
125 MABRY HALL
CAPITAL BUILDING
SANTA FE, NEW MEXICO

RE: CENTRAL BISTI LOWER GALLUP
SAND UNIT AREA, SAN JUAN
COUNTY, NEW MEXICO

GENTLEMEN:

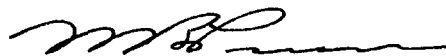
ORDER NO. R-1428, KNOWN AS THE CENTRAL BISTI LOWER GALLUP SAND AGREEMENT ORDER, PROVIDES THAT UNIT OPERATOR SHALL FILE WITH THE COMMISSION AN EXECUTED ORIGINAL OR EXECUTED COUNTERPART OF THE CENTRAL BISTI LOWER GALLUP SAND UNIT AGREEMENT WITHIN 30 DAYS AFTER EFFECTIVE DATE THEREOF. WE TRANSMIT HERewith FOR YOUR FILE AN ORIGINAL EXECUTION COPY OF THE AGREEMENT. THE EFFECTIVE DATE OF THIS UNIT WAS JULY 1, 1959.

WE ALSO WISH TO CALL YOUR ATTENTION TO THE FACT THAT ON OR ABOUT JUNE 24, OUR REPRESENTATIVES WHILE IN SANTA FE DELIVERED TO THE COMMISSION OFFICES A COPY OF "PLAN OF DEVELOPMENT FOR THE FIRST YEAR FROM THE EFFECTIVE DATE OF UNITIZATION". THE PLAN WAS SUBMITTED IN COMPLIANCE WITH SECTION 10 OF THE UNIT AGREEMENT AND WE SHALL APPRECIATE HAVING YOUR APPROVAL.

WE HAVE RECEIVED THE APPROVAL OF THE SUPERVISOR OF THE U.S.G.S.

YOURS VERY TRULY,

SUNRAY MID-CONTINENT OIL COMPANY



M. B. PENN

MBP AJ
ENCL.



MAIN OFFICE OCC

1959 JUN 15 AM 8:22

In reply refer to:
Unit Division

June 24, 1959

C
O
P
Y

Sunray Mid-Continent Oil Company
Post Office Box 2039
Tulsa 2, Oklahoma

Re: Central Bisti Lower Gallup
Sand Unit Agreement
San Juan County, New Mexico

Gentlemen:

The Commissioner of Public Lands approved the Central Bisti Lower Gallup Sand Unit Agreement June 18, 1959 and we hand to Sunray Mid-Continent's Representative, twelve certificates of approval. Although, we do not approve unit agreements prior to the Oil Conservation Commission hearing, the Commissioner approved this agreement due to the urgency of this project.

There is a fee of \$80.00 due for the filing and processing of this agreement.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
Ted Bilberry, Supervisor
Oil and Gas Division

MEM/MMR/m
cc:

OCC- Santa Fe ✓
USGS- Roswell

MAIN OFFICE OCC

1959 JUN 24 PM 1:12 P. O. Box 6721
Roswell, New Mexico

June 23, 1959

Sunray Mid-Continent Oil Company
P. O. Box 2039
Tulsa 2, Oklahoma

Attention: Mr. R. W. Griffith

Gentlemen:

Your initial plan of development dated June 11, 1959, covering the first year of operations under the Central Bisti Lower Gallup Sand unit agreement, San Juan County, New Mexico has been approved on this date. Such approval is subject to like approval by the appropriate officials of the State of New Mexico and to final approval of the unit agreement by the Director.

Three approved copies of the plan are enclosed.

Very truly yours,

JOHN A. ANDERSON
Regional Oil and Gas Supervisor

Enclosures

Copy to: Washington (w/cy of plan)
Farmington (w/cy of plan)
NMOCC - letter only ✓
Comm. Pub. Lands - letter only

MAIN OFFICE OSC

1959 JUN 23 PM 1 14 Box 6721
Roswell, New Mexico

June 23, 1959

Sunray Mid-Continent Oil Company
P. O. Box 2039
Tulsa 2, Oklahoma

Attention: Mr. R. W. Griffith

Gentlemen:

Your initial plan of development dated June 11, 1959, covering the first year of operations under the Central Bisti Lower Gallup Sand unit agreement, San Juan County, New Mexico has been approved on this date. Such approval is subject to like approval by the appropriate officials of the State of New Mexico and to final approval of the unit agreement by the Director.

Three approved copies of the plan are enclosed.

Very truly yours,

JOHN A. ANDERSON
Regional Oil and Gas Supervisor

Enclosures

Copy to: Washington (w/cy of plan)
Farmington (w/cy of plan)
NMOCC - letter only ✓
Comm. Pub. Lands - letter only

March 24, 1959

Sunray Mid-Continent Oil Company
Post Office Box 2039
Tulsa 2, Oklahoma

Re: Unit Agreement-Central
Bisti Lower Gallup Sand Unit
Area, San Juan County

Gentlemen:

With reference to the conference held in the office of the Commissioner on this date, wherein your company was represented by Messrs. Griffith, Penn, Proctor, and Loar and this office was represented by Commissioner Morgan, Mrs. Marian M. Rhea and myself, this letter will serve to confirm unit agreement changes agreed upon in addition to those suggested by the United States Geological Survey at an earlier date.

Those changes are briefly as follows:

1. That the SE/4NE/4, Section 32, Township 26-North, Range 12-West, being State land, remain subject to the unit agreement.
2. That the word 'or' be deleted from lines three and seven on page 5.
3. That provision be made on page 11 for the Commissioner's approval of the Plan of Development and operation.
4. That provision be made on page 22 for the Commissioner to approve plans and formulas for royalty free with-drawing of injected gas.

Sunray Mid-Continent Oil Company
Post Office Box 2039
Tulsa 2, Oklahoma

3-24-59
Page (2.)

5. That on page 26 the standard modified segregation clause be inserted with regard to state leases.

Very truly yours,
MURRAY E. MORGAN
Commissioner of Public Lands

BY:
William O. Jordan, General
Counsel

MEM/WQJ/m
cc:

OCC- Santa Fe

Sunray Mid-Continent
Oil Company
Tulsa 2, Oklahoma

C

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<u>Tract Number</u>	<u>Description</u>	<u>Navajo Allotted Contract No. and Date</u>	<u>Percentage Participation</u>
<u>Indian Allotted Lands</u>			
11	T-25N, R-12W: Sec. 5; SW $\frac{1}{4}$	14-20-603-1292 H.B.P.	4.55355
12	T-25N, R-12W: Sec. 9; SE $\frac{1}{4}$	14-20-603-1228 H.B.P.	4.45422
13	T-25N, R-12W: Sec. 5; S $\frac{1}{2}$ NE $\frac{1}{4}$	14-20-603-1448 H.B.P.	0.81050
14	T-25N, R-12W: Sec. 3; SW $\frac{1}{4}$	14-20-603-1423 H.B.P.	0.90115
15	T-25N, R-12W: Sec. 4; SE $\frac{1}{4}$	14-20-603-1424 H.B.P.	2.10163
16	T-25N, R-12W: Sec. 10; NW $\frac{1}{4}$	14-20-603-1449 H.B.P.	3.75487
18	T-25N, R-12W: Sec. 4; SW $\frac{1}{4}$	14-20-603-321 11-12-53 H.B.P.	3.29207*
19	T-25N, R-12W: Sec. 5; SE $\frac{1}{4}$	14-20-603-323 11-12-53 H.B.P.	4.19727
20	T-25N, R-12W: Sec. 8; SW $\frac{1}{4}$	14-20-603-324 11-12-53 H.B.P.	1.88111
21	T-25N, R-12W: Sec. 8; SE $\frac{1}{4}$	14-20-603-325 11-12-53 H.B.P.	3.94305
22	T-25N, R-12W: Sec. 9; SW $\frac{1}{4}$	14-20-603-326 11-12-53 H.B.P.	4.56969
TOTAL			100.00000

* By agreement the Amerada Ka-da-pah #1 well, situated on Tract 18 was credited with the maximum production factor in computing "total tract oil production during base period" with respect to Tract 18 in contemplation of the use of said well as an injection well.

OIL CONSERVATION COMMISSION

P. O. BOX 871

SANTA FE, NEW MEXICO

June 29, 1959

**Mr. Charlie White
Box 787
Santa Fe, New Mexico**

Dear Mr. White:

On behalf of your client, Sunray Mid-Continent Oil Company, we enclose two copies of Order No. R-1428 issued June 26, 1959 by the Oil Conservation Commission in Case No. 1666.

Very truly yours,

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

ir

Enclosures

C
O
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Y

SUNRAY MID-CONTINENT OIL COMPANY

P. O. BOX 2039

TULSA 2, OKLAHOMA

LEGAL DEPARTMENT

April 8, 1959

The Director
United States Geological Survey
Department of the Interior
Washington 25, D. C.

Through Mr. John Anderson, Supervisor
United States Geological Survey
Roswell, New Mexico

Re: Proposed Central Bisti Lower Gallup
Sand Unit, San Juan County, New Mexico

Dear Sir:

Reference is made to our previous letters of January 21 and February 16 relative to the subject unit. We are now transmitting herewith form of Unit Agreement for the development and operation of the Central Bisti Lower Gallup Sand Unit Area, which has been revised to conform with changes developed in conference between representatives of this company and representatives of the Conservation Division of the Geological Survey in Washington, D. C. on March 16 to March 19, 1959 as outlined in your letter dated March 19th addressed to this company.

Since Indian Allotted lands and State lands are included in the proposed Unit Area, we have also conferred with the Area Director and members of the Area Realty staff at Gallup, New Mexico and with the Commissioner of Public Lands of the State of New Mexico and members of his staff at Santa Fe, New Mexico relative to the Unit and the proposed Unit Agreement with particular reference to changes made pursuant to our earlier conference with representatives of your Department above mentioned. In this connection, we are enclosing photostats of letters written by the Area Director and by the Commissioner of Public Lands evidencing concurrence with the changes now incorporated in the form of Unit Agreement submitted herewith. The only additional changes made are those suggested by the State as outlined in the enclosed letter dated March 24th which changes pertain exclusively to State lands.

The Central Bisti Lower Gallup Sand Unit Area as proposed embraces a total of 7388.46 acres of which 4308.62 acres or 58.3155 per cent are Federal lands, 1080 acres or 14.6174 per cent are State of New Mexico lands, and 1999.84 acres or 27.0671 per cent are Allotted Indian lands.



D-X SUNRAY OIL COMPANY IS A WHOLLY-OWNED REFINING & MARKETING SUBSIDIARY

April 7, 1959

Exhibit "A" attached to the form of Unit Agreement is a map outlining the area sought to be designated and approved for unitization and for the initial Lower Gallup Sand Participating Area, and on which the Federal, State and Indian lands are indicated by distinctive symbols, and the Federal oil and gas leases are identified by lease serial numbers. A schedule showing the acreage, percentage, and kind of ownership of oil and gas interests in all lands in the Unit Area, to the extent known to your applicant, is furnished by Exhibit "B" attached to said Unit Agreement.

Deviations from the June 1957 reprint of the standard form are underlined or lined on the side in red for convenience and in conformity with regulations.

It is respectfully requested that you designate the Unit Area and the initial Participating Area and approve the objective, formula for participation, and the form of the Unit Agreement transmitted herewith.

Respectfully submitted,

SUNRAY MID-CONTINENT OIL COMPANY

By 
Attorney

NEP/s

Enclosures

cc: The Commissioner of Public Lands
State Land Office
Capitol Building
Santa Fe, New Mexico

Enclosures

✓ cc: New Mexico Oil Conservation Commission
125 Mabry Hall
Capitol Building
Santa Fe, New Mexico

Enclosures