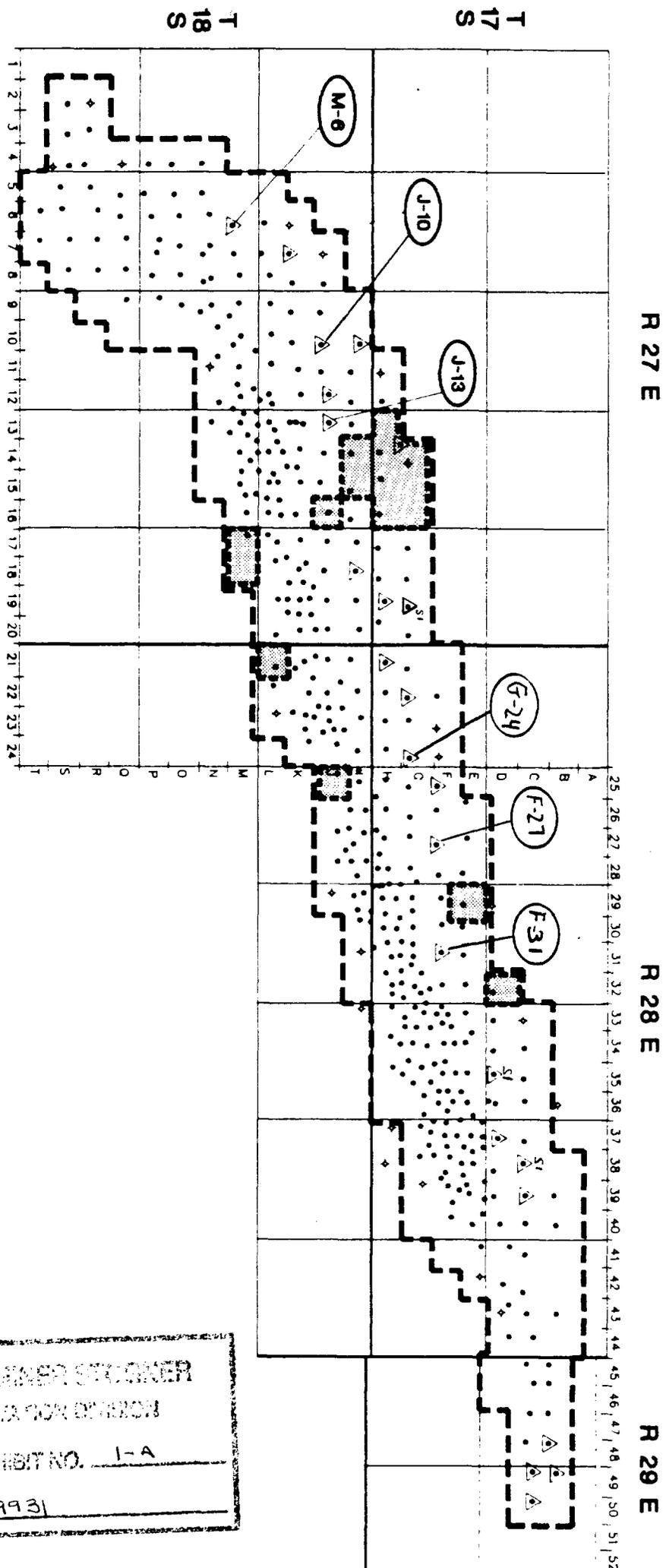


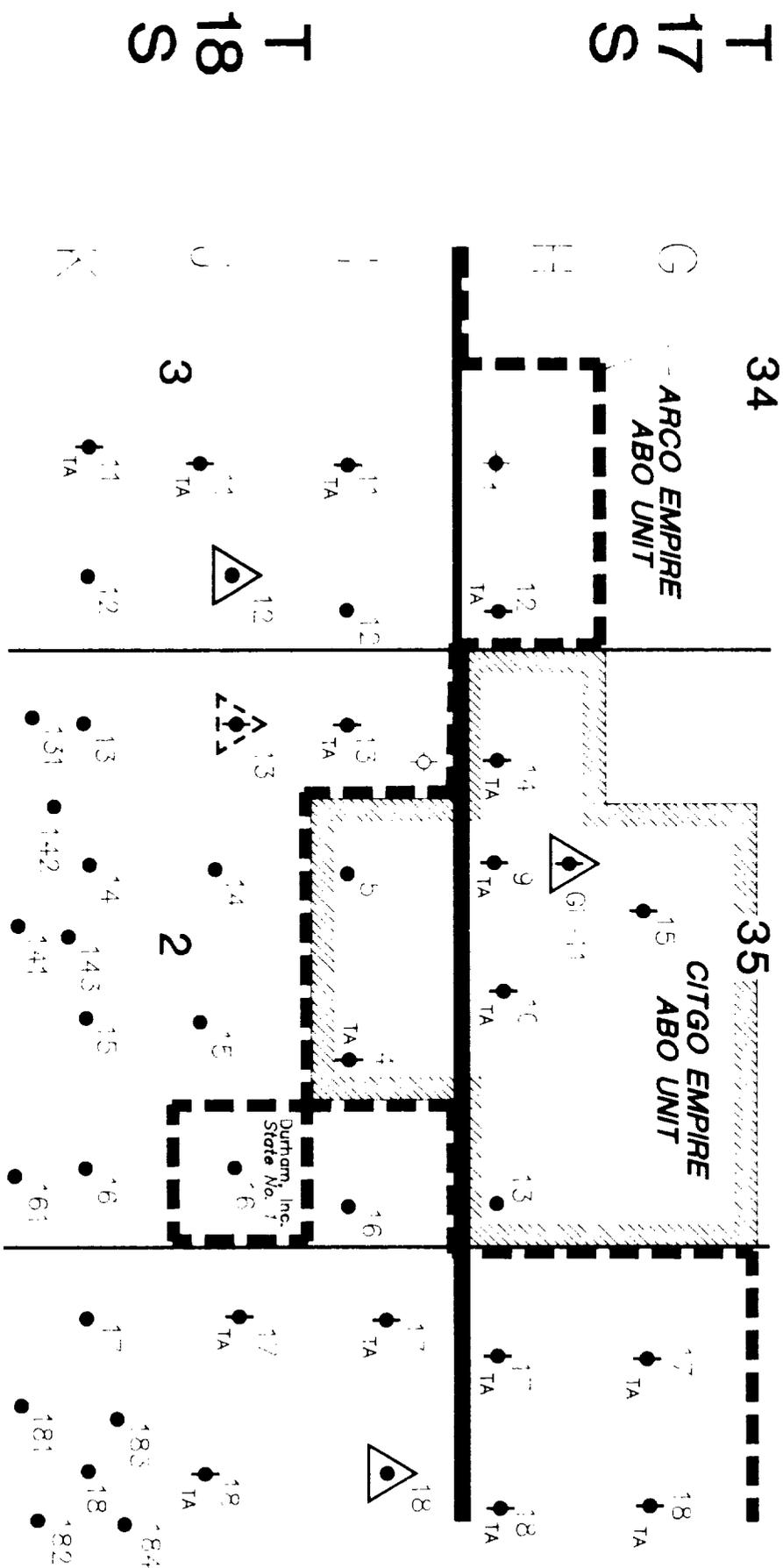
EMPIRE ABO UNIT

Eddy County, New Mexico



BEFORE EXAMINER SIGNATURE	
CL. CONSULT A FOR EXHIBIT	
ARCO	EXHIBIT NO. 1-A
CASE NO.	9931

R 27 E



BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
Arco EXHIBIT NO. 1-B
CASE NO. 9931

LEGEND

- PLUGGED ABANDONED
- INACTIVE GAS INJECTOR
- PROPOSED GAS INJECTOR
- GAS INJECTOR
- PRODUCER
- TEMPORARY ABANDONED

ARCO Oil and Gas Company
 Division of AtlanticRichfieldCompany
 Central District Midland, Texas

EMPIRE ABO FIELD

Eddy Co., New Mexico

Well Status

Scale 1"=1500'
 By: G. SMALLWOOD
 Date: 4/90

Drawn By: LGA Date: 4/90
 Revised By: P.M. Date: 4/90
 Dept: NW ENGR. CITGOULT

EMPIRE-ABO POOL
(Pressure Maintenance)
Eddy County, New Mexico

Order No. R-4549, Authorizing Atlantic Richfield Company to Institute a Pressure Maintenance Project in the Empire-Abo Pool, Eddy County, New Mexico, June 15, 1973, as Amended by Order No. R-4549-A, January 1, 1974, Order No. R-4549-B, April 30, 1974, Order No. R-4549-C, July 1, 1975, Order No. R-4549-D, November 17, 1975, Order No. R-4549-E, January 28, 1980, and Order No. R-4549-F, April 20, 1984.

Order No. R-4549-A, January 1, 1974, extends the project area to include 200.13 acres and increases project allowable to 33,000 barrels per day.

Order No. R-4549-F, April 20, 1984, rescinds Rules 3, 4, 4(A), 5, 6, 7, 8, 9, 10, 11, 12, and 13, adopted by Order No. R-4549, and amended by Orders Nos. R-4549-B through R-4549-E, providing for well allowables based upon reservoir voidage; adopts new Rules 3, 4, 5, and 6; and, redesignates Rules 14A through 14D as Rules 7A through 7D and Rule 15 as Rule 8.

Application of Atlantic Richfield Company for a Pressure Maintenance Project, Eddy County, New Mexico.

CASE NO. 4953
Order No. R-4549

ORDER OF THE COMMISSION

BY THE COMMISSION: This cause came on for hearing at 9 a.m. on April 25, 1973, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 15th day of June, 1973, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Atlantic Richfield Company, seeks authority to institute a pressure maintenance project in the Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New Mexico, by initially limiting reservoir voidage, and within one year by reinjection of approximately 70 per cent of the produced gas, as plant residue gas, into the Abo formation through eight wells in Section 36, Township 17 South, Range 27 East, Sections 3, 4, and 9, Township 18 South, Range 27 East, and Sections 26, 31, 32, and 33, Township 17 South, Range 28 East.

(3) That the applicant further seeks the designation of the project area and the promulgation of special rules and regulations governing said project, including provision for the assignment of special allowables to wells in the project area based on reservoir voidage factors, net gas-oil ratios, the shutting in or curtailment of less efficient wells, and allowable credit for gas injection wells.

(4) (As Amended by Order No. R-4549-A, January 1, 1974) That initially the project area should comprise only the following described area:

EDDY COUNTY, NEW MEXICO
TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM
Section 34: S/2 SE/4
Section 36: S/2

CASE NO. 9931	ARCO	REFORM EXAMINER STOGNER
	EXHIBIT NO. 2	OIL CONTROL DIVISION

(EMPIRE-ABO (PRESSURE MAINTENANCE) POOL - Cont'd.)

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM

- Section 25: S/2 and S/2 N/2
- Section 26: S/2, S/2 NE/4, and SE/4 NW/4
- Section 27: S/2
- Section 31: S/2 and S/2 N/2
- Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
- Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
- Section 34: All
- Section 35: N/2 and N/2 S/2
- Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM

- Section 29: S/2 NW/4 and N/2 SW/4
- Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM

- Section 1: All
- Section 2: S/2, NE/4 NE/4, SW/4 NE/4, S/2 NW/4, and NW/4 NW/4
- Section 3: All
- Section 4: SE/4, S/2 NE/4, S/2 SW/4, and NE/4 SW/4
- Section 8: E/2 SE/4 and SE/4 NE/4
- Section 9: All
- Section 10: W/2 and NE/4
- Section 11: NW/4, W/2 NE/4, and NE/4 NE/4
- Section 15: N/2 NW/4 and SW/4 NW/4
- Section 16: N/2, SW/4, N/2 SE/4, and SW/4 SE/4
- Section 17: S/2 NE/4, NE/4 NE/4, SE/4 NW/4, NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM

- Section 4: N/2 N/2, SW/4 NW/4
- Section 5: NE/4, N/2 NW/4, NE/4 NW/4
- Section 6: NW/4, N/2 SW/4, SE/4 SW/4, N/2 SE/4, SW/4 SE/4, S/2 NE/4, NE/4 NE/4, NW/4 NE/4 (Lot 2)

(5) That the applicant has been a major operator in the Empire-Abo Pool and that with a majority of the other operators in said pool has conducted extensive reservoir evaluations and studies in and of said pool.

(6) That said evaluations and studies show that the Empire-Abo Pool will be more efficiently produced through the curtailment of production from high gas-oil ratio wells or by reinjection of plant residue gas or both, and operation of the pool on a net reservoir voidage basis.

(7) That said evaluations and studies show that production from the project area as described in Finding (4) of this order should be limited to the average reservoir voidage for the project area for the calendar year 1972 or 30,000 barrels of oil per day, whichever is less, except that after reinjection of approximately 70 percent of the produced gas has been achieved, the production from said project area should be limited to the average reservoir voidage for the calendar year 1972 or 40,192 barrels of oil per day, whichever is less.

(8) That to provide incentive for the reinjection of produced gas prior to achievement of the full 70 percent reinjection planned, production in excess of the aforementioned 30,000 barrels per day should be permitted within the project area. Said excess production should be computed in accordance with the following formula and should be limited to 10,192 barrels per day:

additional allowable in (2(MCF gas inj. previous month x 10) 2 excess of 30,000 ((MCF gas prod. previous month))
 BOPD equals 97.07 ((MCF gas prod. previous month))

$$\frac{(MCF \text{ gas inj. previous month } \times 10)}{(MCF \text{ gas prod. previous month })}$$

(9) That the aforesaid pressure maintenance project, designated the ARCO Empire-Abo Unit Pressure Maintenance Project, and comprising the above-described area, is in the interest of conservation and should result in the recovery of approximately thirty million barrels of additional oil from said reservoir.

(10) That an administrative procedure should be established whereby said project area may be contracted or expanded for good cause shown and whereby additional injection wells and producing wells at orthodox and unorthodox locations in the project area may be approved without the necessity of notice and hearing.

(11) That special rules and regulations for the operation of the ARCO Empire-Abo Unit Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well not committed to said unit producing from the same common source of supply should be allowed to produce more than two top unit allowables for the Empire-Abo Pool.

(12) That approval of the application for a pressure maintenance project and the proposed special rules therefore is in the interest of sound conservation practices and will not cause waste or harm correlative rights.

IT IS THEREFORE ORDERED:

(1) That the applicant, Atlantic Richfield Company, is hereby authorized to institute a pressure maintenance project in the Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New Mexico, to be designated the ARCO Empire-Abo Unit Pressure Maintenance Project, initially by the shutting in or curtailment of production from less efficient wells within the project and within 12 months after the effective date of this order by the reinjection of approximately 70 percent of the produced gas, as plant residue gas, into the Abo formation, through the following described wells:

Operator	Lease Name	Well No.	Section	Location
Amoco	Malco "H" Federal	2	3	H
Amoco	Windfuhr Federal	4	4	J
Exxon	Chalk Bluff Draw Unit "A"	4	9	C
All in Township 18 South, Range 27 East, NMPM.				
M. Yates III	Dooley Abo State	2	36	J
In Township 17 South, Range 27 East, NMPM.				
Hondo	State "A"	21	26	K
Amoco	State "BM"	1	31	K
Amoco	State "BV"	1	32	F
Arco	M. Yates B (ARC)	8	33	G

All in Township 17 South, Range 28 East, NMPM.

(EMPIRE-ABO (PRESSURE MAINTENANCE) POOL - Cont'd.)

(2) That the injection should be through 2-3/8-inch internally coated tubing installed in a packer set within 100 feet of the uppermost perforations, and that the casing-tubing annulus should be fitted with a pressure gauge in order to determine leakage in the casing, tubing, or packer.

(3) That Special Rules and Regulations governing the operation of the ARCO Empire-Abo Unit Pressure Maintenance Project, Eddy County, New Mexico, are hereby promulgated as follows:

**SPECIAL RULES AND REGULATIONS
FOR THE
EMPIRE-ABO PRESSURE MAINTENANCE PROJECT**

RULE 1. (As Amended by Order No. R-4549-A, January 1, 1974, and Order No. R-4549-C, July 1, 1975.) The project area of the ARCO Empire-Abo Unit Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

EDDY COUNTY, NEW MEXICO

TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM

Section 34: S/2 SE/4
Section 36: S/2

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM

Section 25: S/2 and S/2 N/2
Section 26: S/2, S/2 NE/4, and SE/4 NW/4
Section 27: S/2
Section 31: S/2 and S/2 N/2
Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
Section 34: All
Section 35: N/2 and N/2 S/2
Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM

Section 29: S/2 NW/4 and N/2 SW/4
Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM

Section 1: All
Section 2: S/2, NE/4 NE/4, SW/4 NE/4,
NW/4
Section 3: All
Section 4: SE/4, S/2 NE/4, S/2 SW/4, and NE/4 SW/4
Section 8: E/2 SE/4 and SE/4 NE/4
Section 9: All
Section 10: W/2 and NE/4
Section 11: NW/4, W/2 NE/4, and NE/4 NE/4
Section 15: N/2, NW/4 and SW/4 NW/4
Section 16: N/2, SW/4, N/2 SE/4, and SW/4 SE/4
Section 17: S/2 NE/4, NE/4 NE/4, SE/4 NW/4,
NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM

Section 4: N/2 N/2, SW/4 NW/4
Section 5: NE/4, N/2 NW/4, NE/4 NW/4
Section 6: NW/4, N/2 SW/4, SE/4 SW/4, N/2
SE/4, SW/4 SE/4, S/2 NE/4, NE/4 NE/4,
NW/4 NE/4 (Lot 2)

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

RULE 3. (As Added by Order No. R-4549-F, April 20, 1984.) That the maximum daily project allowable shall be an amount of oil which will result in monthly average associated gas production of no more than 65 MMCF per day.

For the purpose of these rules, "Available Residue Gas" shall be defined as being all gas produced from the unitized formation less plant shrinkage, plant fuel, and lease fuel required for operation of the lease.

RULE 4. (As Added by Order No. R-4549-F, April 20, 1984.) That all available unit residue gas shall be reinjected. No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any other means. That in addition to the injection of available residue gas, the project operator may inject up to and including 35 million cubic feet of extraneous gas per day into the Abo formation underlying the project area; further, that withdrawals of said extraneous gas may be made, but pending reservoir blow-down, during not more than 30 days in any one 180-day period; provided however, that pending blow-down, the daily rate of withdrawal shall not exceed the average daily rate of injection of such extraneous gas during the preceding 180-day period; provided further, that the project operator shall establish and maintain an "Extraneous Gas Bank Statement" which shall be filed with the Division each month concurrently with the project operator's "Empire-Abo Pressure Maintenance Project Monthly Report", and which shall show thereon each month the volume of extraneous gas injected, the cumulative volume of such gas injected, the volume of gas delivered back to the supplier of extraneous gas, the cumulative volume of gas delivered back to the supplier, and the net cumulative extraneous gas bank.

RULE 5. (As Added by Order No. R-4549-F, April 20, 1984.) Allowables shall be assigned to unit wells in accordance with nominations submitted by the unit operator during the months of March, July, and November of each year. That such nominations shall accompany the Pressure Maintenance Project Operator's Report filed for that month.

The allowables assigned shall result in production of casinghead gas averaging not more than 65 MMCF per day for the month, provided however, that on a cumulative basis, the unit operator may carry gas overproduction of 325 MMCF.

That no producing well in the project area which directly or diagonally offsets a well not committed to the unit, and producing from the same common source of supply, shall receive an allowable or produce in excess of two times the top unit allowable for the pool.

RULE 6. (As Added by Order No. R-4549-F, April 20, 1984.) Each month the project operator shall submit to the Division a Pressure Maintenance Project Operator's Report on a form prescribed by the Division. The report shall show all project wells, production of oil, gas, and water, volumes of water, residue gas, and extraneous gas injected; total production of oil, gas and water, and such other data as the Division may require.

(EMPIRE-ABO (PRESSURE MAINTENANCE) POOL - Cont'd.)

RULE 7. A. (As Amended by Order No. R-4549-B, April 30, 1974, Order No. R-4549-E, January 28, 1980, and Renumbered by Order No. R-4549-F, April 20, 1984.) The Director of the Division is hereby authorized to approve such additional producing wells and gas injection and water injection wells at orthodox and unorthodox locations within the boundaries of the ARCO Empire Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided said wells are drilled no closer than 660 feet to any outer boundary of said unit nor closer than 10 feet to any quarter-quarter section or subdivision inner boundary and provided that no well shall be approved for gas or water injection when such well is located closer than 1650 feet to a tract which is not committed to the unit and on which is located a well producing from the same common source of supply. To obtain such approval, the project operator shall file proper application with the Division Director, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) A schematic drawing of the proposed well which fully describes the casing, tubing, perforated interval, and depth.

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

RULE 7. B. (As Amended by Order No. R-4549-B, April 30, 1974, Order No. R-4549-E, January 28, 1980, and Renumbered by Order No. R-4549-F, April 20, 1984.) The Director of the Division is hereby authorized to approve the drilling of "horizontal drainholes" for the purposes of production or injection within the boundaries of the ARCO Empire Abo Unit Area as may be necessary to complete an efficient production and injection pattern, provided no perforated or openhole portion of said wells shall be closer than 330 feet to the outer boundary of said unit or to any tract not committed to such unit nor, in the case of a well to be used for injection closer than 1650 feet to such boundary or tract. To obtain such approval, the project operator shall file proper application with the Division Director, which application, if it seeks authorization to convert additional wells to injection or to drill additional production or injection wells shall include the following:

(1) A plat identifying the lands committed to the unit agreement and those lands not committed to said agreement, and showing the location of the proposed well, all wells within the unit area, and offset operators.

(2) Schematic drawings of the proposed well which fully describes the casing, tubing, perforated or open-hole interval, kick-off point, and proposed trajectory of the drainhole section.

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

RULE 7. C. (As Amended by Order No. R-4549-B, April 30, 1974, Order No. 4549-E, January 28, 1980, and Renumbered by Order No. R-4549-F, April 20, 1984.) The Director may approve the proposed well if, within 20 days after receiving the application, no objection to the proposal is received. The Director may grant immediate approval, provided waivers of objection are received from all offset operators.

RULE 7. D. (As Amended by Order No. R-4549-B, April 30, 1974, Order No. R-4549-E, January 28, 1980, and Renumbered by Order No. R-4549-F, April 20, 1984.) Within 20 days following completion of any horizontal drainhole the operator shall submit a report to the Division Director with sufficient detail to locate the kick-off point and the trajectory of the deviated portion of the well bore with respect to any quarter-quarter section(s) penetrated by such well and any 40-acre tract directly or diagonally offsetting such quarter-quarter section(s).

The Director may approve the final location of the horizontal drainhole by acceptance of such report.

The Director may rescind the authority for any horizontal drainhole if the perforated or openhole portion of such hole is located closer to the unit boundary or any uncommitted tract than permitted by these rules or if it should appear that such rescission is necessary to prevent waste or protect correlative rights.

RULE 8. (As Amended and Renumbered by Order No. R-4549-F, April 20, 1984.) Expansion or contraction of the project area may be approved by the Director of the Division administratively when good cause is shown therefor.

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

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

POST OFFICE BOX 2088
STATE LAND OFFICE BUILDING
SANTA FE, NEW MEXICO 87501

RECEIVED

MAY 21 1980 31

APPLICATION FOR AUTHORIZATION TO INJECT

I. Purpose: Secondary Recovery Pressure Maintenance Storage
Application qualifies for administrative approval? yes no

II. Operator: ARCO Oil and Gas Company
Address: P.O. Box 1610, Midland, Texas 79702

Contact party: Gary B. Smallwood, Sr. Engineer Phone: (915) 688-5359

III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? yes no
If yes, give the Division order number authorizing the project R-4549

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)

XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Gary B. Smallwood Title: Senior Engineer

Signature: Gary B. Smallwood Date: 3-19-90 3/21/90

BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
ARCO EXHIBIT NO. 9931
CASE NO. 9931

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. Initial application to inject in 1973. Case #4953

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

- (1) Lease name; Well No.; location by Section, Township, and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) the intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells;
- (3) the formation name and depth with expected maximum injection rates and pressures; and
- (4) a notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

ARCO OIL AND GAS COMPANY
EMPIRE ABO UNIT J-10
APPLICATION TO INJECT GAS
MARCH, 1990

III. WELL DATA

- A. (1) Location
2310' FNL & 2310' FWL, Section 3-T18S-R27E
Eddy County, New Mexico
- (2) Casing
8-5/8" @ 1455' w/450 sx cement in 11" hole
TOC @ surface: circulated
5-1/2" @ 5705' w/300 sx cement in 7-7/8" hole
TOC unknown
- (3) Proposed Tubing
2-3/8" internally plastic coated @ approximately 5452'
- (4) Proposed Packer
Lok-set type (Baker Tool Co.) with on-off tool @ approximately
5452'
- B. (1) Injection formations: Abo
Pool Name: Empire Abo
- (2) Injection Interval: Perfs 5564-5630'
- (3) Well was drilled as an oil producer
- (4) No other perfs
- (5) Next higher productive pool: San Andres - Top of the San Andres
occurs at 1673'

VII. PROPOSED OPERATION

- (1) Average daily rate of fluid to be injected: 6000 MCFPD
- (2) The system is closed
- (3) Average injection pressure: 2000 psi
Maximum injection pressure: 2000 psi
- (4) Source of injection fluid: Empire Abo Unit Gas Injection Plant

IX. PROPOSED STIMULATION

Acidize perfs w/3500 gallons 15% NEFE HCl

ARCO OIL AND GAS COMPANY
EMPIRE ABO UNIT J-13
APPLICATION TO INJECT GAS
MARCH, 1990

III. WELL DATA

- A. (1) Location
1980' FNL & 660' FWL, Section 2-T18S-R27E
Eddy County, New Mexico
- (2) Casing
8-5/8" @ 1006' w/675 sx cement in 11" hole
TOC @ surface: circulated
5-1/2" @ 6131' w/225 sx cement in 7-7/8" hole
TOC unknown
- (3) Proposed Tubing
2-3/8" internally plastic coated @ approximately 5600'
- (4) Proposed Packer
Lok-set type (Baker Tool Co.) with on-off tool @ approximately
5600'
- B. (1) Injection formations: Abo
Pool Name: Empire Abo
- (2) Injection Interval: Perfs 5710-5724', 5754-5784'
- (3) Well was drilled as an oil producer
- (4) Perfs from 2300-2301' were squeezed w/525 sx cement. Perfs
from 5020-5021' were squeezed w/275 sx. Perfs from
5364-5390' were squeezed w/105 sx.
- (5) Next higher productive pool: San Andres - Top of the San Andres
occurs at 1672'

VII. PROPOSED OPERATION

- (1) Average daily rate of fluid to be injected: 6000 MCFPD
- (2) The system is closed
- (3) Average injection pressure: 2000 psi
Maximum injection pressure: 2000 psi
- (4) Source of injection fluid: Empire Abo Unit Injection Plant

IX PROPOSED STIMULATION

Acidize perfs w/15% NEFE HCl

Section VI.
Well Data in Area of Review

ARCO Empire Abo Unit Well No. J-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1488' cemented with 700 sacks, circulated .
4-1/2" @ 5720' cemented with 850 sacks, top of cement @ 925'.
Date Drilled: 8-5-59
Location: 2310' FNL & 1650' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5720'
Record of Completion: Perf 5620-5664' w/ 2JSPF. 2000 gals. 15% HCl. 79 BO,
1BAW & 88 MCF in 20 hrs. CIBP set @ 5269' on 8-24-77

ARCO Empire Abo Unit Well No. J-12

Type: EAU Gas Injection Well
Construction: 8-5/8" @ 997' cemented with 600 sacks, circulated .
5-1/2" @ 6123' cemented with 250 sacks, top of cement @ 4400'.
Date Drilled: 8-5-59
Location: 1980' FNL & 660' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6123'
Record of Completion: Perf 5650-670' w/ 2JSPF & treated w/500 gals 15% HCl on
2/59 . Treated with 2000 gals 15% on 6/70. Perf 4630-32 and
squeezed w/800 sacks on 7/79. Perf 700-02 and squeezed with 130
sacks, circulated to surface. Ran 2-3/8" IPC tbg. Packer at 5605'.
Treated with 5000 gals. 15%.Started GI @ 7-3-79. Perf 5592-5608 &
5572-80 & 5536-58 w/ 1 JSPF. 10,000 gals 15 %.

ARCO Empire Abo Unit Well No. J-14

Type: EAU Oil Producer
Construction: 8-5/8" @ 971' cemented with 600 sacks, circulated .
5-1/2" @ 6160' cemented with 230 sacks.
Date Drilled: 1-23-59
Location: 2180' FNL & 1905' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6133'
Record of Completion: Perf. 5620-40 & treated with 2000 gal DAD. Squeezed perms @
5620-40 w/ 100 sacks on 9/74. Perf. 5748-5776 acidized w/ 3200
gals. 15% on 9/74. Acidized w/ 6000 gal DAD treatment on 10/74.
286 BO, 15 BW & 315 MCFPD.

ARCO Empire Abo Unit Well No. J-15

Type: EAU Oil Producer
Construction: 8-5/8" @ 1216' cemented with 650 sacks, circulated .
5-1/2" @ 5920' cemented with 300 sacks.
Date Drilled: 3-4-59
Location: 1980' FEL & 2310' FNL, Sec 2-18S-27E; Eddy Co.
Depth: 5920'
Record of Completion: Perf. 5773-95 & 5810-72 oa w/ 2SPF. Treated with 2000 gal
15%, 9/59. Perf. 4010' cemented with 625 sacks.

ARCO Empire Abo Unit Well No. K-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1493' cemented with 650 sacks, circulated .
5-1/2" @ 5881' cemented with 250 sacks. TOC @ 4120'
Date Drilled: 2-25-59
Location: 1980' FSL & 1780' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5881'
Record of Completion: Perf. 5650-70 w/ 2SPF.No treatment, TOC @ 4120'. Treated
with 5000 gal 15% on 5/64. Well was SI 9/76.

ARCO Empire Abo Unit Well No. K-12

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 700 sacks, circulated .
5-1/2" @ 6103' cemented with 435 sacks. TOC @ 2675'
Date Drilled: 12-31-58
Location: 1980' FSL & 660' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6103'
Record of Completion: Perf. 5314-32 w/ 2SPF. Treated with 1000 gal 15%. Sqz.
4/64 w/ 100 sacks & perf. 5656-64, 5670-86 w/ 2spf. Acidize w/
1000 gals. Sqz. w/ 150 sacks on 6/77. Spotted 100 gals acetic acid
5806-5686. Perf. 5766-5804 w/ 2 spf. Acidized w/ 500 gals. 15%.
Pumped 1500 gals. DAD treatment.

ARCO Empire Abo Unit Well No. K-143

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 600 sacks, circulated .
5-1/2" @ 6107' cemented with 1275 sacks.
Date Drilled: 4-16-79
Location: 1820' FSL & 2550' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6107'
Record of Completion: Perf. 5910-25 w 2JSPF. treated w/ 1000 gal 15% and flushed
with 20 BLC. Sqz. w/ 125 sacks and perf. 6070-90 w/ 2JSPF. Treated
with 150 gals 15%, 1000 gals CaCl wtr, 1000 gals LC, 2000 gals acid.
Completed well on 5/79.

ARCO Empire Abo Unit Well No. I-10

Type: EAUGI
Construction: 8-5/8" @ 1471' cemented with 600 sacks, circulated .
4-1/2" @ 5710' cemented with 750 sacks.
Date Drilled: 11-30-59
Location: 990' FNL & 2310' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5710'
Record of Completion: Perf. 5825-305 w 2JSPF. Acidized with 2000 gals. Sqz. with
239 sacks. Perf. 5456-82 with 2JSPF. Acidized with 3000 gals. 15%.
108 BO in 24 hrs. 12-25-59. 2/3/74 treated 5532-46 w/ 1000 gals
acid. Treated perfs. 5456-5516 w/ 5000 gals. 15% acid. Ran IPC tbq
and started gas injection 5456-5546 on 6/22/74.

ARCO Empire Abo Unit Well No. I-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1485' cemented with 700 sacks, circulated .
4-1/2" @ 5719' cemented with 850 sacks. TOC 125'.
Date Drilled: 10-29-59
Location: 972' FNL & 1647' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5719'
Record of Completion: Perf. 5554-98 w 2JSPF on 11-20-59.

ARCO Empire Abo Unit Well No. I-12

Type: EAU Oil Producer
Construction: 8-5/8" @ 1496' cemented with 700 sacks, circulated .
4-1/2" @ 5661' cemented with 850 sacks. TOC 650'.
Date Drilled: 10-05-59
Location: 982' FNL & 330' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5661'
Record of Completion: Perf. 5610-30 and treated w/ acid 10/59.

ARCO Empire Abo Unit Well No. I-13

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1479' cemented with 700 sacks, circulated .
4-1/2" @ 5695' cemented with 850 sacks.
Date Drilled: 10-29-59
Location: 990' FNL & 650' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 5695'
Record of Completion: Perf. 5610-54 w 2JSPF , treated w/ 3000 gals., 15%.
Completed on 11-20-59.

ARCO Empire Abo Unit Well No. J-09

Type: EAU Oil Producer
Construction: 8-5/8" @ 1463' cemented with 620 sacks .
5-1/2" @ 5656' cemented with 350 sacks.
Date Drilled: 5-29-60
Location: 2310' FNL & 990' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5656'
Record of Completion: Perf. 5562-5614 w 2JSPF. Treated w/ 3000 gals acid
4/15/68. On 12/11/70 set CIBP @ 5540. Perf. 5463 & pumped 500
gals acid & squeezed thru perms 125 sacks cement. Pushed down CIBP to
5630 and acidized perms @ 5562-5614 w/ 2000 gals. On 9-16-71
treated w/ 5000 gals acid. On 1-19-72 acidized w/ 3000 gals 20%. SI
12-1-76. Returned to production 8-29-87 @ 63 BOPD 3 BWPD & 410
MCFPD.

ARCO Empire Abo Unit Well No. K-13

Type: EAU Oil Producer
Construction: 8-5/8" @ 993' cemented with 700 sacks.
5-1/2" @ 6094' cemented with 300 sacks.
Date Drilled: 10-05-58
Location: 1880' FSL & 660' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6094'
Record of Completion: Perf. 5360-86 w 4JSPF on 11-58. Treated w/ 500 gals. 15%.
1-64 squeezed & perf. 6043-50. Treated w/ 1000 gals.

ARCO Empire Abo Unit Well No. K-131

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 800 sacks, circulated .
5-1/2" @ 6145' cemented with 1360 sacks.
Date Drilled: 2-21-79
Location: 972' FNL & 1647' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6145'
Record of Completion: Sqz perfs @ 5709-11. Pumped 200 sacks of cement then drilled
out and pressure tested casing. Perf. 6014-34 w/ 2JSPF and acidized
w/ 2300 gals 15%. Completed on 4-17-79.

ARCO Empire Abo Unit Well No. K-14

Type: EAU Oil Producer
Construction: 8-5/8" @ 984' cemented with 775 sacks. TOC @ surface.
5-1/2" @ 6193' cemented with 175 sacks.
Date Drilled: 11-23-58
Location: 1980' FSL & 1830' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6193'
Record of Completion: Perf. 5410-36 w 4SPF & acidized w/ 2500 gals. No production
was obtained on test and the perfs were squeezed w/ 100 sacks cement.
Perf'd 5420-70 w/ 2SPF & acidized w/ 1000 gals. No production
obtained & perfs were squeezed w/ 100 sacks cement. Perf'd 5540-
5555 w/ 2SPF and acidized w/ 5500 gals. Well flowed 75 BO in 24
hours. Completed 1-59. On 9-73 squeezed 5540-5555 w/ 100 sacks
cement and perforated 5946-97 w/ 2JSPF & acidized w/ 3000 gals.
Squeezed 1-29-80 & perforated 6100-6110'. Acidized w/ 2000 gals
PAD acid on 10-30-86.

ARCO Empire Abo Unit Well No. K-141

Type: EAU Oil Producer
Construction: 8-5/8" @ 1006' cemented with 400 sacks, circulated to surface .
5-1/2" @ 6203' cemented with 300 sacks. TOC 1130'.
Date Drilled: 4-7-77
Location: 1370' FSL & 2445' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6203'
Record of Completion: Perf. 5990-6024' w/ 2JSPF acidized w/ 500 gals 15%. Perf'd
@ 6100' w/ four .45" holes & treated w/ 1000 gals DAD. Completed
5/18/77.

ARCO Empire Abo Unit Well No. K-142

Type: EAU Oil Producer (drainhole)
Construction: 10-3/4" @ 953' cemented with 400 sacks, circulated .
7" @ 6027' cemented with 575 sacks.
Date Drilled: 7-31-79
Location: 1700' FSL & 1400' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6027'
Record of Completion: Ran 5 1/2" OD 19' radius whipstock w/ 42' 4 1/2" anchor pipe,
87' 5 1/2" sheath pipe. Oriented whipstock w/ btm of anchor pipe at
6060'. Completed well 10/6/79.

ARCO Empire Abo Unit Well No. K-09

Type: EAU Oil Producer
Construction: 8-5/8" @ 1505' cemented with 700 sacks, circulated .
4-1/2" @ 5729' cemented with 800 sacks.
Date Drilled: 7-20-59
Location: 1650' FSL & 990' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5729'
Record of Completion: Perf. 5620-60, completed on 8-9-59. SI on 12-01-76.
Returned to production on 7/81

ARCO Empire Abo Unit Well No. K-10

Type: EAU Oil Producer
Construction: 8-5/8" @ 1465' cemented with 700 sacks, circulated .
4-1/2" @ 5778' cemented with 950 sacks.
Date Drilled: 5-23-59
Location: 1650' FSL & 2310' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5778'
Record of Completion: Perf. 5660-5700 w 2 SPF & treated w/ 1000 gals 15% on 6-
22-59.

ARCO Empire Abo Unit Well No. L-09

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 700 sacks, circulated .
5-1/2" @ 6431' cemented with 160 sacks.
Date Drilled: 12-31-58
Location: 660' FSL & 660' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 6431'
Record of Completion: Perf. 5232-58 w 2 SPF. Perfs. were squeezed w/ 200 sacks and
well was reperforated @ 5560-90 & acidized w/ 1000 gals 15%.
Completed on 2/59. Well was SI 9-19-76. Returned to production after
casing repair on 9/86.

ARCO Empire Abo Unit Well No. L-10

Type: EAU Oil Producer
Construction: 8-5/8" @ 1500' cemented with 750 sacks, circulated .
5-1/2" @ 5830' cemented with 300 sacks.
Date Drilled: 2-20-59
Location: 660' FSL & 1980' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5830'
Record of Completion: Perf. 5718-40 w JSPF & acidized w/ 500 gals 15% &
completed on 4-7-59. Perf'd squeeze holes @ 3500' on 8/77. Pumped
500 sacks cement, DO cement & returned well to production.

ARCO Empire Abo Unit Well No. L-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 983' cemented with 700 sacks, circulated .
5-1/2" @ 6043' cemented with 175 sacks.
Date Drilled: 12-2-58
Location: 610' FSL & 1980' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6043'
Record of Completion: Perf. 5340-65w 4 SPF & acidized w/ 500 gals 15%. Perfs
were squeezed and well was reperf'd @ 5345-80 & treated w/ 1000 gals
15%. Well was completed 1/59. On 6/64 Perfs @ 5345-80 were
squeezed w/ 100 sacks and well was perforated 5847-58, 5866-75,
5882-92 w/ 2 SPF & acidized w/ 2000 gals LSTNE. On 11/80 squeezed
w/ 100 sacks and perf'd 5940-54 & 5958-66 and treated w/ 1650 gals
of 15%. Well SI 12-8-80.

CITGO Empire Abo Unit Well No. 14

Type: Oil Producer (TA'd)
Construction: 8-5/8" @ 982' cemented with 400 sacks.
5-1/2" @ 5701' cemented with 800 sacks.
Date Drilled: 5-23-60
Location: 330' FSL & 990' FWL, Sec 35-17S-27E; Eddy Co.
Depth: 5701'
Record of Completion: Perf. 5556-98 & acidized w/ 10000 gals 15%. IPF 1841 BOPD

CITGO Empire Abo Unit Well No. 9

Type: Oil Producer (TA'd)
Construction: 8-5/8" @ 985' cemented with 400 sacks.
5-1/2" @ 5629' cemented with 800 sacks.
Date Drilled: 4-20-60
Location: 330' FSL & 1900' FWL, Sec 35-17S-27E; Eddy Co.
Depth: 5629'
Record of Completion: Perf. 5504-50 & acidized w/ 10000 gals 15%. IPF 600 BOPD

CITGO Empire Abo Unit Well No. 5

Type: Oil Producer

Construction: 8-5/8" @ 963' cemented with 425 sacks.
5-1/2" @ 5764' cemented with 300 sacks.

Date Drilled: 7-5-59

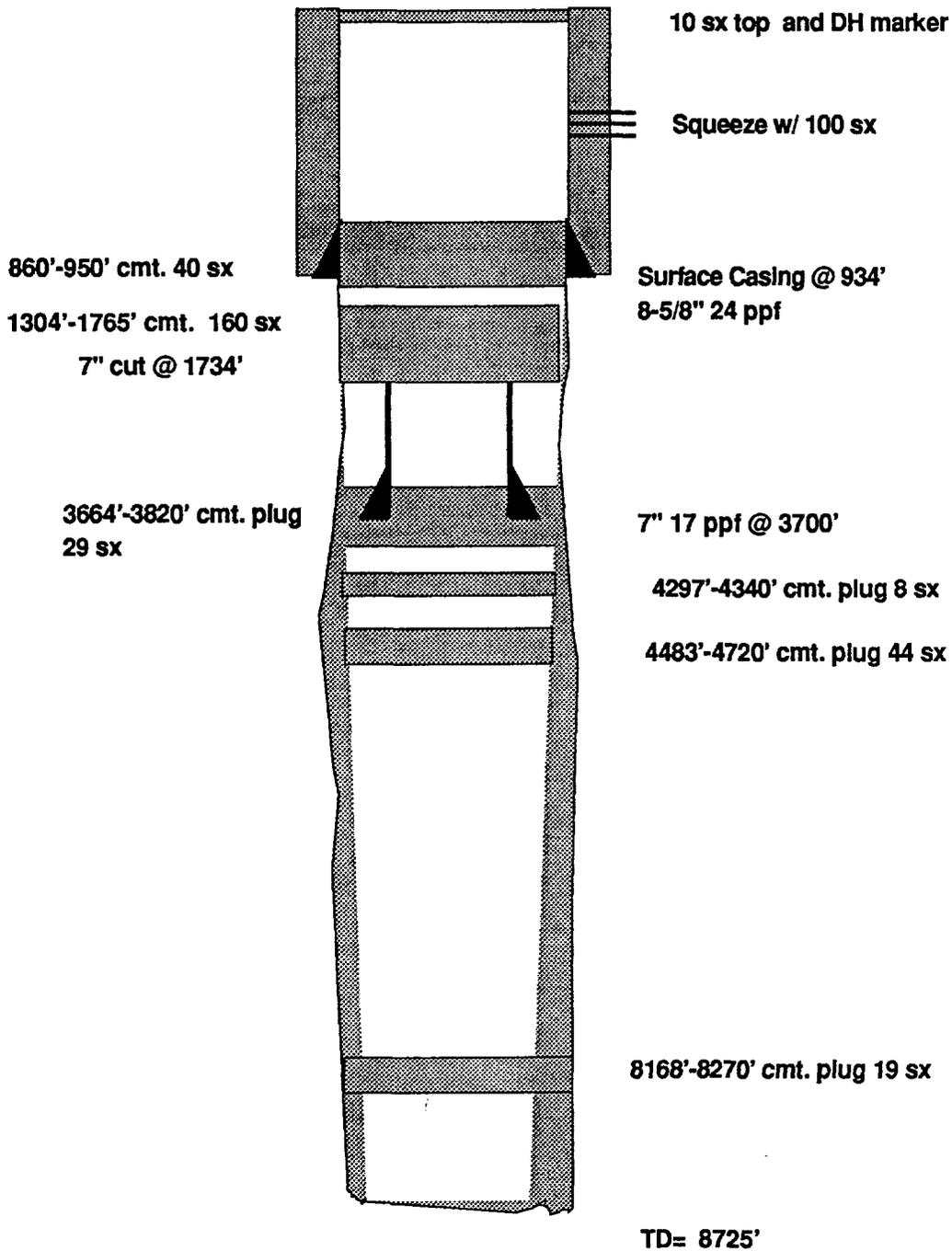
Location: 990' FNL & 1980' FWL, Sec 35-17S-27E; Eddy Co.

Depth: 5764'

Record of Completion: Perf. 5627-5731 OA & acidized w/ 2000 gals 15%. IPF 212
BOPD

Well Name & No.: Hondo C State No. 1
Date: 5-22-90

330' FNL & 990' FWL Sec. 2, 18 S and 27 E



Section VIII. Geological Data

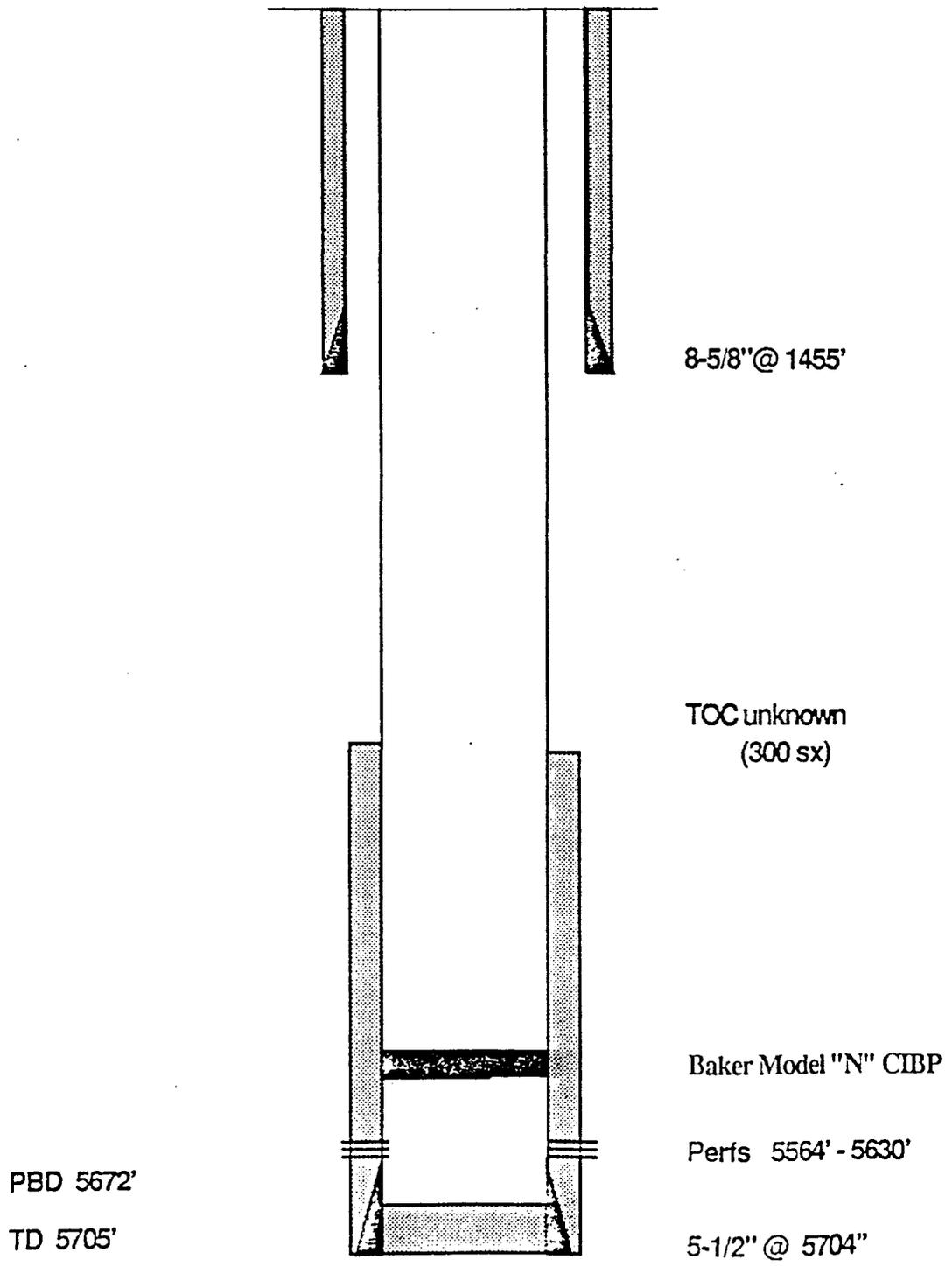
The Empire Abo field produces from a transgressive, carbonate, barrier reef buildup of lower Leonardian (Permian) age. This reef is one of several in a long trend flanking the northern edge of the Delaware Basin. The reef grew from southwest to northeast. It is approximately 12.5 miles long and 1.5 miles wide. Parallel to the reef trend, the reef dips 1 degree from southwest to northeast. Perpendicular to this trend the reef dips sharply at 10 to 20 degrees from crest to fore-reef, or north to south. The average depth of the reef is 5800 feet and the thickness averages 300 feet.

The trapping mechanism at Empire Abo is both stratigraphic and structural. The reef dips below the oil water contact to the south and east. Permeability pinch outs to the north and west occur as a result of carbonate muds, green shales and anhydrite inclusions.

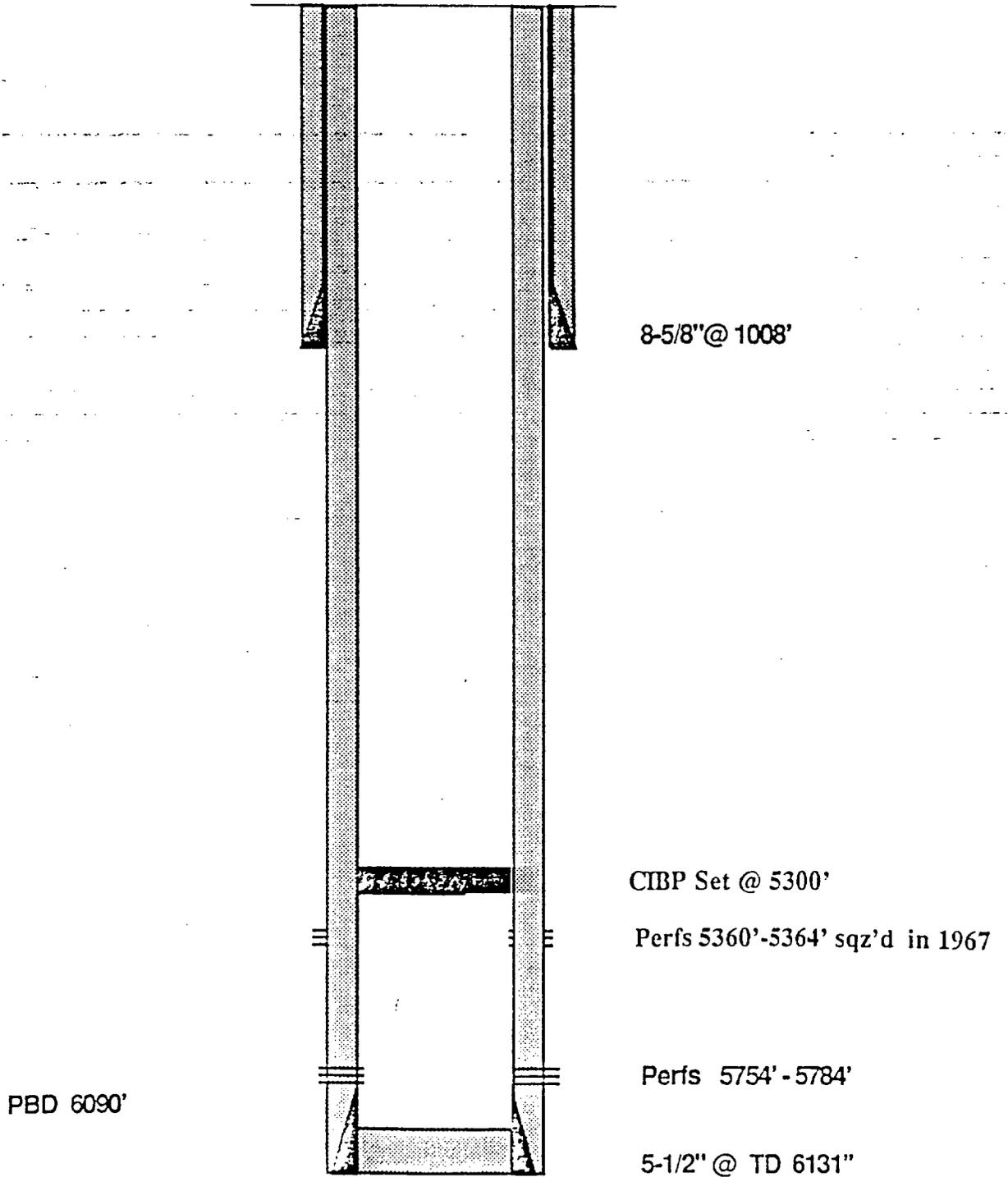
Porosity development is erratic and cannot be correlated between wells. Development is the result of leaching of abundant detrital fossil fragments, dolomitization and recrystallization. The most prolific porosity development is found in the reef core. There is no apparent intercrystalline porosity.

Vertical fracturing, which contributes to the gravity drainage mechanism of the reservoir, is apparently due to local slumping as well as large scale settling and some tectonic activity. Fracture orientation is generally 0 to 45 degrees from vertical and is parallel to the reef trend.

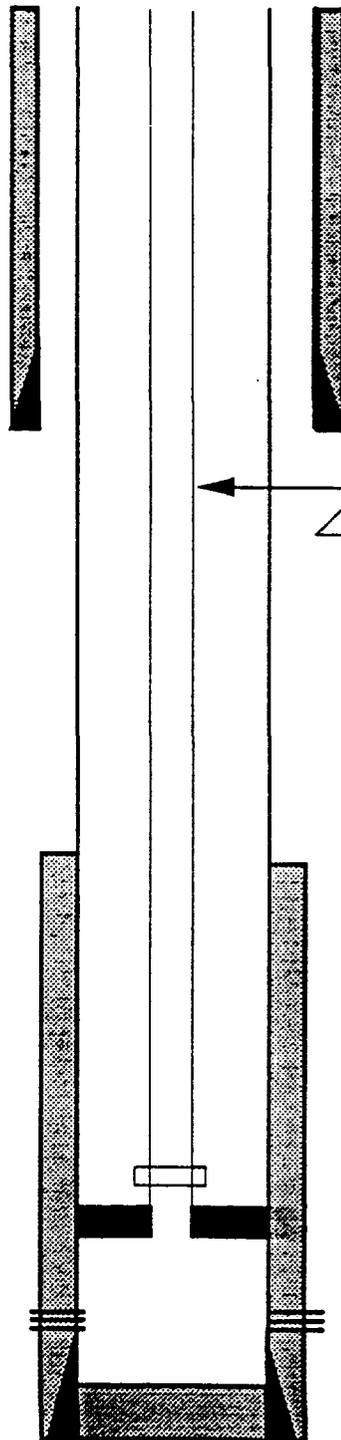
Empire Abo Unit # J-10
Present Wellbore Configuration



Empire Abo Unit # J-13
Present Wellbore Configuration



Empire Abo Unit # J-10
Proposed Wellbore Configuration



8-5/8" @ 1455'

2-3/8" 4.7# J-55 8rd EUE ABmod IPC tbg
Btm'd @ 5450'

TOC unknown
(300 sx)

On-off too w/1.78 "R" profile (Nickel Plated)
Lok Set pkr set @ 5450' (Nickel Plated)

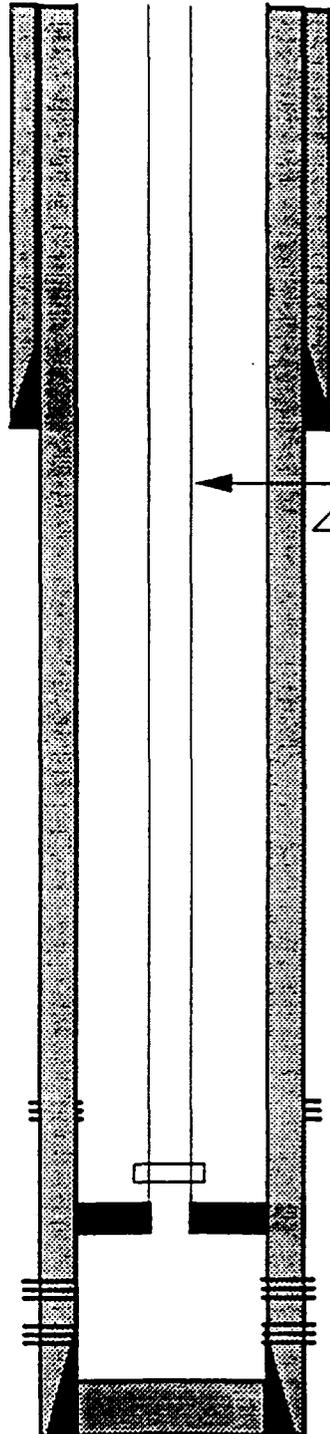
Perfs 5564' - 5630'

5-1/2" @ 5704'

PBD 5672'

TD 5705'

Empire Abo Unit # J-13
Proposed Wellbore Configuration



8-5/8" @ 1008'

2-3/8" 4.7# J-55 8rd EUE ABmod IPC tbg
Btm'd @ 5600'

Perfs 5360' - 5364' sqz'd 1967

On-off too w/1.78 "R" profile (Nickel Plated)

Lok Set pkr set @ 5600' (Nickel Plated)

Perfs 5710' - 5724'

Perfs 5754 - 5784'

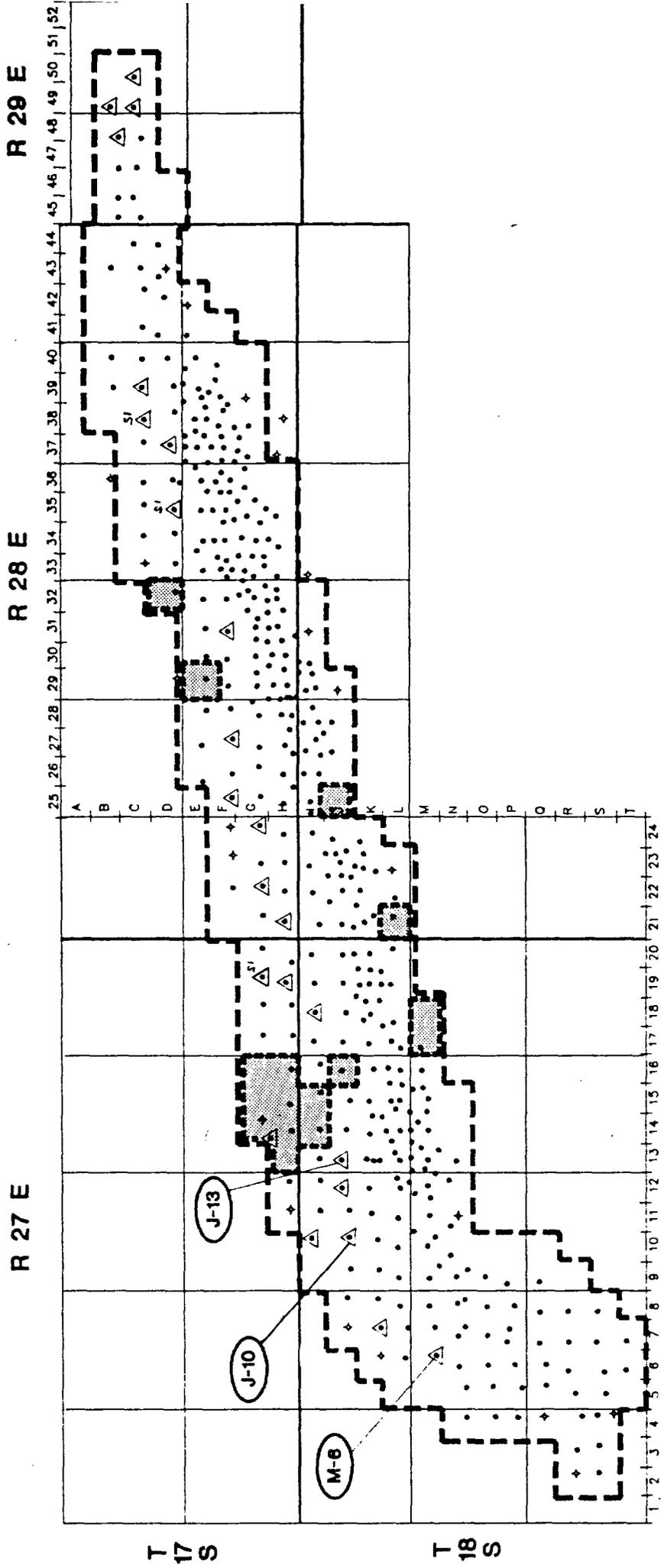
5-1/2" @ 6131'

PBD 6090'

TD 6131

EMPIRE ABO UNIT

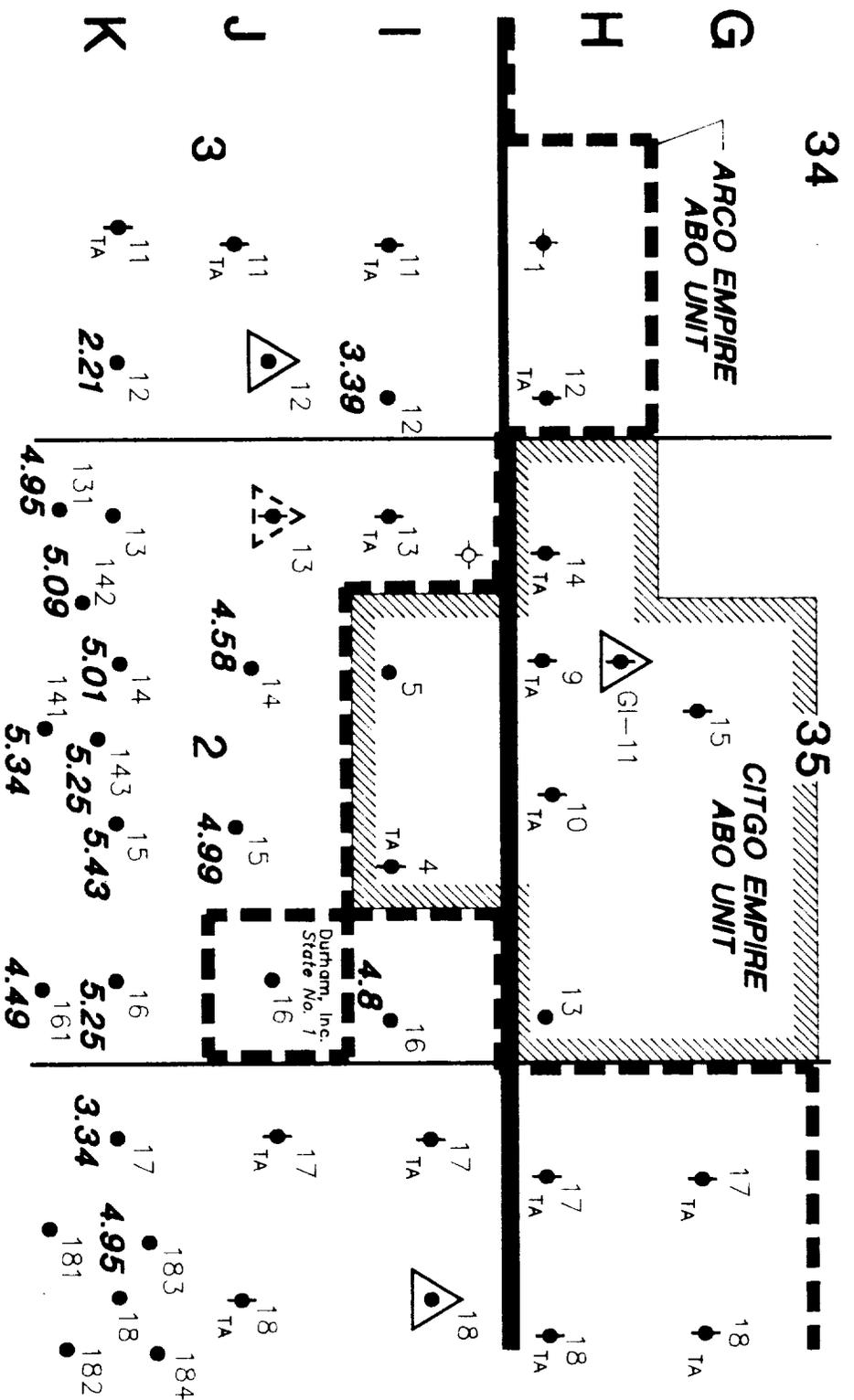
Eddy County, New Mexico



R 27 E

T 17 S

T 18 S



LEGEND

- ◆ PLUGGED ABANDONED
- ▲ INACTIVE GAS INJECTOR
- ▲ PROPOSED GAS INJECTOR
- GAS INJECTOR
- PRODUCER
- ◆ TA TEMPORARY ABANDONED

BEFORE EXAMINER STOGNER
 OIL CONSERVATION DIVISION
 ARCO EXHIBIT NO. 4
 CASE NO. 9931

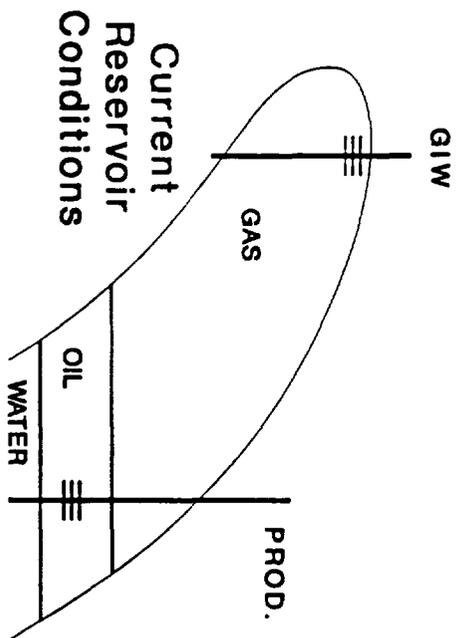
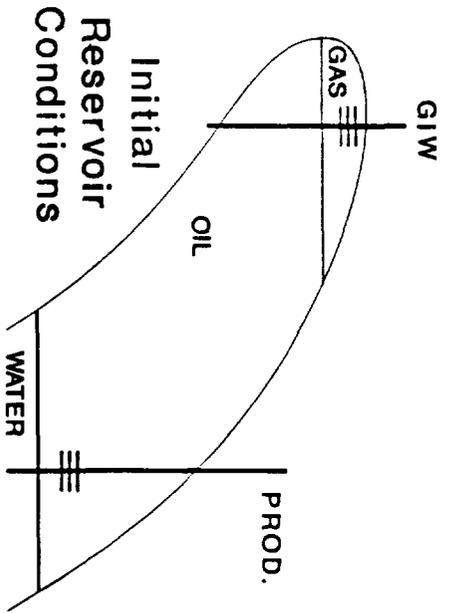
ARCO Oil and Gas Company
 Division of AtlanticRichfieldCompany
 Central District Midland, Texas

EMPIRE ABO FIELD
 Eddy Co., New Mexico

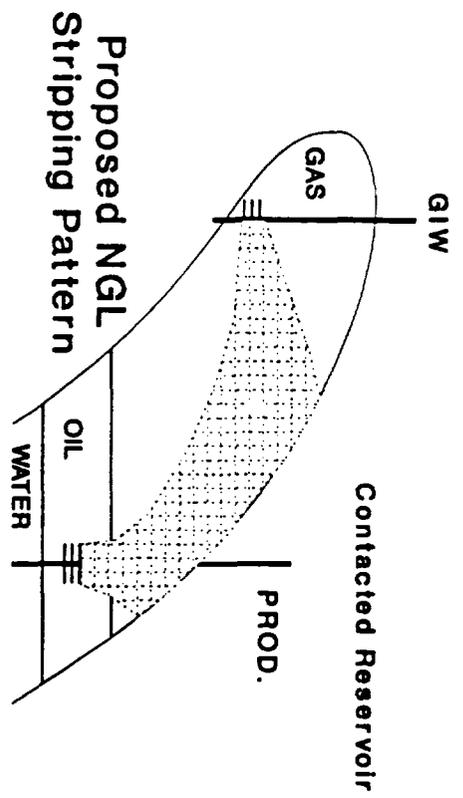
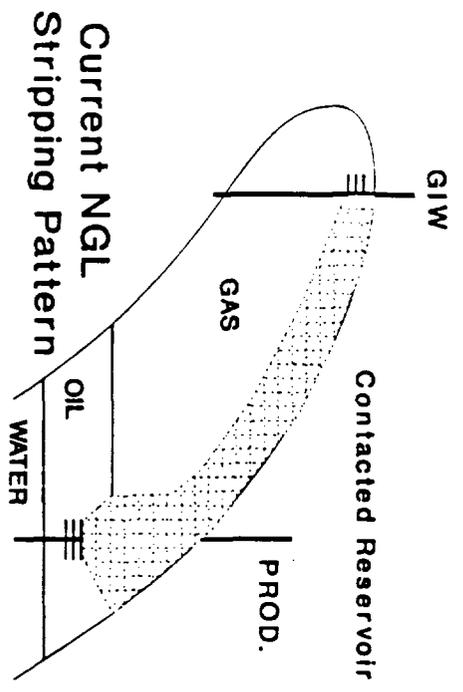
NGL Yield Gals./MCF

Scale 1" = 1500'
 By: C SMALLWOOD Date: 4/90
 Date: 4/90
 Dept. NW ENGR.

Drawn By: LGA Date: 4/90
 Revised By: P.M. Date: 4/90
 Eng. No. CITGOUT



**EMPIRE ABO UNIT
Reservoir Schematic**



BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION

EXHIBIT NO. 5

CASE NO. 9931

ARCO EMPIRE ABO UNIT

GAS INJECTION WELL M-6

OLD PERFORATIONS	5330-5420
OLD INJECTION RATE	71 MCFPD
NEW PERFORATIONS	5540-5584
NEW INJECTION RATE	3000 MCFPD

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
ARCO	EXHIBIT NO. 6
CASE NO.	9931

ARCO OIL & GAS EMPIRE ABO UNIT

TARGET AREA AVERAGE NGL CONTENT 5 GAL/MCF

AVERAGE UNIT NGL CONTENT 3.80 GAL/MCF

INCREMENTAL NGL CONTENT 1.2 GAL/MCF

EXPECTED INJECTION RATE 6 MMCFPD

EST. NGL PRODUCTION RATE GAIN 170 BPD

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
Arco	EXHIBIT NO. 7
CASE NO.	9931

BEFORE THE

OIL CONSERVATION DIVISION

NEW MEXICO DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES

IN THE MATTER OF THE APPLICATION
OF ARCO OIL & GAS COMPANY FOR
PRESSURE MAINTENANCE EXPANSION,
EDDY COUNTY, NEW MEXICO.

CASE NO. 9931

AFFIDAVIT

STATE OF NEW MEXICO)
)ss.
COUNTY OF SANTA FE)

WILLIAM F. CARR, attorney in fact and authorized representative of ARCO Oil & Gas Company, the Applicant herein, being first duly sworn, upon oath, states that the notice provisions of Rule 1207 of the New Mexico Oil Conservation Division have been complied with, that Applicant has caused to be conducted a good faith diligent effort to find the correct addresses of all interested persons entitled to receive notice as shown by Exhibit "A" attached hereto, and that pursuant to Rule 1207, notice has been given at the correct addresses provided by such rule.

William F. Carr

WILLIAM F. CARR

SUBSCRIBED AND SWORN to before me this 12th day of June, 1990.

Michael J. Ferrer

Notary Public

My Commission Expires:

August 19, 1991

BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
ARCO EXHIBIT NO. 8
CASE NO. 9931

EXHIBIT A

Bureau of Land Management
Carlsbad Resource Area
Post Office Box 1778
Carlsbad, New Mexico 88220
Attn: Barry Hunt

State Land Office
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501
Attn: Floyd Prando

OXY, U.S.A., Inc.
Post Office Box 50250
Midland, Texas 79710
Attn: Frank Vitrano

CITGO EMPIRE ABO UNIT WELL #5

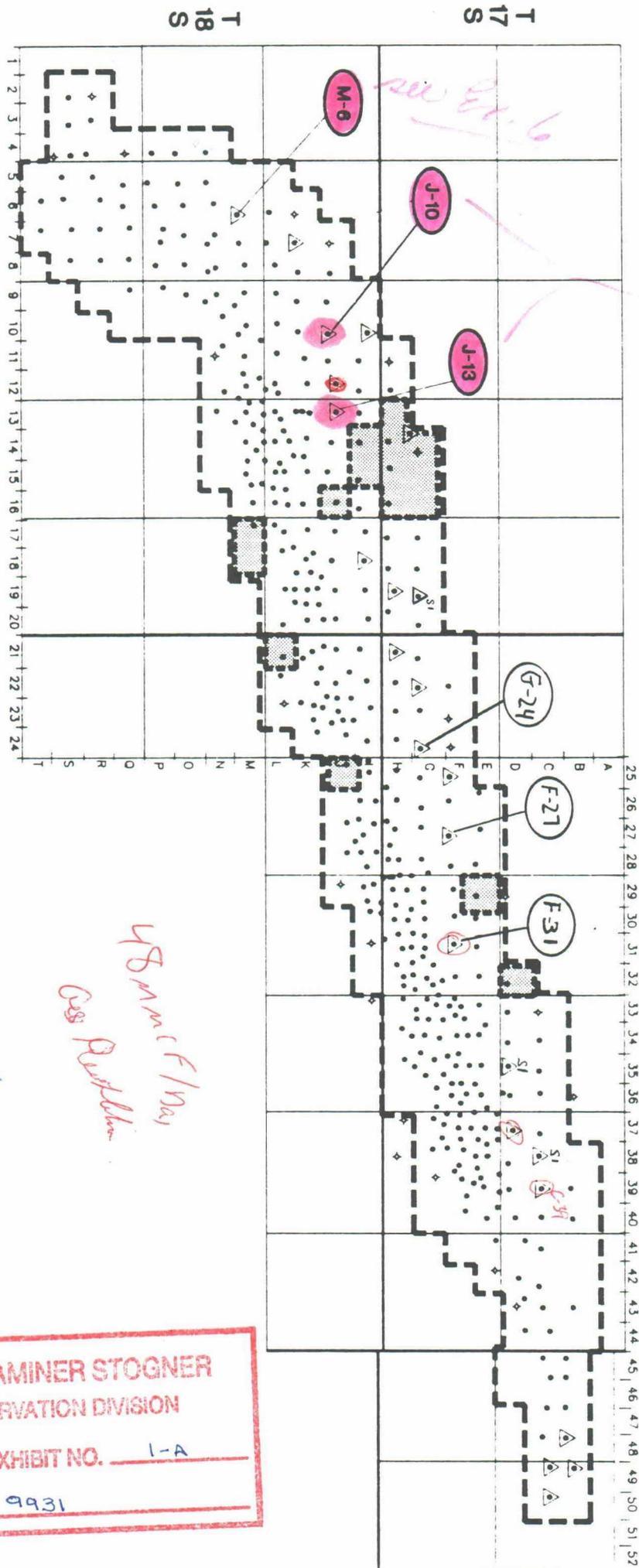
SWEET AREA AVERAGE NGL CONTENT	5 GAL/MCF
AVERAGE UNIT NGL CONTENT	3.80 GAL/MCF
INCREMENTAL NGL CONTENT	1.2 GAL/MCF
PRODUCTION RATE	700 MCFPD
EST. NGL PRODUCTION RATE GAIN	20 BPD

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
<u>Area</u>	EXHIBIT NO. <u>9</u>
CASE NO. <u>9931</u>	

EMPIRE ABO UNIT

Eddy County, New Mexico

Proposed boundaries



- should name on map - consulted there.

*V8 M.M. (F/May)
Case Resolution*

BEFORE EXAMINER STOGNER
OIL CONSERVATION DIVISION
 ARCO EXHIBIT NO. 1-A
 CASE NO. 9931

**EMPIRE-ABO POOL
(Pressure Maintenance)
Eddy County, New Mexico**

Order No. R-4549, Authorizing Atlantic Richfield Company to Institute a Pressure Maintenance Project in the Empire-Abo Pool, Eddy County, New Mexico, June 15, 1973, as Amended by Order No. R-4549-A, January 1, 1974, Order No. R-4549-B, April 30, 1974, Order No. R-4549-C, July 1, 1975, Order No. R-4549-D, November 17, 1975, Order No. R-4549-E, January 28, 1980, and Order No. R-4549-F, April 20, 1984.

Order No. R-4549-A, January 1, 1974, extends the project area to include 200.13 acres and increases project allowable to 33,000 barrels per day.

Order No. R-4549-F, April 20, 1984, rescinds Rules 3, 4, 4(A), 5, 6, 7, 8, 9, 10, 11, 12, and 13, adopted by Order No. R-4549, and amended by Orders Nos. R-4549-B through R-4549-E, providing for well allowables based upon reservoir voidage; adopts new Rules 3, 4, 5, and 6; and, redesignates Rules 14A through 14D as Rules 7A through 7D and Rule 15 as Rule 8.

Application of ~~Atlantic Richfield Company~~
for a ~~Pressure Maintenance Project~~, Eddy
County, New Mexico.

CASE NO. 4953
Order No. R-4549

ORDER OF THE COMMISSION

BY THE COMMISSION: This cause came on for hearing at 9 a.m. on April 25, 1973, at Santa Fe, New Mexico, before Examiner Richard L. Stamets.

NOW, on this 15th day of June, 1973, the Commission, a quorum being present, having considered the testimony, the record, and the recommendations of the Examiner, and being fully advised in the premises,

FINDS:

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

(2) That the applicant, Atlantic Richfield Company, seeks authority to institute a pressure maintenance project in the Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New Mexico, by initially limiting reservoir voidage, and within one year by reinjection of approximately 70 per cent of the produced gas, as plant residue gas, into the Abo formation through eight wells in Section 36, Township 17 South, Range 27 East, Sections 3, 4, and 9, Township 18 South, Range 27 East, and Sections 26, 31, 32, and 33, Township 17 South, Range 28 East.

(3) That the applicant further seeks the designation of the project area and the promulgation of special rules and regulations governing said project, including provision for the assignment of special allowables to wells in the project area based on reservoir voidage factors, net gas-oil ratios, the shutting in or curtailment of less efficient wells, and allowable credit for gas injection wells.

(4) (As Amended by Order No. R-4549-A, January 1, 1974) That initially the project area should comprise only the following described area:

**EDDY COUNTY, NEW MEXICO
TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM
Section 34: S/2 SE/4
Section 36: S/2**

BEFORE EXAMINER STOGNER OIL CONSERVATION DIVISION
ARCO
EXHIBIT NO. 2
CASE NO. 9931

(EMPIRE-ABO (PRESSURE MAINTENANCE) POOL - Cont'd.)

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM

Section 25: S/2 and S/2 N/2
Section 26: S/2, S/2 NE/4, and SE/4 NW/4
Section 27: S/2
Section 31: S/2 and S/2 N/2
Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
Section 34: All
Section 35: N/2 and N/2 S/2
Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM

Section 29: S/2 NW/4 and N/2 SW/4
Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM

Section 1: All
Section 2: S/2, NE/4 NE/4, SW/4 NE/4,
S/2 NW/4, and NW/4 NW/4
Section 3: All
Section 4: SE/4, S/2 NE/4, S/2 SW/4,
and NE/4 SW/4
Section 8: E/2 SE/4 and SE/4 NE/4
Section 9: All
Section 10: W/2 and NE/4
Section 11: NW/4, W/2 NE/4, and NE/4 NE/4
Section 15: N/2 NW/4 and SW/4 NW/4
Section 16: N/2, SW/4, N/2 SE/4, and
SW/4 SE/4
Section 17: S/2 NE/4, NE/4 NE/4, SE/4
NW/4, NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM

Section 4: N/2 N/2, SW/4 NW/4
Section 5: NE/4, N/2 NW/4, NE/4 NW/4
Section 6: NW/4, N/2 SW/4, SE/4 SW/4, N/2 SE/4,
SW/4 SE/4, S/2 NE/4, NE/4 NE/4,
NW/4 NE/4 (Lot 2)

(5) That the applicant has been a major operator in the Empire-Abo Pool and that with a majority of the other operators in said pool has conducted extensive reservoir evaluations and studies in and of said pool.

(6) That said evaluations and studies show that the Empire-Abo Pool will be more efficiently produced through the curtailment of production from high gas-oil ratio wells or by reinjection of plant residue gas or both, and operation of the pool on a net reservoir voidage basis.

(7) That said evaluations and studies show that production from the project area as described in Finding (4) of this order should be limited to the average reservoir voidage for the project area for the calendar year 1972 or 30,000 barrels of oil per day, whichever is less, except that after reinjection of approximately 70 percent of the produced gas has been achieved, the production from said project area should be limited to the average reservoir voidage for the calendar year 1972 or 40,192 barrels of oil per day, whichever is less.

(8) That to provide incentive for the reinjection of produced gas prior to achievement of the full 70 percent reinjection planned, production in excess of the aforementioned 30,000 barrels per day should be permitted within the project area. Said excess production should be computed in accordance with the following formula and should be limited to 10,192 barrels per day:

additional allowable in $(\frac{2(\text{MCF gas in } \text{previous month} \times 10)}{\text{excess of 30,000}})$
BOPD equals 97.07 $(\frac{\text{MCF gas prod. previous month}}{\text{MCF gas prod. previous month}})$

$(\frac{\text{MCF gas in } \text{previous month} \times 10}{\text{MCF gas prod. previous month}})$

(9) That the aforesaid pressure maintenance project, designated the ARCO Empire-Abo Unit Pressure Maintenance Project, and comprising the above-described area, is in the interest of conservation and should result in the recovery of approximately thirty million barrels of additional oil from said reservoir.

(10) That an administrative procedure should be established whereby said project area may be contracted or expanded for good cause shown and whereby additional injection wells and producing wells at orthodox and unorthodox locations in the project area may be approved without the necessity of notice and hearing.

(11) That special rules and regulations for the operation of the ARCO Empire-Abo Unit Pressure Maintenance Project should be promulgated and, for operational convenience, such rules should provide certain flexibility in authorizing the production of the project allowable from any well or wells in the project area in any proportion, provided that no well in the project area which directly or diagonally offsets a well not committed to said unit producing from the same common source of supply should be allowed to produce more than two top unit allowables for the Empire-Abo Pool.

(12) That approval of the application for a pressure maintenance project and the proposed special rules therefore is in the interest of sound conservation practices and will not cause waste or harm correlative rights

IT IS THEREFORE ORDERED:

(1) That the applicant, Atlantic Richfield Company, is hereby authorized to institute a pressure maintenance project in the Empire-Abo Pool in its Empire-Abo Unit Area, Eddy County, New Mexico, to be designated the ARCO Empire-Abo Unit Pressure Maintenance Project, initially by the shutting in or curtailment of production from less efficient wells within the project and within 12 months after the effective date of this order by the reinjection of approximately 70 percent of the produced gas, as plant residue gas, into the Abo formation, through the following described wells:

Operator	Lease Name	Well No.	Section	Location
Amoco	Malco "H" Federal	2	3	H
Amoco	Windfuhr Federal	4	4	J
Exxon	Chalk Bluff Draw Unit "A"	4	9	C
All in Township 18 South, Range 27 East, NMPM.				
M. Yates III	Dooley Abo State	2	36	J
In Township 17 South, Range 27 East, NMPM.				
Hondo	State "A"	21	26	K
Amoco	State "BM"	1	31	K
Amoco	State "BV"	1	32	F
Arco	M. Yates B (ARC)	8	33	G
All in Township 17 South, Range 28 East, NMPM.				

(EMPIRE-ABO (PRESSURE MAINTENANCE) POOL - Cont'd.)

(2) That the injection should be through 2-3/8-inch internally coated tubing installed in a packer set within 100 feet of the uppermost perforations, and that the casing-tubing annulus should be fitted with a pressure gauge in order to determine leakage in the casing, tubing, or packer.

(3) That Special Rules and Regulations governing the operation of the ARCO Empire-Abo Unit Pressure Maintenance Project, Eddy County, New Mexico, are hereby promulgated as follows:

**SPECIAL RULES AND REGULATIONS
FOR THE
EMPIRE-ABO PRESSURE MAINTENANCE PROJECT**

RULE 1. (As Amended by Order No. R-4549-A, January 1, 1974, and Order No. R-4549-C, July 1, 1975.) The project area of the ARCO Empire-Abo Unit Pressure Maintenance Project, hereinafter referred to as the Project, shall comprise the area described as follows:

EDDY COUNTY, NEW MEXICO
TOWNSHIP 17 SOUTH, RANGE 27 EAST, NMPM
Section 34: S/2 SE/4
Section 36: S/2

TOWNSHIP 17 SOUTH, RANGE 28 EAST, NMPM
Section 25: S/2 and S/2 N/2
Section 26: S/2, S/2 NE/4, and SE/4 NW/4
Section 27: S/2
Section 31: S/2 and S/2 N/2
Section 32: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
Section 33: S/2, NE/4, S/2 NW/4, and NE/4 NW/4
Section 34: All
Section 35: N/2 and N/2 S/2
Section 36: N/2 NW/4 and SW/4 NW/4

TOWNSHIP 17 SOUTH, RANGE 29 EAST, NMPM
Section 29: S 2 NW/4 and N/2 SW/4
Section 30: SW/4, S/2 N/2, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 27 EAST, NMPM
Section 1: All
Section 2: S/2, NE/4 NE/4, SW/4 NE/4,
NW/4
Section 3: All
Section 4: SE/4, S/2 NE/4, S/2 SW/4, and NE/4 SW/4
Section 8: E/2 SE/4 and SE/4 NE/4
Section 9: All
Section 10: W/2 and NE/4
Section 11: NW/4, W/2 NE/4, and NE/4 NE/4
Section 15: N/2, NW/4 and SW/4 NW/4
Section 16: N/2, SW/4, N/2 SE/4, and SW/4 SE/4
Section 17: S/2 NE/4, NE/4 NE/4, SE/4 NW/4,
NE/4 SW/4, and N/2 SE/4

TOWNSHIP 18 SOUTH, RANGE 28 EAST, NMPM
Section 4: N/2 N/2, SW/4 NW/4
Section 5: NE/4, N/2 NW/4, NE/4 NW/4
Section 6: NW/4, N/2 SW/4, SE/4 SW/4, N/2
SE/4, SW/4 SE/4, S/2 NE/4, NE/4 NE/4,
NW/4 NE/4 (Lot 2)

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

RULE 3. (As Added by Order No. R-4549-F, April 20, 1984.) That the maximum daily project allowable shall be an amount of oil which will result in monthly average associated gas production of no more than 65 MMCF per day.

For the purpose of these rules, "Available Residue Gas" shall be defined as being all gas produced from the unitized formation less plant shrinkage, plant fuel, and lease fuel required for operation of the lease.

RULE 4. (As Added by Order No. R-4549-F, April 20, 1984.) That all available unit residue gas shall be reinjected. No raw gas nor plant residue gas attributable to the project shall be sold or otherwise disposed of by any other means. That in addition to the injection of available residue gas, the project operator may inject up to and including 35 million cubic feet of extraneous gas per day into the Abo formation underlying the project area; further, that withdrawals of said extraneous gas may be made, but pending reservoir blow-down, during not more than 30 days in any one 180-day period; provided however, that pending blow-down, the daily rate of withdrawal shall not exceed the average daily rate of injection of such extraneous gas during the preceding 180-day period; provided further, that the project operator shall establish and maintain an "Extraneous Gas Bank Statement" which shall be filed with the Division each month concurrently with the project operator's "Empire-Abo Pressure Maintenance Project Monthly Report", and which shall show thereon each month the volume of extraneous gas injected, the cumulative volume of such gas injected, the volume of gas delivered back to the supplier of extraneous gas, the cumulative volume of gas delivered back to the supplier, and the net cumulative extraneous gas bank.

RULE 5. (As Added by Order No. R-4549-F, April 20, 1984.) Allowables shall be assigned to unit wells in accordance with nominations submitted by the unit operator during the months of March, July, and November of each year. That such nominations shall accompany the Pressure Maintenance Project Operator's Report filed for that month.

The allowables assigned shall result in production of casinghead gas averaging not more than 65 MMCF per day for the month, provided however, that on a cumulative basis, the unit operator may carry gas overproduction of 325 MMCF.

That no producing well in the project area which directly or diagonally offsets a well not committed to the unit, and producing from the same common source of supply, shall receive an allowable or produce in excess of two times the top unit allowable for the pool.

RULE 6. (As Added by Order No. R-4549-F, April 20, 1984.) Each month the project operator shall submit to the Division a Pressure Maintenance Project Operator's Report on a form prescribed by the Division. The report shall show all project wells, production of oil, gas, and water; volumes of water, residue gas, and extraneous gas injected; total production of oil, gas and water, and such other data as the Division may require.

POST OFFICE BOX 2088
STATE LAND OFFICE BLDG
SANTA FE, NEW MEXICO 87501

RECEIVED

MAY 21 1980 31

APPLICATION FOR AUTHORIZATION TO INJECT

I. Purpose: Secondary Recovery Pressure Maintenance Storage
Application qualifies for administrative approval? Yes No

II. Operator: ARCO Oil and Gas Company
Address: P.O. Box 1610, Midland, Texas 79702
Contact party: Gary B. Smallwood, Sr. Engineer Phone: (915) 688-5359

III. Well data: Complete the data required on the reverse side of this form for each well proposed for injection. Additional sheets may be attached if necessary.

IV. Is this an expansion of an existing project? yes no
If yes, give the Division order number authorizing the project R-4549

V. Attach a map that identifies all wells and leases within two miles of any proposed injection well with a one-half mile radius circle drawn around each proposed injection well. This circle identifies the well's area of review.

VI. Attach a tabulation of data on all wells of public record within the area of review which penetrate the proposed injection zone. Such data shall include a description of each well's type, construction, date drilled, location, depth, record of completion, and a schematic of any plugged well illustrating all plugging detail.

VII. Attach data on the proposed operation, including:

1. Proposed average and maximum daily rate and volume of fluids to be injected;
2. Whether the system is open or closed;
3. Proposed average and maximum injection pressure;
4. Sources and an appropriate analysis of injection fluid and compatibility with the receiving formation if other than reinjected produced water; and
5. If injection is for disposal purposes into a zone not productive of oil or gas at or within one mile of the proposed well, attach a chemical analysis of the disposal zone formation water (may be measured or inferred from existing literature, studies, nearby wells, etc.).

VIII. Attach appropriate geological data on the injection zone including appropriate lithologic detail, geological name, thickness, and depth. Give the geologic name, and depth to bottom of all underground sources of drinking water (aquifers containing waters with total dissolved solids concentrations of 10,000 mg/l or less) overlying the proposed injection zone as well as any such source known to be immediately underlying the injection interval.

IX. Describe the proposed stimulation program, if any.

X. Attach appropriate logging and test data on the well. (If well logs have been filed with the Division they need not be resubmitted.)

XI. Attach a chemical analysis of fresh water from two or more fresh water wells (if available and producing) within one mile of any injection or disposal well showing location of wells and dates samples were taken.

XII. Applicants for disposal wells must make an affirmative statement that they have examined available geologic and engineering data and find no evidence of a hydrologic or any other hydrologic connection between the disposal zone and any underground source of drinking water.

XIII. Applicants must complete the "Proof of Notice" section on the reverse side of this form.

XIV. Certification

I hereby certify that the information submitted with this application is true and correct to the best of my knowledge and belief.

Name: Gary B. Smallwood Title: Senior Engineer

Signature: Gary B. Smallwood Date: 3-19-80 3/21/80

BEFORE EXAMINER'S SIGNATURE

OIL CONSERVATION DIVISION

EXHIBIT NO. 3

CASE NO. 9931

APPROVED

* If the information required under Sections VI, VIII, X, and XI above has been previously submitted, it need not be duplicated and resubmitted. Please show the date and circumstance of the earlier submittal. Initial application to inject in 1973. Case #4953

III. WELL DATA

A. The following well data must be submitted for each injection well covered by this application. The data must be both in tabular and schematic form and shall include:

- (1) Lease name; Well No.; location by Section, Township, and Range; and footage location within the section.
- (2) Each casing string used with its size, setting depth, sacks of cement used, hole size, top of cement, and how such top was determined.
- (3) A description of the tubing to be used including its size, lining material, and setting depth.
- (4) The name, model, and setting depth of the packer used or a description of any other seal system or assembly used.

Division District offices have supplies of Well Data Sheets which may be used or which may be used as models for this purpose. Applicants for several identical wells may submit a "typical data sheet" rather than submitting the data for each well.

B. The following must be submitted for each injection well covered by this application. All items must be addressed for the initial well. Responses for additional wells need be shown only when different. Information shown on schematics need not be repeated.

- (1) The name of the injection formation and, if applicable, the field or pool name.
- (2) The injection interval and whether it is perforated or open-hole.
- (3) State if the well was drilled for injection or, if not, the original purpose of the well.
- (4) Give the depths of any other perforated intervals and detail on the sacks of cement or bridge plugs used to seal off such perforations.
- (5) Give the depth to and name of the next higher and next lower oil or gas zone in the area of the well, if any.

XIV. PROOF OF NOTICE

All applicants must furnish proof that a copy of the application has been furnished, by certified or registered mail, to the owner of the surface of the land on which the well is to be located and to each leasehold operator within one-half mile of the well location.

Where an application is subject to administrative approval, a proof of publication must be submitted. Such proof shall consist of a copy of the legal advertisement which was published in the county in which the well is located. The contents of such advertisement must include:

- (1) The name, address, phone number, and contact party for the applicant;
- (2) the intended purpose of the injection well; with the exact location of single wells or the section, township, and range location of multiple wells;
- (3) the formation name and depth with expected maximum injection rates and pressures; and
- (4) a notation that interested parties must file objections or requests for hearing with the Oil Conservation Division, P. O. Box 2088, Santa Fe, New Mexico 87501 within 15 days.

NO ACTION WILL BE TAKEN ON THE APPLICATION UNTIL PROPER PROOF OF NOTICE HAS BEEN SUBMITTED.

NOTICE: Surface owners or offset operators must file any objections or requests for hearing of administrative applications within 15 days from the date this application was mailed to them.

ARCO OIL AND GAS COMPANY
EMPIRE ABO UNIT J-10
APPLICATION TO INJECT GAS
MARCH, 1990

III. WELL DATA

- A. (1) Location
2310' FNL & 2310' FWL, Section 3-T18S-R27E
Eddy County, New Mexico
- (2) Casing
8-5/8" @ 1455' w/450 sx cement in 11" hole
TOC @ surface: circulated
5-1/2" @ 5705' w/300 sx cement in 7-7/8" hole
TOC unknown
- (3) Proposed Tubing
2-3/8" internally plastic coated @ approximately 5452'
- (4) Proposed Packer
Lok-set type (Baker Tool Co.) with on-off tool @ approximately
5452'
- B. (1) Injection formations: Abo
Pool Name: Empire Abo
- (2) Injection Interval: Perfs 5564-5630'
- (3) Well was drilled as an oil producer
- (4) No other perfs
- (5) Next higher productive pool: San Andres - Top of the San Andres
occurs at 1673'

VII. PROPOSED OPERATION

- (1) Average daily rate of fluid to be injected: 6000 MCFPD
- (2) The system is closed
- (3) Average injection pressure: 2000 psi
Maximum injection pressure: 2000 psi
- (4) Source of injection fluid: Empire Abo Unit Gas Injection Plant

IX. PROPOSED STIMULATION

Acidize perfs w/3500 gallons 15% NEFE HCl

ARCO OIL AND GAS COMPANY
EMPIRE ABO UNIT J-13
APPLICATION TO INJECT GAS
MARCH, 1990

III. WELL DATA

- A. (1) Location
1980' FNL & 660' FWL, Section 2-T18S-R27E
Eddy County, New Mexico
- (2) Casing
8-5/8" @ 1006' w/675 sx cement in 11" hole
TOC @ surface: circulated
5-1/2" @ 6131' w/225 sx cement in 7-7/8" hole
TOC unknown
- (3) Proposed Tubing
2-3/8" internally plastic coated @ approximately 5600'
- (4) Proposed Packer
Lok-set type (Baker Tool Co.) with on-off tool @ approximately
5600'
- B. (1) Injection formations: Abo
Pool Name: Empire Abo
- (2) Injection Interval: Perfs 5710-5724', 5754-5784'
- (3) Well was drilled as an oil producer
- (4) Perfs from 2300-2301' were squeezed w/525 sx cement. Perfs
from 5020-5021' were squeezed w/275 sx. Perfs from
5364-5390' were squeezed w/105 sx.
- (5) Next higher productive pool: San Andres - Top of the San Andres
occurs at 1672'

VII. PROPOSED OPERATION

- (1) Average daily rate of fluid to be injected: 6000 MCFPD
- (2) The system is closed
- (3) Average injection pressure: 2000 psi
Maximum injection pressure: 2000 psi
- (4) Source of injection fluid: Empire Abo Unit Injection Plant

IX. PROPOSED STIMULATION

Acidize perfs w/15% NEFE HCl

Section VI.
Well Data in Area of Review

ARCO Empire Abo Unit Well No. J-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1488' cemented with 700 sacks, circulated .
4-1/2" @ 5720' cemented with 850 sacks, top of cement @ 925'.
Date Drilled: 8-5-59
Location: 2310' FNL & 1650' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5720'
Record of Completion: Perf 5620-5664' w/ 2JSPF. 2000 gals. 15% HCl. 79 BO,
1BAW & 88 MCF in 20 hrs. CIBP set @ 5269' on 8-24-77

ARCO Empire Abo Unit Well No. J-12

Type: EAU Gas Injection Well
Construction: 8-5/8" @ 997' cemented with 600 sacks, circulated .
5-1/2" @ 6123' cemented with 250 sacks, top of cement @ 4400'.
Date Drilled: 8-5-59
Location: 1980' FNL & 660' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6123'
Record of Completion: Perf 5650-670' w/ 2JSPF & treated w/500 gals 15% HCl on
2/59 . Treated with 2000 gals 15% on 6/70. Perf 4630-32 and
squeezed w/800 sacks on 7/79. Perf 700-02 and squeezed with 130
sacks, circulated to surface. Ran 2-3/8" IPC tbg. Packer at 5605'.
Treated with 5000 gals. 15%.Started GI @ 7-3-79. Perf 5592-5608 &
5572-80 & 5536-58 w/ 1 JSPF. 10,000 gals 15 %.

ARCO Empire Abo Unit Well No. J-14

Type: EAU Oil Producer
Construction: 8-5/8" @ 971' cemented with 600 sacks, circulated .
5-1/2" @ 6160' cemented with 230 sacks.
Date Drilled: 1-23-59
Location: 2180' FNL & 1905' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6133'
Record of Completion: Perf. 5620-40 & treated with 2000 gal DAD. Squeezed perms @
5620-40 w/ 100 sacks on 9/74. Perf. 5748-5776 acidized w/ 3200
gals. 15% on 9/74. Acidized w/ 6000 gal DAD treatment on 10/74.
286 BO, 15 BW & 315 MCFPD.

ARCO Empire Abo Unit Well No. J-15

Type: EAU Oil Producer
Construction: 8-5/8" @ 1216' cemented with 650 sacks, circulated .
5-1/2" @ 5920' cemented with 300 sacks.
Date Drilled: 3-4-59
Location: 1980' FEL & 2310' FNL, Sec 2-18S-27E; Eddy Co.
Depth: 5920'
Record of Completion: Perf. 5773-95 & 5810-72 oa w/ 2SPF. Treated with 2000 gal
15%, 9/59. Perf. 4010' cemented with 625 sacks.

ARCO Empire Abo Unit Well No. K-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1493' cemented with 650 sacks, circulated .
5-1/2" @ 5881' cemented with 250 sacks. TOC @ 4120'
Date Drilled: 2-25-59
Location: 1980' FSL & 1780' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5881'
Record of Completion: Perf. 5650-70 w/ 2SPF.No treatment, TOC @ 4120'. Treated
with 5000 gal 15% on 5/64. Well was St 9/76.

ARCO Empire Abo Unit Well No. K-12

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 700 sacks, circulated .
5-1/2" @ 6103' cemented with 435 sacks. TOC @ 2675'
Date Drilled: 12-31-58
Location: 1980' FSL & 660' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6103'
Record of Completion: Perf. 5314-32 w/ 2SPF. Treated with 1000 gal 15%. Sqz.
4/64 w/ 100 sacks & perf. 5656-64, 5670-86 w/ 2spf. Acidize w/
1000 gals. Sqz. w/ 150 sacks on 6/77. Spotted 100 gals acetic acid
5806-5686. Perf. 5766-5804 w/ 2 spf. Acidized w/ 500 gals. 15%.
Pumped 1500 gals. DAD treatment.

ARCO Empire Abo Unit Well No. K-143

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 600 sacks, circulated .
5-1/2" @ 6107' cemented with 1275 sacks.
Date Drilled: 4-16-79
Location: 1820' FSL & 2550' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6107'
Record of Completion: Perf. 5910-25 w 2JSPF. treated w/ 1000 gal 15% and flushed
with 20 BLC. Sqz. w/ 125 sacks and perf. 6070-90 w/ 2JSPF. Treated
with 150 gals 15%, 1000 gals CaCl wtr, 1000 gals LC, 2000 gals acid.
Completed well on 5/79.

ARCO Empire Abo Unit Well No. I-10

Type: EAU GI
Construction: 8-5/8" @ 1471' cemented with 600 sacks, circulated .
4-1/2" @ 5710' cemented with 750 sacks.
Date Drilled: 11-30-59
Location: 990' FNL & 2310' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5710'
Record of Completion: Perf. 5825-305 w 2JSPF. Acidized with 2000 gals. Sqz. with
239 sacks. Perf. 5456-82 with 2JSPF. Acidized with 3000 gals. 15%.
108 BO in 24 hrs. 12-25-59. 2/3/74 treated 5532-46 w/ 1000 gals
acid. Treated perfs. 5456-5516 w/ 5000 gals. 15% acid. Ran IPC tbg
and started gas injection 5456-5546 on 6/22/74.

ARCO Empire Abo Unit Well No. I-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1485' cemented with 700 sacks, circulated .
4-1/2" @ 5719' cemented with 850 sacks. TOC 125'.
Date Drilled: 10-29-59
Location: 972' FNL & 1647' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5719'
Record of Completion: Perf. 5554-98 w 2JSPF on 11-20-59.

ARCO Empire Abo Unit Well No. I-12

Type: EAU Oil Producer
Construction: 8-5/8" @ 1496' cemented with 700 sacks, circulated .
4-1/2" @ 5661' cemented with 850 sacks. TOC 650'.
Date Drilled: 10-05-59
Location: 982' FNL & 330' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 5661'
Record of Completion: Perf. 5610-30 and treated w/ acid 10/59.

ARCO Empire Abo Unit Well No. I-13

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 1479' cemented with 700 sacks, circulated .
4-1/2" @ 5695' cemented with 850 sacks.
Date Drilled: 10-29-59
Location: 990' FNL & 650' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 5695'
Record of Completion: Perf. 5610-54 w 2JSPF , treated w/ 3000 gals., 15%.
Completed on 11-20-59.

ARCO Empire Abo Unit Well No. J-09

Type: EAU Oil Producer
Construction: 8-5/8" @ 1463' cemented with 620 sacks .
5-1/2" @ 5656' cemented with 350 sacks.
Date Drilled: 5-29-60
Location: 2310' FNL & 990' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5656'
Record of Completion: Perf. 5562-5614 w 2JSPF. Treated w/ 3000 gals acid
4/15/68. On 12/11/70 set CIBP @ 5540. Perf. 5463 & pumped 500
gals acid & squeezed thru perms 125 sacks cement. Pushed down CIBP to
5630 and acidized perms @ 5562-5614 w/ 2000 gals. On 9-16-71
treated w/ 5000 gals acid. On 1-19-72 acidized w/ 3000 gals 20%. SI
12-1-76. Returned to production 8-29-87 @ 63 BOPD 3 BWPD & 410
MCFPD.

ARCO Empire Abo Unit Well No. K-13

Type: EAU Oil Producer
Construction: 8-5/8" @ 993' cemented with 700 sacks.
5-1/2" @ 6094' cemented with 300 sacks.
Date Drilled: 10-05-58
Location: 1880' FSL & 660' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6094'
Record of Completion: Perf. 5360-86 w 4JSPF on 11-58. Treated w/ 500 gals. 15%.
1-64 squeezed & perf. 6043-50. Treated w/ 1000 gals.

ARCO Empire Abo Unit Well No. K-131

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 800 sacks, circulated .
5-1/2" @ 6145' cemented with 1360 sacks.
Date Drilled: 2-21-79
Location: 972' FNL & 1647' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6145'
Record of Completion: Sqz perms @ 5709-11. Pumped 200 sacks of cement then drilled
out and pressure tested casing. Perf. 6014- 34 w/ 2JSPF and acidized
w/ 2300 gals 15%. Completed on 4-17-79.

ARCO Empire Abo Unit Well No. K-14

Type: EAU Oil Producer
Construction: 8-5/8" @ 984' cemented with 775 sacks. TOC @ surface.
5-1/2" @ 6193' cemented with 175 sacks.
Date Drilled: 11-23-58
Location: 1980' FSL & 1830' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6193'
Record of Completion: Perf. 5410-36 w 4SPF & acidized w/ 2500 gals. No production
was obtained on test and the perms were squeezed w/ 100 sacks cement.
Perf'd 5420-70 w/ 2SPF & acidized w/ 1000 gals. No production
obtained & perms were squeezed w/ 100 sacks cement. Perf'd 5540-
5555 w/ 2SPF and acidized w/ 5500 gals. Well flowed 75 BO in 24
hours. Completed 1-59. On 9-73 squeezed 5540-5555 w/ 100 sacks
cement and perforated 5946-97 w/ 2JSPF & acidized w/ 3000 gals.
Squeezed 1-29-80 & perforated 6100-6110'. Acidized w/ 2000 gals
PAD acid on 10-30-86.

ARCO Empire Abo Unit Well No. K-141

Type: EAU Oil Producer
Construction: 8-5/8" @ 1006' cemented with 400 sacks, circulated to surface .
5-1/2" @ 6203' cemented with 300 sacks. TOC 1130'.
Date Drilled: 4-7-77
Location: 1370' FSL & 2445' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6203'
Record of Completion: Perf. 5990-6024' w/ 2JSPF acidized w/ 500 gals 15%. Perf'd
@ 6100' w/ four .45" holes & treated w/ 1000 gals DAD. Completed
5/18/77.

ARCO Empire Abo Unit Well No. K-142

Type: EAU Oil Producer (drainhole)
Construction: 10-3/4" @ 953' cemented with 400 sacks, circulated .
7" @ 6027' cemented with 575 sacks.
Date Drilled: 7-31-79
Location: 1700' FSL & 1400' FWL, Sec 2-18S-27E; Eddy Co.
Depth: 6027'
Record of Completion: Ran 5 1/2" OD 19' radius whipstock w/ 42' 4 1/2" anchor pipe,
87' 5 1/2" sheath pipe. Oriented whipstock w/ btm of anchor pipe at
6060'. Completed well 10/6/79.

ARCO Empire Abo Unit Well No. K-09

Type: EAU Oil Producer
Construction: 8-5/8" @ 1505' cemented with 700 sacks, circulated .
4-1/2" @ 5729' cemented with 800 sacks.
Date Drilled: 7-20-59
Location: 1650' FSL & 990' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5729'
Record of Completion: Perf. 5620-60, completed on 8-9-59. SI on 12-01-76.
Returned to production on 7/81

ARCO Empire Abo Unit Well No. K-10

Type: EAU Oil Producer
Construction: 8-5/8" @ 1465' cemented with 700 sacks, circulated .
4-1/2" @ 5778' cemented with 950 sacks.
Date Drilled: 5-23-59
Location: 1650' FSL & 2310' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5778'
Record of Completion: Perf. 5660-5700 w 2 SPF & treated w/ 1000 gals 15% on 6-
22-59.

ARCO Empire Abo Unit Well No. L-09

Type: EAU Oil Producer
Construction: 8-5/8" @ 1000' cemented with 700 sacks, circulated .
5-1/2" @ 6431' cemented with 160 sacks.
Date Drilled: 12-31-58
Location: 660' FSL & 660' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 6431'
Record of Completion: Perf. 5232-58 w 2 SPF. Perfs. were squeezed w/ 200 sacks and
well was reperforated @ 5560-90 & acidized w/ 1000 gals 15%.
Completed on 2/59. Well was SI 9-19-76. Returned to production after
casing repair on 9/86.

ARCO Empire Abo Unit Well No. L-10

Type: EAU Oil Producer
Construction: 8-5/8" @ 1500' cemented with 750 sacks, circulated .
5-1/2" @ 5830' cemented with 300 sacks.
Date Drilled: 2-20-59
Location: 660' FSL & 1980' FWL, Sec 3-18S-27E; Eddy Co.
Depth: 5830'
Record of Completion: Perf. 5718-40 w JSPF & acidized w/ 500 gals 15% &
completed on 4-7-59. Perf'd squeeze holes @ 3500' on 8/77. Pumped
500 sacks cement, DO cement & returned well to production.

ARCO Empire Abo Unit Well No. L-11

Type: EAU Oil Producer (TA'd)
Construction: 8-5/8" @ 983' cemented with 700 sacks, circulated .
5-1/2" @ 6043' cemented with 175 sacks.
Date Drilled: 12-2-58
Location: 610' FSL & 1980' FEL, Sec 3-18S-27E; Eddy Co.
Depth: 6043'
Record of Completion: Perf. 5340-65w 4 SPF & acidized w/ 500 gals 15%. Perfs
were squeezed and well was reperfd @ 5345-80 & treated w/ 1000 gals
15%. Well was completed 1/59. On 6/64 Perfs @ 5345-80 were
squeezed w/ 100 sacks and well was perforated 5847-58, 5866-75,
5882-92 w/ 2 SPF & acidized w/ 2000 gals LSTNE. On 11/80 squeezed
w/ 100 sacks and perf'd 5940-54 & 5958-66 and treated w/ 1650 gals
of 15%. Well SI 12-8-80.

CITGO Empire Abo Unit Well No. 14

Type: Oil Producer (TA'd)
Construction: 8-5/8" @ 982' cemented with 400 sacks.
5-1/2" @ 5701' cemented with 800 sacks.
Date Drilled: 5-23-60
Location: 330' FSL & 990' FWL, Sec 35-17S-27E; Eddy Co.
Depth: 5701'
Record of Completion: Perf. 5556-98 & acidized w/ 10000 gals 15%. IPF 1841 BOPD

CITGO Empire Abo Unit Well No. 9

Type: Oil Producer (TA'd)
Construction: 8-5/8" @ 985' cemented with 400 sacks.
5-1/2" @ 5629' cemented with 800 sacks.
Date Drilled: 4-20-60
Location: 330' FSL & 1900' FWL, Sec 35-17S-27E; Eddy Co.
Depth: 5629'
Record of Completion: Perf. 5504-50 & acidized w/ 10000 gals 15%. IPF 600 BOPD

CITGO Empire Abo Unit Well No. 5

Type: Oil Producer

Construction: 8-5/8" @ 963' cemented with 425 sacks.

5-1/2" @ 5764' cemented with 300 sacks.

Date Drilled: 7-5-59

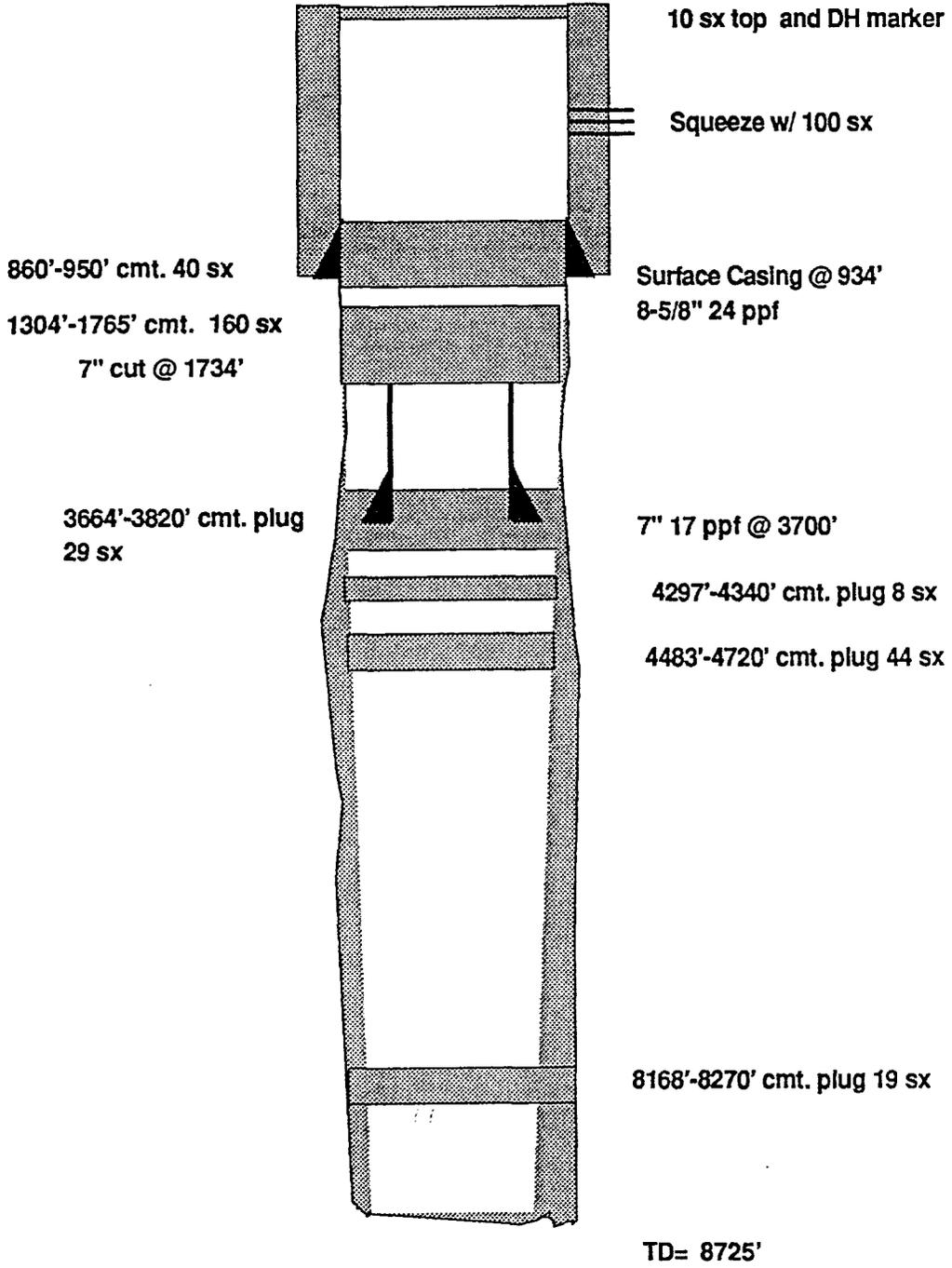
Location: 990' FNL & 1980' FWL, Sec 35-17S-27E; Eddy Co.

Depth: 5764'

Record of Completion: Perf. 5627-5731 OA & acidized w/ 2000 gals 15%. IPF 212
BOPD

Well Name & No.: Hondo C State No. 1
Date: 5-22-90

330' FNL & 990' FWL Sec. 2, 18 S and 27 E



Section VIII. Geological Data

The Empire Abo field produces from a transgressive, carbonate, barrier reef buildup of lower Leonardian (Permian) age. This reef is one of several in a long trend flanking the northern edge of the Delaware Basin. The reef grew from southwest to northeast. It is approximately 12.5 miles long and 1.5 miles wide. Parallel to the reef trend, the reef dips 1 degree from southwest to northeast. Perpendicular to this trend the reef dips sharply at 10 to 20 degrees from crest to fore-reef, or north to south. The average depth of the reef is 5800 feet and the thickness averages 300 feet.

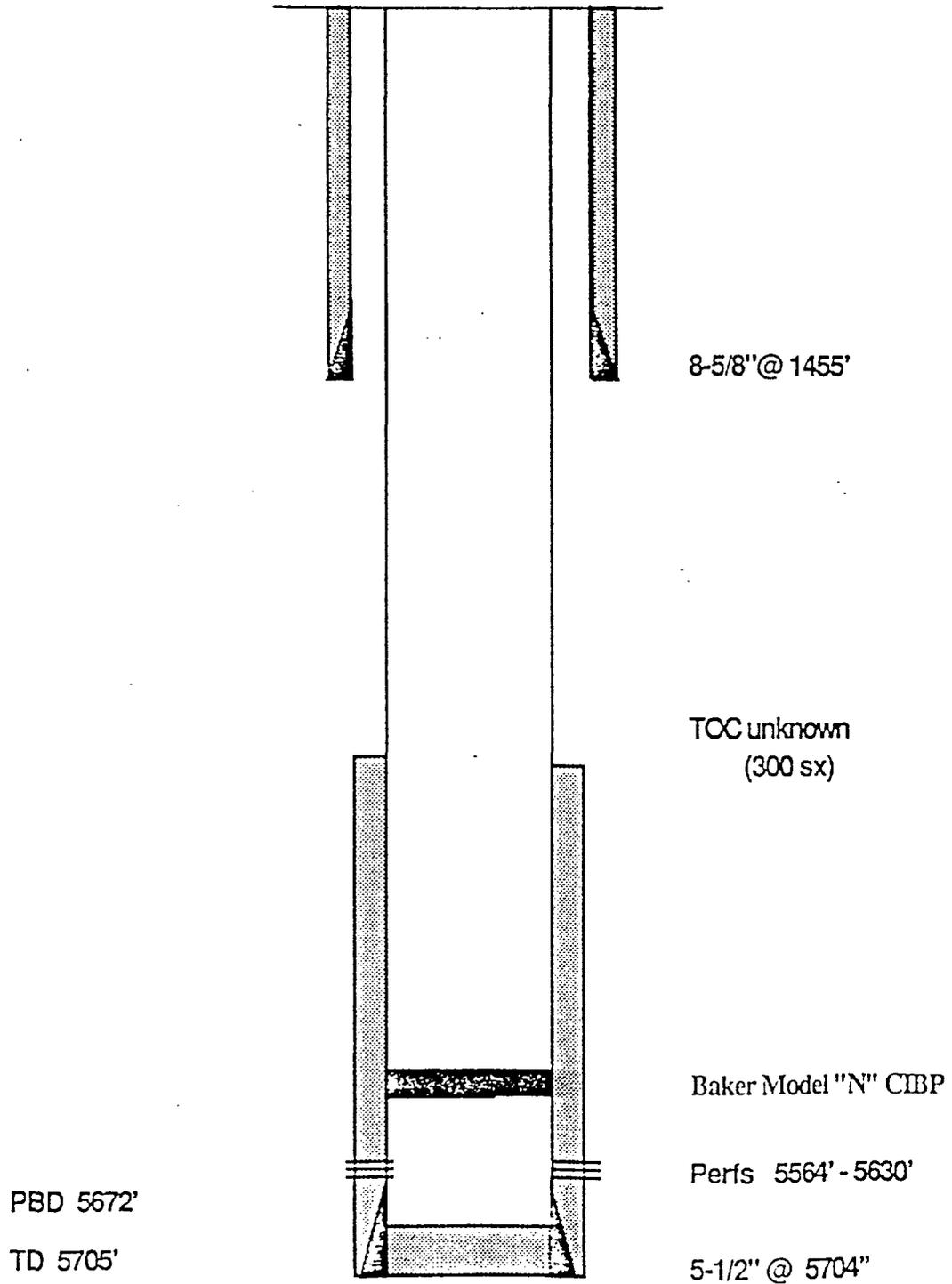
The trapping mechanism at Empire Abo is both stratigraphic and structural. The reef dips below the oil water contact to the south and east. Permeability pinch outs to the north and west occur as a result of carbonate muds, green shales and anhydrite inclusions.

Porosity development is erratic and cannot be correlated between wells. Development is the result of leaching of abundant detrital fossil fragments, dolomitization and recrystallization. The most prolific porosity development is found in the reef core. There is no apparent intercrystalline porosity.

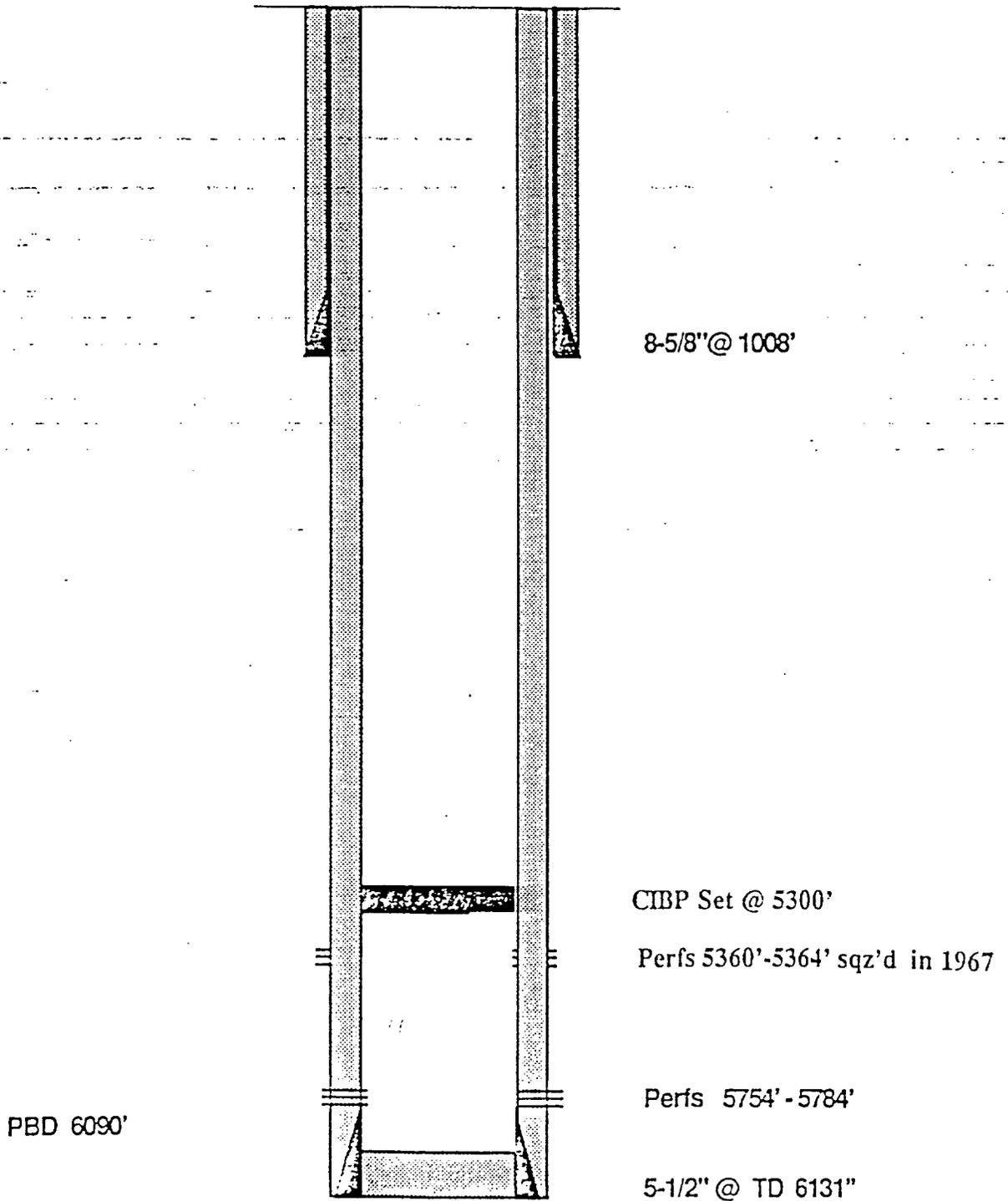
Vertical fracturing, which contributes to the gravity drainage mechanism of the reservoir, is apparently due to local slumping as well as large scale settling and some tectonic activity. Fracture orientation is generally 0 to 45 degrees from vertical and is parallel to the reef trend.

Empire Abo Unit # J-10

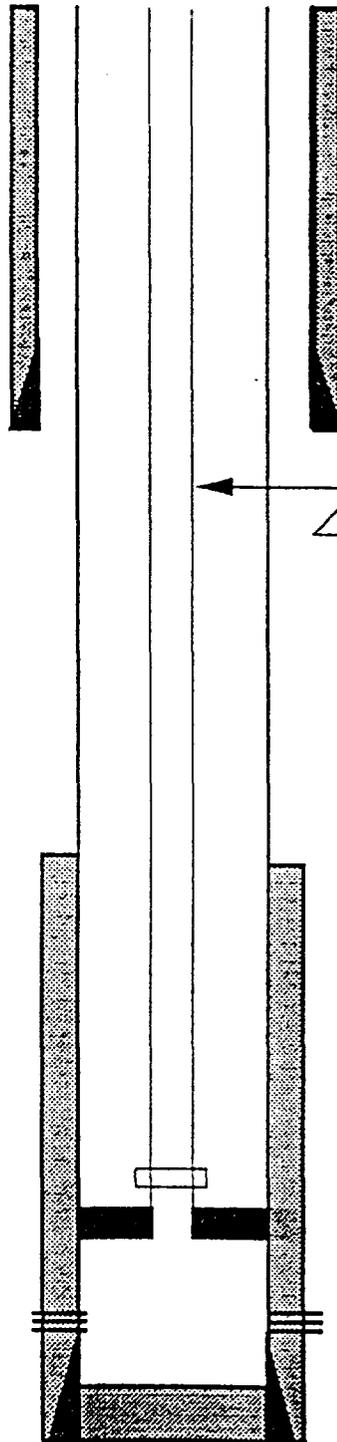
Present Wellbore Configuration



Empire Abo Unit # J-13
Present Wellbore Configuration



Empire Abo Unit # J-10
Proposed Wellbore Configuration



8-5/8" @ 1455'

2-3/8" 4.7# J-55 8rd EUE ABmod IPC tbg
Btm'd @ 5450'

TOC unknown
(300 sx)

On-off too w/1.78 "R" profile (Nickel Plated)
Lok Set pkr set @ 5450' (Nickel Plated)

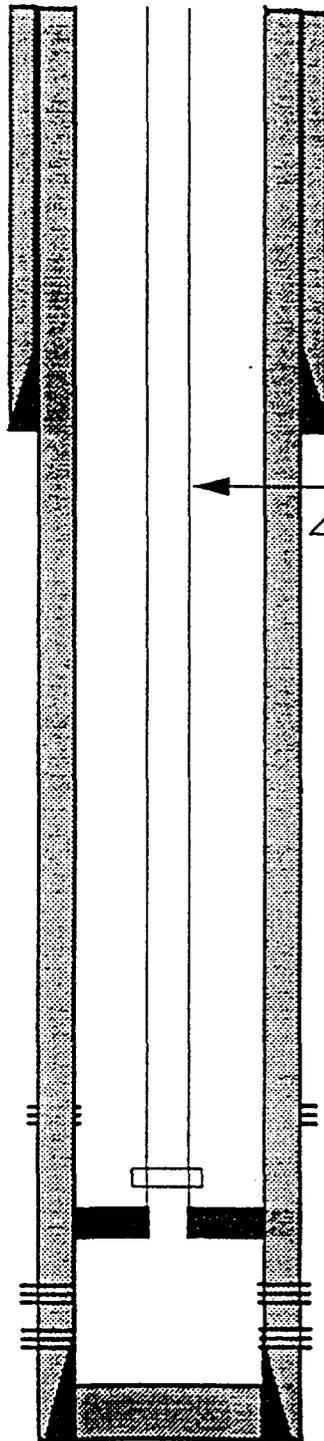
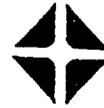
Perfs 5564' - 5630'

5-1/2" @ 5704'

PBD 5672'

TD 5705'

Empire Abo Unit # J-13
Proposed Wellbore Configuration



8-5/8" @ 1008'

2-3/8" 4.7# J-55 8rd EUE ABmod IPC tbg
Btm'd @ 5600'

Perfs 5360' - 5364' sqz'd 1967

On-off too w/1.78 "R" profile (Nickel Plated)

Lok Set pkr set @ 5600' (Nickel Plated)

Perfs 5710' - 5724'

Perfs 5754 - 5784'

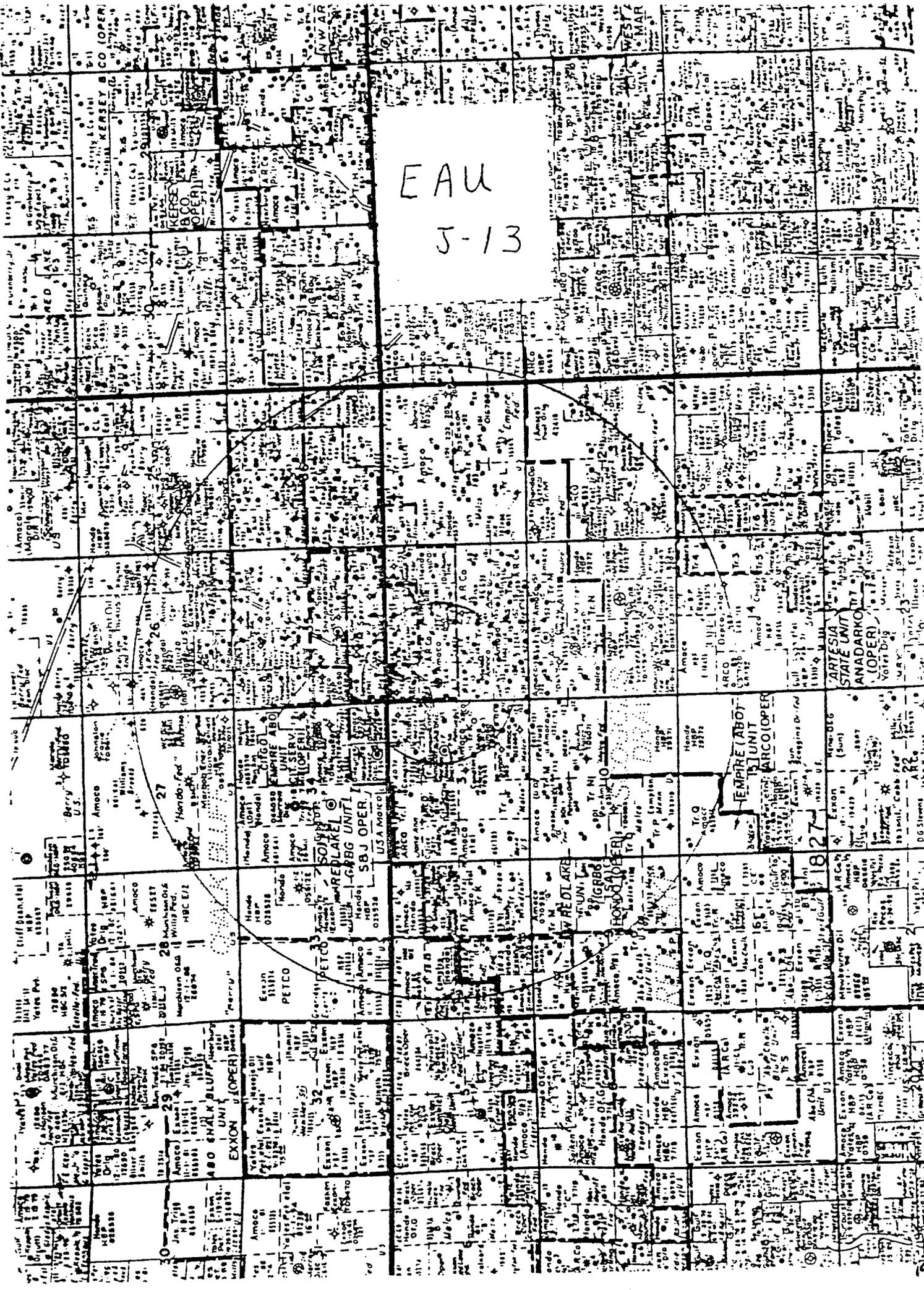
5-1/2" @ 6131'

PBD 6090'

TD 6131

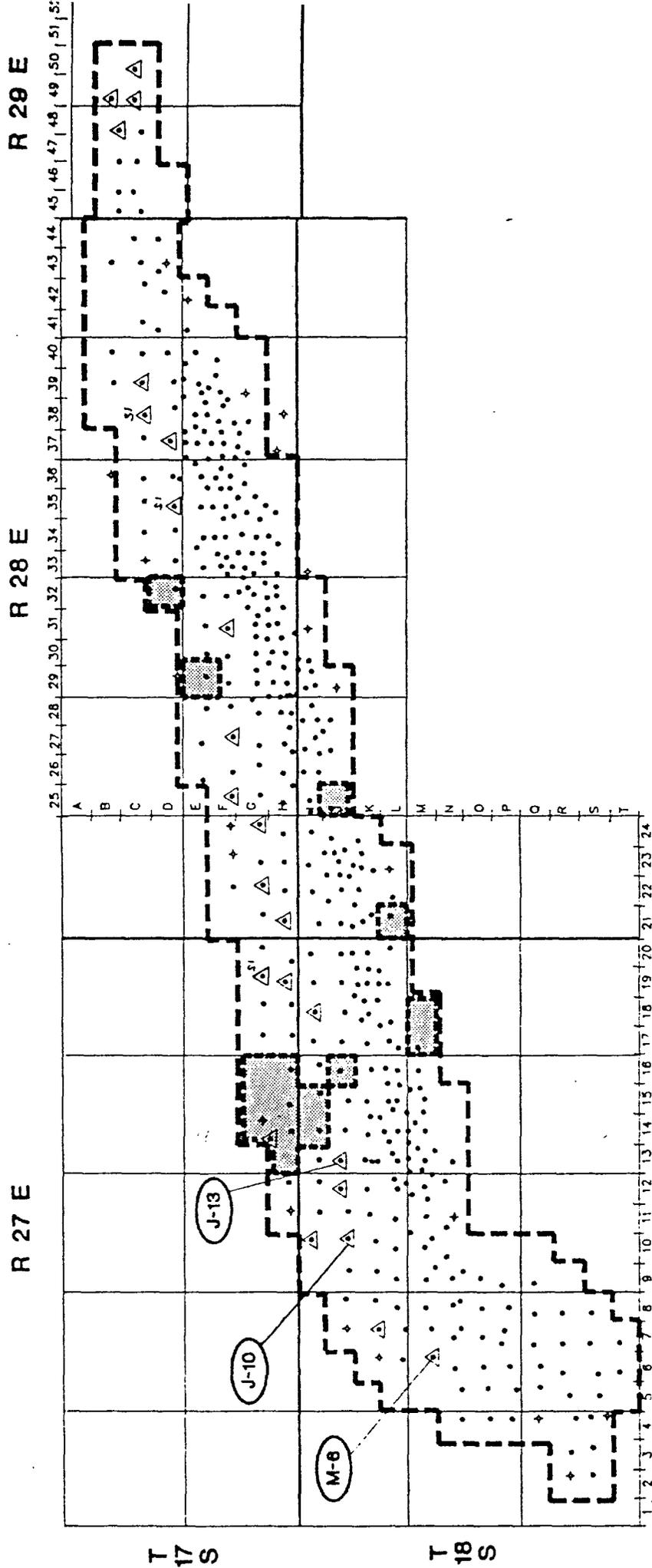
EAU

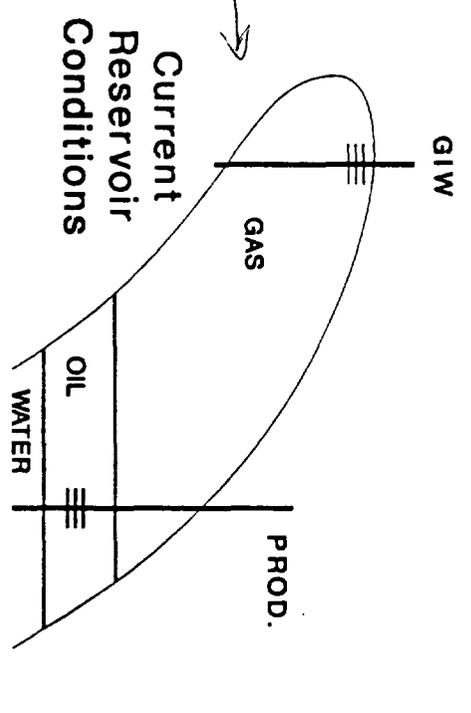
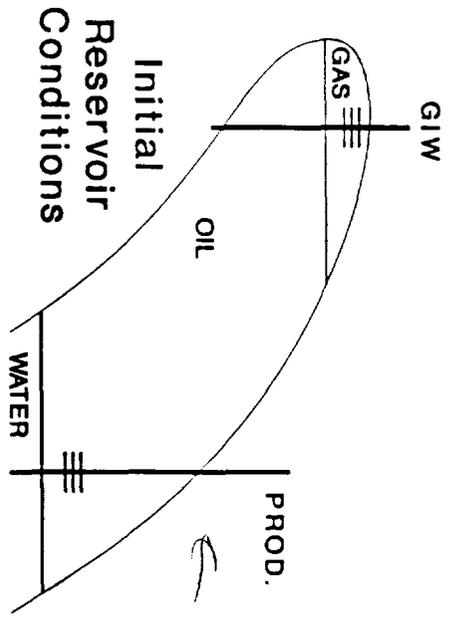
J-13



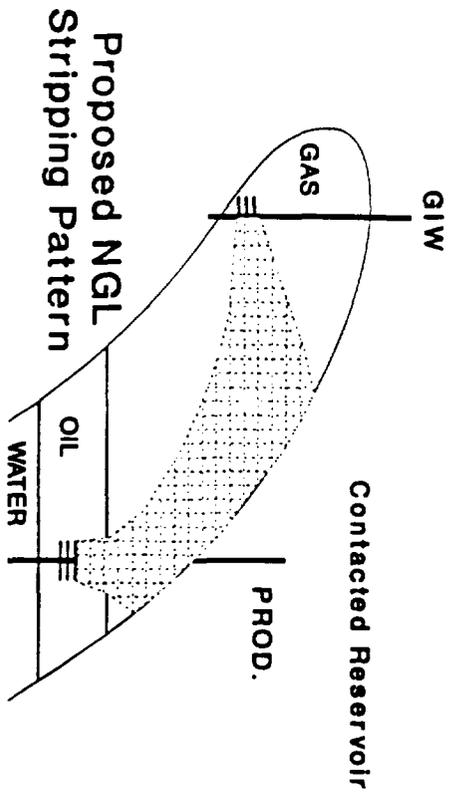
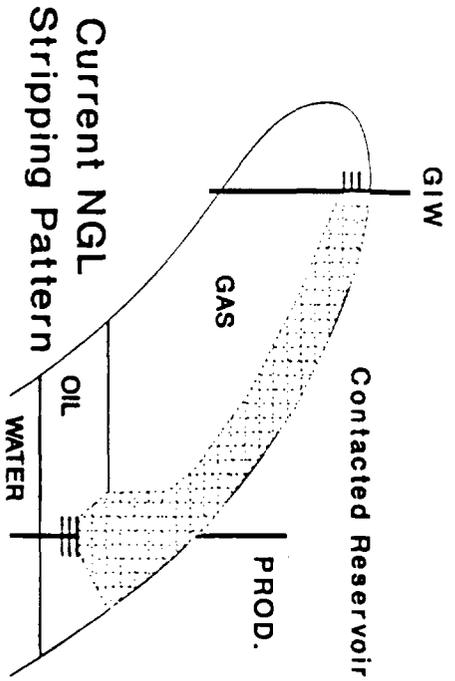
EMPIRE ABO UNIT

Eddy County, New Mexico





EMPIRE ABO UNIT
Reservoir Schematic



BEFORE EXAMINATION PROSNER
 OIL COMPANY RECORD DIVISION

ARCO _____ SERIAL NO. 5
 CASE NO. 9931

ARCO EMPIRE ABO UNIT

GAS INJECTION WELL M-6

OLD PERFORATIONS	5330-5420
OLD INJECTION RATE	71 MCFPD
NEW PERFORATIONS	5540-5584
NEW INJECTION RATE	3000 MCFPD

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
ARCO _____	EXHIBIT NO. <u>6</u>
CASE NO. <u>9931</u>	

ARCO OIL & GAS EMPIRE ABO UNIT

TARGET AREA AVERAGE NGL CONTENT	5 GAL/MCF
AVERAGE UNIT NGL CONTENT	3.80 GAL/MCF
INCREMENTAL NGL CONTENT	1.2 GAL/MCF
EXPECTED INJECTION RATE	6 MMCFPD
EST. NGL PRODUCTION RATE GAIN	170 BPD

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
ARCO	EXHIBIT NO. 7
CASE NO	9931

BEFORE THE

OIL CONSERVATION DIVISION

NEW MEXICO DEPARTMENT OF ENERGY, MINERALS AND NATURAL RESOURCES

IN THE MATTER OF THE APPLICATION
OF ARCO OIL & GAS COMPANY FOR
PRESSURE MAINTENANCE EXPANSION,
EDDY COUNTY, NEW MEXICO.

CASE NO. 9931

AFFIDAVIT

STATE OF NEW MEXICO)
)ss.
COUNTY OF SANTA FE)

WILLIAM F. CARR, attorney in fact and authorized representative of ARCO Oil & Gas Company, the Applicant herein, being first duly sworn, upon oath, states that the notice provisions of Rule 1207 of the New Mexico Oil Conservation Division have been complied with, that Applicant has caused to be conducted a good faith diligent effort to find the correct addresses of all interested persons entitled to receive notice as shown by Exhibit "A" attached hereto, and that pursuant to Rule 1207, notice has been given at the correct addresses provided by such rule.

William F. Carr
WILLIAM F. CARR

SUBSCRIBED AND SWORN to before me this 12th day of June, 1990.

Charles E. Ferre
Notary Public

My Commission Expires:

August 19, 1991

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
<u>Arco</u>	EXHIBIT NO. <u>8</u>
CASE NO. <u>9931</u>	

EXHIBIT A

Bureau of Land Management
Carlsbad Resource Area
Post Office Box 1778
Carlsbad, New Mexico 88220
Attn: Barry Hunt

State Land Office
310 Old Santa Fe Trail
Santa Fe, New Mexico 87501
Attn: Floyd Prando

OXY, U.S.A., Inc.
Post Office Box 50250
Midland, Texas 79710
Attn: Frank Vitrano

CITGO EMPIRE ABO UNIT WELL #5

SWEET AREA AVERAGE NGL CONTENT	5 GAL/MCF
AVERAGE UNIT NGL CONTENT	3.80 GAL/MCF
INCREMENTAL NGL CONTENT	1.2 GAL/MCF
PRODUCTION RATE	700 MCFPD
EST. NGL PRODUCTION RATE GAIN	20 BPD

BEFORE EXAMINER STOGNER	
OIL CONSERVATION DIVISION	
<u>Area</u>	EXHIBIT NO. <u>9</u>
CASE NO. <u>9931</u>	