LAW OFFICES
LOSEE, CARSON & DICKERSON, P. A.
300 AMERICAN HOME BUILDING
P. O. DRAWER 239
ARTESIA, NEW MEXICO 88210

AREA CODE 505
746-3508

A. J. LOSEE
JOEL M. CARSON
CHAD DICKERSON
DAVID R. VANDIVER

October 2, 1981

OIL CONSERVATION DIVISION

, 1981

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VIA PUROLATOR

Energy and Minerals Department
Oil Conservation Division
P. O. Box 2088
State Land Office
Santa Fe, New Mexico 87501

Re: Case No. 7352
Application for Tight Formation
October 21, 1981 Examiner Hearing

Gentlemen:

Enclosed, please find four copies of a complete set of Exhibits 1 through 17, which Yates Petroleum Corporation proposes to offer or introduce at the hearing set for the captioned case, together with two separate statements of the meaning and purpose of each exhibit, one as to engineering (Exhibits 9 - 17) and one as to geological testimony (Exhibits 1 - 8).

Sincerely yours,

LOSEE, CARSON & DICKERSON, P.A.

Chad Dickerson

Chad Dickerson

CD:pvm
Enclosures

OIL CONSERVATION DIVISION
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ENGINEERING TESTIMONY - CASE NO. 7352

BACKGROUND

The data presented in this testimony will show that the Permo-Penn interval defined by the previous witness meets the guidelines set forth by the Federal Energy Regulatory Commission for designation as a tight gas sand formation under Section 107 (b) of the Natural Gas Policy Act. These guidelines require that three engineering criteria be met:

a) The estimated average insitu gas permeability, throughout the pay section, is expected to be 0.1 millidarcy or less.

b) The stabilized production rate, against atmospheric pressure, of wells completed for production in the formation, without stimulation, is not expected to exceed 188 thousand cubic feet per day (Mcf/D) for production from an average depth of 5827 feet.

c) No well drilled into the proposed tight formation is expected to produce, without stimulation, more than five barrels of crude oil per day.

EXHIBIT NO. 2

Exhibit No. 2 is a map presented by the previous witness on which is outlined the area for which a tight gas sand designation is sought. The red dots show the location of the 50 wells completed in the designated Permo-Penn interval as of January 1, 1981. The triangles indicate wells where drill stem test data was used to calculate the insitu permeability of the pay section. We will discuss these permeability calculations in detail later. The square indicates the location of the one well where core data is available.

EXHIBIT NO. 9

Exhibit No. 9 is a list of all wells within the boundaries of the proposed area that were drilled deep enough to penetrate the designated Permo-Penn interval. Information on the 333 wells includes well name, location, operator, spud date, total depth, field and production up to January 1, 1981. The list is current to the start of 1981. Most of these wells were Morrow prospects drilled to depths near 9000 feet. There are 119 Morrow producers in the proposed area. These Morrow

wells have produced a total of 82.21 billion SCF for an average of 691 million SCF per well. The Morrow is the principal gas-producing interval in this area. Many of the deep wells in Exhibit No. 9 will be recompleted in the designated Permo-Penn formation at some point in the future if the Permo-Penn gas can be produced economically. In addition, exploratory drilling for Morrow gas will be stimulated somewhat when the tight gas sand designation makes the Permo-Penn interval a more attractive salvage zone. The drilling of a Morrow well is always a risky project since the Morrow pay zone consists of a series of meandering channels that twist and turn in an impredictible fashion.

EXHIBIT NO. 10

Exhibit No. 10 is a list of the 50 wells completed in the designated Permo-Penn formation as of January 1, 1981. Most of the engineering data on the subject formation will come from the wells in Exhibit No. 10. Although the average depth (which is considered top) to the top of the designated Permo-Penn interval is 5822 feet, production from 49 of the 50 wells comes from below 5822 feet. The average depth to the top of the pay zone in these 50 wells is 6490 feet. These wells have produced a total of 9.01 billion SCF for an average of 180 million SCF per well. Although the designated Permo-Penn interval is less productive than the Morrow, it still represents a significant resource of natural gas to be utilized when economic conditions are favorable.

EXHIBIT NO. 11

Exhibit No. 11 lists the wells that were spudded or completed in the designated Permo-Penn interval after July 16, 1979. These eight wells are the only ones out of the 50 wells in Exhibit No. 10 that would be eligible for tight gas prices should the present application for tight gas designation be approved. Approximately five additional wells have come on line in 1981. These would also be eligible if the tight formation designation is approved. All production from the other 42 active wells will never be eligible for tight gas prices under current regulations. Our application mainly seeks a long-term opportunity to produce gas from the designated Permo-Penn formation by recompleting wells originally drilled to deeper horizons.

DESCRIPTION OF FORMATION BY ENGINEERING PARAMETERS

With the foregoing as background, we now consider in detail the engineering data available for the designated Permo-Penn formation in the proposed area. The data will demonstrate that three criteria are met:

a) The average permeability in the natural state is less than or equal to 0.1 millidarcy.

b) The stabilized flow rate before stimulation is less than 188 Mcf/D.

c) No well produces more than 5 barrels of oil per day.

The estimated average insitu gas permeability throughout the pay section was calculated by two standard methods that are widely accepted in the industry. These methods include:

1) Permeability calculation from pressure buildup data taken during drill stem tests.

2) Laboratory measurements on a cored section of the designated Permo-Penn interval from a single well.

In a pressure buildup test, a well is produced for a period of time and then shut-in. Bottom-hole pressure data is recorded throughout the shut-in period. Here the conventional Horner method of analysis was used to estimate formation permeability. In this method, the bottom-hole pressure after shut-in is plotted against the quantity $\frac{T+\Delta T}{\Delta T}$ on semilog paper and the slope of the straight-line portion of this plot is measured. Here T is the length of time the well was allowed to flow and ΔT is the variable time since the well was shut-in. The average permeability is calculated from the equation $k = \frac{162.6\ q\ B_g\ u}{mh}$ where

k = average permeability (millidarcys)

q = gas flow rate before shut-in (barrels per day)

B_g = gas formation volume factor (reservoir ft^3/standard ft^3)

u = viscosity of gas (centipoises)

m = slope of straight line on Horner plot (psi per cycle)

h = height of pay zone (feet).

Here, the gas flow rate (q) was measured during the flowing phase of the drill stem test. The formation volume factor (B_g) and the gas viscosity (u) were both calculated from the compositon of the gas recovered during the drill stem test.

The slope (m) was measured directly from the Horner plot and the height (h) of the pay zone was estimated from the section of the electric logs that covers the same interval as the drill stem test.

Permeability calculated from drill stem test data will give a good representation of insitu permeability since the drill stem test is performed while the well is still being drilled. The formation has been altered relatively little from its natural condition. If there is some formation damage due to the drilling mud, most of this damage is removed during the preflow phase of the drill stem test. In contrast, pressure data taken after the well is acidized or fractured will give higher values for the permeability because the formation has been etched and broken by the treatments.

EXHIBIT NO. 12 No evidence of calculations

Exhibit No. 12 shows data from drill stem tests at ten wells within the proposed area. The locations of these wells are indicated by the triangles on Exhibit No. 2. Of the ten wells, only Murphy NW Federal #1 is not completed in the designated Permo-Penn formation. This well was cored and drill stem tested in the Permo-Penn interval, but is now a completed Morrow producer. The values of permeability calculated from the drill stem tests range from 0.003 millidarcy for Irish Hills KW State #2 to 0.091 millidarcy for La Cama #1. The average permeability for the ten wells was determined to be 0.031 millidarcy.

The last column in Exhibit No. 12 (labelled "Years to Reach Pseudo-Steady State") gives the approximate time required for a pressure disturbance at the wellbore to reach the outer boundary of the reservoir feeding the well. Said another way, gas near the outer boundary of the reservoir begins to move toward the wellbore at the time indicated in Exhibit No. 12. Flush production of gas relatively near the well occurs until the whole reservoir is feeding the well. Then the pressure begins to drop with time uniformly throughout the reservoir and the flow rate becomes stabilized. The calculated time to reach stabilized flow ranges from 1.8 years for Cities JG State #1 to 33 years for Irish Hills KW State #2. The average time was determined to be 10.7 years.

The formula for the length of time required to reach stabilized, or pseudo-steady state, flow is

$$t = \frac{1136 \, \phi \, uc_t \, r_e^2}{k}$$

find perf. for each well and figure ϕ from logs to reach Exhibit #12 figures

where

t = time to stabilize (hours)

ϕ = porosity of pay zone (fraction)

u = viscosity of gas (centipoises)

c_t = total compressibility of the rock - fluid system (psi^{-1})

r_e = radius to reservoir boundary (feet)

k = permeability (millidarcys)

In the calculation, the porosity (ϕ) was taken from the electric logs and the viscosity (u) was determined from the composition of the produced gas. Since the gas is so much more compressible than the rock or the water, the compressibilities of the rock and the water were ignored and the total compressibility was taken as the compressibility of the gas times the gas saturation ($C_t = S_g C_g$). The compressibility of the gas was determined from its composition while the gas saturation came from the electric logs. The drainage area was assumed to equal the 320-acre proration unit and the radius was set at 2106 feet for a 320-acre circle. The permeability of the formation was calculated from the pressure buildup data as described above. The idea of a time to reach stabilized flow was introduced here because it follows naturally from the calculation of the formation permeability. We will discuss stabilized flow in more detail after all the data on permeability have been presented.

how (what pair) is this determined

EXHIBIT NO. 13

The second procedure for obtaining insitu permeability is to measure the permeability of actual cored sections of Permo-Penn rock in the laboratory. The only core data available comes from the Murphy NW Federal #1 well marked with a square in Exhibit No. 2. A log of the Permo-Penn interval in the Murphy well appears in Exhibit No. 5 (Well 6), and Exhibit No. 13 shows the permeabilities measured by Core Laboratories for the 72 feet of core recovered. Special tests were run on 16 samples from the Murphy core to evaluate the effects of overburden pressure on the core samples in order to determine a representative value for the insitu reservoir permeability. Routine core analyses are normally run with a confining or overburden pressure of only 200 psi. The overburden pressure within the Permo-Penn formation is really about 3300 psi and special core tests were required in order to correct the results of routine core analyses for the effects of the actual overburden pressure. The results of these special tests, performed

how was this determined?

how are these special test done discrib procedure.

at an overburden pressure of 3300 psi, are listed in the last columns of Exhibit No. 13.

EXHIBIT NO. 14 totally Confused

Exhibit No. 14 shows the correlation that was developed between routine permeability at 200 psi overburden pressure and insitu permeability at actual overburden pressure of 3300 psi. Data from the petroleum literature was used to help define the relationship since there are relatively few data points available for the Murphy core. The dashed line in Exhibit No. 14 is a correlation developed by F. O. Jones and W. W. Owens of Amoco Production Company for rocks where overburden pressure has a minimum effect on permeability. This Amoco research work was reported in the Journal of Petroleum Technology in September of 1980 (pages 1631-1640). The solid line in Exhibit No. 14 was drawn parallel to the dashed line in order to better fit the actual data points for the Murphy core. Then this solid line was used to convert the routine permeability values into insitu permeabilities at 3300 psi overburden pressure.

refers to JPT article

EXHIBIT NO. 15

Exhibit No. 15 tabulates the permeabilities of the core material from the Permo-Penn pay section in the Murphy NW Federal #1. Those sections of the interval that the electric log condemned as non-productive are omitted. The average routine permeability for the Murphy well is 0.116 millidarcy. It happens that the insitu permeability corrected for overburden pressure from core data (Exhibit No. 15) and the insitu permeability from buildup data (Exhibit No. 12) are both 0.035 millidarcy for Murphy NW Federal #1. The Murphy well can be considered a typical well since its insitu permeability of 0.035 millidarcy is very close to the average 0.031 millidarcy for the ten wells in Exhibit No. 12.

Two standard types of permeability data have been presented. The average insitu permeability from drill stem test data is 0.031 millidarcy. The average insitu permeability from available core data is 0.035 millidarcy. Both types of engineering data indicate that the permeability of the designated Permo-Penn pay section is confortably below 0.1 millidarcy.

EXHIBIT NO. 16

Data on flow rates before stimulation are not available for the vast majority of the wells that produce from the designated Permo-Penn formation. Natural flow rates are so low that they are routinely neither measured nor recorded. The normal completion procedure has been to perforate and immediately treat the well. We recall that nearly all these wells were completed before there existed a tight gas designation. In the absence of data on natural flow rates, we propose to use production data for the stimulated wells at a time in their life when the production rates are approaching stabilized values. Exhibit No. 12 showed that the time to reach a stabilized rate varied form 1.8 to 33 years and averaged 10.7 years. Thus, actual flow rates measured two years into the lives of the Permo-Penn wells will be either near stabilized rates or considerably higher than stabilized rates. Exhibit No. 16 shows actual production rates for the 24th calender month in the producing lives of the wells that are producing from the designated Permo-Penn formation. Only 34 of the 50 wells have been producing for two years or longer. The average rate of gas production for these 34 wells is 144 thousand cubic feet per day and the average rate of oil production is 0.6 barrels of oil per day. The gas rates vary from 1 to 655 thousand cubic feet per day and only two wells produced over 300 thousand cubic feet per day. The oil rates vary from zero to 4.1 barrels of oil per day after two years. Only one well produced over 2.0 barrels of oil per day and no well produced as much as five barrels of oil per day in the 24th month after it began production.

The FERC guidelines require that the gas flow rate be measured against atmospheric pressure. The average flow rate of 144 Mcf/D calculated above for stimulated wells was measured against pipeline pressures of 150 to 300 psi. The corresponding flow rate at one atmosphere is given by the equation

$$q\ (1\ \text{atm}) = q\ (\text{actual}) \times \frac{P_f^2 - P_s^2\ (1\ \text{atm})}{P_f^2 - P_s^2\ (\text{actual})}$$

where

P_f = reservoir pressure (2294 psia on average)

P_s (1 atm) = bottom-hole flowing pressure corresponding to one atmosphere at surface (15 psia)

P_s (actual) = actual bottom-hole flowing pressure (292 psia on average).

Then

$$q(1 \text{ atm}) = 144 \text{ Mcf/D} \times \frac{2294^2 - 15^2}{2294^2 - 292^2} = 146 \text{ Mcf/D}$$

is an estimate of the average stabilized production rate against atmospheric pressure based on data from stimulated wells.

The rates in Exhibit No. 16 are maximum values since all data applies to stimulated wells and since many of the wells have not actually stabilized. Thus, the average gas production rate is about 146 thousand cubic feet per day or less and the maximum oil production rate is about 4.1 barrels of oil per day or less under stabilized non-stimulated conditions.

FORMATION WATER SANDS

The classificaiton of the designated Permo-Penn formation as a tight gas sand in the proposed area will not cause problems with respect to formation water sands. All of the area proposed for tight gas sand designation lies within the Roswell Artesian Water Basin as established by the New Mexico State Engineer. The Roswell Artesian Water Basin is a main source of fresh water for Chaves County and northern Eddy County. Regulations governing the drilling of oil and gas wells within the Basin are enforced by the New Mexico Oil Conservation Division in order to protect the fresh water formations. These regulations require that a water protection casing string be set and cemented through the fresh-water-bearing strata. The base of the Artesian aquifer lies at a depth of about 1000 feet at the north end of the proposed area and at a depth of about 1400 feet at the south end. In a typical casing program, conductor pipe is set at a depth of 300 to 400 feet and cement is circulated to surface in order to protect the shallow fresh water. Then, an intermediate string of casing is set about a hundred feet below the base of the Artesian aquifer at a depth of 1100 to 1500 feet. Cement is circulated to surface behind the intermediate string to protect the Artesian aquifer. The production casing is set at the total depth of the well (usually in the Morrow formation) and cemented with 400 to 1000 sacks of cement. This provides a cement shield approximately 1000 feet above the top of the Permo-Penn formation. The application to drill and the casing program for each individual well must be approved by the New

Mexico Oil Conservation Division and the United State Geological Survey for wells on federal lands.

EXHIBIT NO. 17

Exhibit No. 17 summarizes the engineering data that has been presented on the designated Permo-Penn formation. The average insitu reservoir permeability, determined by two standard methods, averages less than the allowed 0.1 millidarcy. The average stabilized flow rate for gas is below the maximum allowed daily rate of 188 thousand cubic feet per day. Lastly, no well produces as much as five barrels of oil per day under stabilized conditions.

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 17S RANGE 24E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Divide Fed. JW #1	1980S	1980W	4	Yates	07-31-76	7160	Undesignated Wolfcamp	28,851
Hagstrom #1	1983S	1992W	8	Beard	01-23-78	7200	High Hope Atoka, East	43,981
Federal U #1	1980S	1980W	9	Socony & Mobil	02-14-65	8200	D & A	---
Hanlad #1	1980N	660W	17	Beard	07-08-78	7220	High Hope Atoka, East High Hope Abo, East	30,724 17,184
McCaw #1	1980N	1980E	18	Beard	06-13-78	7140	High Hope Atoka, East	115,246
Niles KA #1	660S	1980W	24	Yates	10-20-78	8186	Undesignated Wolfcamp	59,426
Federal GR #1	2050N	660E	25	Yates	10-31-76	8200	Eagle Creek Strawn Eagle Creek Permo-Penn	54,736 2,342
Cass North #1	660S	1980E	29	Pubco	02-11-72	8900	P & A	---
Mesa Federal #1	1980S	1980W	30	Estroil	08-28-74	7700	D & A	---
Catclaw ST #1	1980N	1980E	31	Mesa	11-16-78	7675	Gopher Abo	22,850
Marathon ST #1	660N	660E	33	Carper	02-15-64	7020	P & A	---
State DF #1	660N	660W	35	Yates	10-15-63	8269	Undesignated Abo	55,860
Pubco No. ST #1	1980S	1650E	36	Yates	05-16-80	8370	Eagle Creek Permo-Penn	530

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 17S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Eagle Federal #1	1980N	1980E	8	Pubco	03-08-72	7840	P & A	---
Sasha CA Fed #1	330S	1750E	9	Yates	07-31-73	7950	P & A	---
Artesia Airport CF #2	1650S	860E	10	Yates	10-12-74	8080	D & A	---
Artesia Airport CF #1	330S	990W	11	Yates	11-02-71	8099	Eagle Creek Atoka	471,878
Jackson AT #9	660S	660W	13	Yates	01-30-79	8400	Eagle Creek Atoka-Morrow, East	108,453
Achen-Frey DM #3	660S	1980W	13	Yates	05-10-74	8430	Eagle Creek San Andres	6,697 BO
Federal BZ #12	1980S	1980W	21	Yates	09-12-75	8180	Eagle Creek Strawn Eagle Creek Permo-Penn	24,905 1,267
Jackson Estate BY #9	1980S	990W	22	Yates	02-09-80	8295	Eagle Creek Atoka-Morrow, East	36,742
Mitchell IN #2	2030S	660E	23	Yates	08-09-77	9500	Eagle Creek Atoka-Morrow, East	70,510
Jackson GM #1	660S	1650W	24	Yates	08-27-76	8383	Eagle Creek Atoka-Morrow, East	829,029
City of Artesia EQ #1	1650S	1980E	24	Yates	08-16-75	8406	Eagle Creek Atoka-Morrow, East Eagle Creek Permo-Penn	28,011 55,974
Jackson EM #1	660S	1980E	25	Yates	06-15-75	8530	Eagle Creek Atoka-Morrow, East	5,225,365
Flint #1	1980S	660W	25	Western	02-04-74	8507	Eagle Creek Permo-Penn	347,524
Flint #2	660S	23I0W	25	Western	06-13-75	10243	Eagle Creek Atoka-Morrow, East Eagle Creek Permo-Penn	170,976* 199,378
Gossett EU #1	1650S	1980W	26	Yates	09-18-75	8420	Eagle Creek Strawn Eagle Creek Permo-Penn	251,851 209,181
Ingram Jackson BY #7	1980N	1980E	26	Yates	01-19-79	8430	Eagle Creek Atoka-Morrow, East	48,935
Morley EW #1	660S	660E	27	Yates	01-15-76	8443	Eagle Creek Permo Penn	175,000
Federal BZ #16	1980N	660E	28	Yates	09-29-76	8302	Eagle Creek San Andres	7,704 BO

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 17S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Gable FV #1	1980N	660E	29	Yates	03-24-76	8190	Eagle Creek Permo-Penn	67,314
Federal CR #1	660S	660W	29	Yates	07-31-73	8340	Richard Knob Atoka-Morrow	85,563
							Eagle Creek Strawn	4,018
							Eagle Creek Permo-Penn	144,538
Federal EF #2	1980S	660W	31	Yates	03-07-80	8440	Richard Knob Atoka-Morrow	2,744
							Eagle Creek Permo-Penn	3,230
State CY #1	1980S	1980W	32	Yates	11-26-73	8330	Richard Knob Atoka-Morrow	56,663
							Eagle Creek Strawn	29,310
							Eagle Creek Permo-Penn	131,358
Federal GC #1	660S	660E	32	Yates	06-07-76	8400	Richard Knob Atoka-Morrow	53,785
							Eagle Creek Strawn	33,955
							Eagle Creek Permo-Penn	95,579
Federal CR #4	1980S	1980W	33	Yates	12-26-78	8476	Richard Knob Atoka-Morrow	86,793
Sowers FB #1	1980N	660W	34	Yates	11-14-75	8515	Eagle Creek Permo-Penn	175,891
Manseau EK #1	660N	1980E	35	Yates	05-21-75	8455	Eagle Creek Strawn	179,660
							Eagle Creek Permo-Penn	110,664
Powell DG #1	660S	1980E	35	Yates	06-14-74	8700	Atoka Morrow, West	45,490
							Eagle Creek Permo-Penn	175,839
Arco EC ST #1	660N	2310E	36	Yates	03-20-75	8678	Eagle Creek Atoka-Morrow, East	4,668,718
							Eagle Creek Strawn	46,723
							Eagle Creek Permo-Penn	73,798
Arco EC ST #2	1980S	1100E	36	Yates	10-16-75	8590	Eagle Creek Strawn	321,680

* NO 1980 PRODUCTION

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 17 S, RANGE 26 E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Haldeman DA #1	660 S	2040 W	3	Yates	12-29-73	8420	P & A	---
Bowman NA #1	1980 S	1980 W	4	Yates	03-29-80	8200	Wildcat Canyon	146 BO
State CK #1	660 N	2180 W	4	Yates	06-03-66	8150	POW Morrow	856,242
SNY #1	1650 N	2310 W	5	Hondo	07-03-75	8053	D & A	---
Coll LD #1	660 S	660 E	9	Yates	06-14-80	8480	P & A	---
Bolton CU #1	660 N	2180 E	9	Yates	08-02-73	9040	D & A	---
Haines #1	760 S	1980 E	11	Coquina	01-29-74	8800	Undesignated Morrow	29,594*
Holt DL #1	1980 N	1980 W	12	Yates	05-19-74	8960	D & A	---
Holden DE #1	1980 S	1980 E	12	Yates	11-13-71	9000	Riverside Atoka	248,915
Haldeman OU #1	1980 S	1980 W	14	Yates	12-13-80	8734	P & A	---
Blaine #1	660 N	1980 E	14	Coquina	04-09-74	8803	D & A	---
Hunter FL #1	1980 N	1940 W	15	Yates	02-26-76	8597	Kennedy Farms Morrow	110,485
Caffal FD #1	660 S	1980 E	15	Yates	12-15-75	8670	Kennedy Farms Atoka Kennedy Farms Upper Penn	22,353* 87,068
Armstrong KS ST #1	1980 S	560 E	16	Yates	03-06-79	8580	Kennedy Farms Morrow	802,688
John ST #1	2180 S	2180 E	16	Coquina	05-15-74	8669	D & A	---
Hombaker HW #1	510 S	1680 E	20	Arco	06-20-66	8755	D & A	---
Siegenthaler IS #1	1980 S	660 E	21	Yates	11-07-77	8670	Kennedy Farms Morrow Kennedy Farms Atoka	879,061 37,384
Siegenthaler IS #2	1460 S	1980 W	21	Yates	02-14-78	8627	Kennedy Farms Upper Penn	20,255
Tom Brown GO #1	835 N	1980 W	22	Yates	12-10-76	8725	Kennedy Farms Morrow	1,168,104

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 17S RANGE 26E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Tidwell ED #1	990 S	660 E	22	Yates	01-19-75	8830	Kennedy Farms Morrow Kennedy Farms Atoka	1,153,888 39,592*
KD #1	660 S	1980 E	23	Antweil	12-20-78	8880	D & A	---
Berry EE #1	990 S	990 W	23	Yates	02-21-75	8807	Kennedy Farms Morrow	1,109,752
Sweet Yates FM #1	1980 N	1980 E	25	Yates	02-17-76	8997	Kennedy Farms Atoka	616,312
Hnulik EJ #1	1315 N	660 W	26	Yates	06-11-75	8850	Kennedy Farms Morrow Kennedy Farms Atoka	1,522,461 17,139*
Glenn Farmer #1	1980 S	1980 W	26	Sun Texas	06-24-77	8881	Kennedy Farms Morrow	43,616
JH Ansley #1	660 N	660 E	27	Sun Texas	11-24-74	8806	Kennedy Farms Morrow	1,228,506
Big Buck Pounds #1	1980 S	660 E	27	Hanson	05-22-74	8821	Kennedy Farms Morrow	399,106
Johnson JT	2016 N	660 E	28	Yates	07-25-78	8732	Kennedy Farms Upper Penn	91,170
Martin #1	1980 S	660 W	29	Maddox	02-10-77	8600	P & A	---
Nellor EO #1	1980 N	660 W	30	Yates	01-15-76	8477	D & A	---
Caskey EV #1	660 S	1400 W	30	Yates	11-19-75	8570	Eagle Creek Atoka-Morrow, East Eagle Creek Strawn	52,438 165,851
Goat Roper LP #1	1130 S	1300 E	30	Yates	02-08-80	8610	Eagle Creek Atoka-Morrow, East	120,204
Haldeman EN #1	1980 N	660 W	31	Yates	07-12-75	8595	Eagle Creek Atoka-Morrow, East	1,865,969
Patterson EL #1	880 S	660 W	31	Yates	08-15-75	8640	Eagle Creek Strawn	637,043
Patterson EL #2	660 S	2310 W	31	Yates	12-28-78	8942	Eagle Creek Atoka-Morrow, East	802,012
Kennedy JQ #1	2510 N	660 E	33	Yates	05-22-78	8732	Kennedy Farms Morrow Kennedy Farms Upper Penn	8,897 156,399
Kennedy Farms #1	1980 N	2310 W	34	Hanson	07-11-73	8860	Kennedy Farms Morrow	193,262

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 17S RANGE 26E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Clyde Guy #1	1980 S	660 E	34	Hanson	06-29-74	8975	D & A	---
Marjorie Naylor	990 S	1650 E	35	Fasken	03-14-75	9056	D & A	---
Blevins IK #1	960 N	690 W	35	Yates	09-13-77	8925	Kennedy Farms Morrow	253,003
Bradshaw IY #1	660 S	660 W	35	Yates	01-25-78	8992	D & A	---
Big Boggy ST #1X	990 S	2080 E	36	HEYCO	01-27-77	9185	D & A	---

* NO 1980 PRODUCTION

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 18S RANGE 24E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Federal CH #2	1980N	1980W	1	Yates	10-26-73	8376	TA	---
Spearman KQ #1	1980S	1980W	13	Yates	03-05-80	8800	Richard Knob Atoka-Morrow	68,707
Cities JG ST #1	660S	660E	13	Yates	10-28-78	8900	Undesignated Mississippian	43,844
							Penasco Draw Permo-Penn	11,755
Anderson ST CS #1-Y	1980N	1800E	14	Yates	03-15-68	7160	Penasco Draw Permo-Penn	206,550
Federal J #1	660S	660W	21	Midwest	09-11-70	8750	P & A	---
State HZ #1	1980N	1980E	22	Yates	05-03-77	8536	Undesignated Cisco	NOL
Weed ST #1	1980N	1880W	24	Mesa	08-06-78	8524	D & A	---
Lincoln ST #1	2030N	660E	24	Mesa	03-17-78	8636	Penasco Draw Morrow	395,543
State JM #1	660N	660E	25	Yates	10-29-78	9016	Penasco Draw Morrow	2,141
							Penasco Draw Permo-Penn	119,995
Cass ST #1	1980S	1980W	25	Pubco	05-26-72	8770	D & A	---
Four Mile ST #1	660S	1980E	26	Mesa	12-09-79	8744	Undesignated Group 3	1,235 BO
Federal AA #1	660S	660E	27	Yates	08-28-61	8673	Undesignated Group 1	530 BO
Maralo ST #1	660N	1980W	28	Estroil	09-15-75	8540	P & A	---
State 32 #1	1980S	660E	32	Maddox	04-01-78	8565	Antelope Sink Morrow	61,178*
State GP #1	1980N	1980E	33	Amoco	02-11-79	8880	D & A	---
Eddy 35 #1	1980N	1980E	35	Gulf	11-07-79	8974	Undesignated Group 1	2,593 BO
Rio ST #1	1980S	1980W	36	Mesa	03-13-79	8935	Penasco Draw Morrow	399,590
Rio ST #2	1980S	1980E	36	Mesa	06-09-79	8955	Penasco Draw Morrow	1,538,808

* NO 1980 PRODUCTION

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 18S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Superior Fed. #1	1980N	1980E	1	Coquina	06-26-73	8700	Atoka Morrow, West	1,151,339
Superior Fed. #2	1980S	1980W	1	Coquina	12-06-73	8677	Atoka Morrow, West	114,054*
Johnson #1	2080S	660E	2	Superior	09-06-73	8650	Atoka Morrow, West	792,432
Murphy NW #1	1980S	1980W	3	Yates	11-10-80	8630	Richard Knob Atoka-Morrow	NOL
Morris MC #1	1980N	1980E	3	Yates	10-26-79	8630	Eagle Creek Permo-Penn	78,103
Griffin JJ #1	1650N	1980W	4	Yates	02-28-78	8500	Eagle Creek Permo-Penn	239,587
Pipkin HE #1	660S	660W	4	Yates	02-17-77	8560	Eagle Creek Permo-Penn	73,408
Grynberg A Fed. #1	660N	1980E	5	Gulf	10-21-77	8400	Richard Knob Atoka-Morrow Eagle Creek Permo-Penn	108,919 14,490
Federal AB #2	660S	1980E	5	Yates	10-14-77	8555	Richard Knob Atoka-Morrow Eagle Creek Permo-Penn	475,907 115,552
Federal EF #1	660S	1980E	6	Yates	04-23-75	8413	Richard Knob Atoka-Morrow Eagle Creek Permo-Penn	63,673 89,086
Federal CX #1	1980N	660E	7	Yates	09-22-73	8625	Eagle Creek Permo-Penn	194,259
Federal CX #2	1980S	660W	7	Yates	07-12-77	8417	Eagle Creek Permo-Penn	7,943
Federal CX #3	1980S	2310W	7	Yates	02-16-79	8750	Eagle Creek Permo-Penn	34,881
Federal CZ #1	660N	1980E	8	Yates	12-29-73	8671	Richard Knob Atoka-Morrow Eagle Creek Permo-Penn	308,377 272,752
Yates Fed B #7	660S	1980E	9	Amoco	05-04-78	8700	D & A	---
Johnson #1	1980N	660E	10	Amoco	01-28-78	8700	Atoka Morrow, West	91,358
Clancy #1	660S	1980E	11	Coquina	03-23-73	8700	Atoka Cisco, West	32,664*
Hoffman #1	660N	1980E	11	Coquina	08-18-73	8635	P & A	---
Hare #1	660S	660E	12	Coquina	04-12-74	8871	Atoka Morrow, West	104,322
Pennzoil 13 Fed. #1	660S	1980E	13	Fasken	07-08-71	8920	Atoka Morrow, West	137,538

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 18S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Vandiver #1	1980N	1980W	13	Pennzoil	09-08-69	8859	Atoka Morrow, West	44,143*
Vandiver #2	1980N	660E	13	Brunson	05-26-73	8912	Atoka Morrow, West	469,510*
Five Mile Unit #1	1980N	660E	14	Coquina	12-05-72	8790	Atoka Cisco, West	64,125*
Upham KN #1	1980S	1980W	14	Yates	02-03-79	8880	Atoka Morrow, West	144,057
Four Dinkus GV #1	660S	1980E	16	Yates	02-11-77	8810	D & A	---
Four Dinkus IE ST #1	1980S	1980E	17	Yates	06-07-77	8700	D & A	---
Eddy GX ST #1	860S	2310E	18	Gulf	04-08-78	8680	Penasco Draw Permo-Penn	172,924
Gulf KC ST #1	660N	1980W	18	Yates	11-26-78	8800	Richard Knob Atoka-Morrow	813,113
Eddy GK ST #1	1980S	660E	19	Gulf	09-16-77	8825	Penasco Draw Morrow	707,827
Eddy GK ST #2	2310N	1980W	19	Gulf	11-25-77	8708	Penasco Draw Morrow	765,552
Penasco #1	660S	1980E	20	Antweil	03-30-77	8830	Penasco Draw Morrow	4,526,487
La Cama #1	1980N	1980W	20	Yates	09-11-77	8700	Penasco Draw Permo-Penn	463,762
Federal AB #5	1980S	660W	21	Yates	03-11-78	8894	Penasco Draw Atoka Undesignated Upper Penn Penasco Draw Permo-Penn	3,253 1,623* 13,871
No. Penasco MG #1	660S	660E	23	Yates	01-19-80	9040	P & A	---
Brown-Yates #1	1650S	990E	24	Fasken	12-20-70	9000	Atoka Morrow, West	10,308,027
Linck #1	1980S	1980W	24	Read & Bates	11-03-71	9050	D & A	---
Kincaid BI #2	600N	620E	25	Yates	10-16-72	9029	D & A	---
Yates AS #2	2310S	990W	25	Yates	03-03-67	5917	Penasco Draw SA Yeso	41,130 BO
Hornbaker BA #2	1980N	660E	25	Yates	03-15-72	9150	Penasco Draw SA Yeso	11,263 BO
Federal AY #2	1490N	1650W	25	Yates	03-24-71	9060	Penasco Draw SA Yeso	29,017 BO
Scout EH #2	1980S	660E	27	Yates	07-11-75	9090	Penasco Draw Atoka	34,871*
Scout EH #4	1980S	660W	27	Yates	08-19-79	9063	Penasco Draw Morrow	41,404

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 18S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Dinkus #1	1980S	1980W	28	Antweil	08-13-76	9034	Undesignated Morrow Undesignated Atoka	7,457* 119,595
Rio #1	1980N	1980E	29	Antweil	06-02-77	8868	Penasco Draw Morrow	469,821
Federal AB #4	660N	1980E	30	Yates	02-11-78	8800	Penasco Draw Morrow	1,610,439
Penasco ST #1	1980S	1980E	30	Mesa	06-06-78	8850	Penasco Draw Permo-Penn	69,351
Penasco IW #1	1980S	1980E	31	Yates	07-04-77	8973	Penasco Draw SA Yeso	5,515 BO
Lone Tree #1	660N	1980W	32	Bennett	08-10-77	8915	Penasco Draw Morrow	131,554
State BI #1	1980N	1980W	33	Scoggins	08-06-67	10130	P & A	---
Scout EH Fed. #3	660N	1980E	34	Yates	12-08-73	9150	Penasco Draw SA Yeso	1,890 BO
Rio Penasco JX #1	660S	1980W	35	Yates	08-16-78	9265	Boyd Morrow	1,124,423
Gushwa DR #1	1980N	660W	35	Yates	11-05-73	9220	Penasco Draw SA Yeso	14,531 BO
Gushwa DR #3	1980N	1980W	35	Yates	09-23-80	9160	Boyd Morrow	NOL
Eddy ST AC #1	1980S	660W	36	Gulf	12-31-58	9283	P & A	---
Kincaid Q #1	990S	1980E	36	Monsanto	04-30-65	9303	D & A	---

* NO 1980 PRODUCTION

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 19S RANGE 23E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Red Tank #1	1980N	1980E	2	Green	08-25-72	8200	P & A	---
South Hope ST #1	990S	1980E	5	Pubco	04-18-72	7792	P & A	---
Frank State #1	2130S	660E	7	Mesa	01-18-79	7700	Runyan Ranch Morrow Runyan Ranch Abo	23,234 SI
Gardner State #1	1980S	1980W	8	Mesa	10-09-78	7785	Runyan Ranch Morrow	714,223
Tres Amigos	1980S	660W	9	McClellan	02-02-80	7921	Runyan Ranch Abo	6,651
Good Hope Unit #1	460S	810E	9	Sweeny	02-16-64	8122	P & A	---
Tres Ranchos Unit #1	660S	660E	10	Magnolia	08-21-56	10034	TA	---
Runyan Fed. #2	1980N	660E	18	Mesa	06-22-79	7796	Runyan Ranch Morrow	40,944
Siegrest ST #1	1980N	990E	25	Mesa	01-13-80	8660	Wildcat Wolfcamp	NOL
Siegrest Draw Unit #1	1980N	1980W	28	Tom Brown	06-18-63	8695	P & A	---
Siegrest Draw Unit #2	1650S	1650E	34	Tom Brown	03-12-64	8700	P & A	---
W. Antelope Sink Unit #1	1980S	660E	35	Tom Brown	02-12-64	8790	P & A	---

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 19S RANGE 24E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Federal CW #1	720S	1830W	1	Yates	09-28-73	9321	Undesignated GP 2 Penasco Draw SA Yeso	362* BO 18,439 BO
SRC KZ ST #2	660N	1980E	1	Yates	09-14-79	9140	Penasco Draw SA Yeso	6,083 BO
SRC KZ ST #6	660N	1980W	1	Yates	03-05-80	9200	Penasco Draw Permo-Penn	92,154
Irish Hills KW #2	1980N	1980E	2	Yates	06-04-80	9190	Penasco Draw Permo-Penn	NOL
State IL #1	1980N	1980E	3	Amoco	06-04-80	8967	Boyd Morrow	NOL
Sullivan Fed #1	660S	660W	5	Superior	11-28-70	8615	Wildcat Morrow	NOL
State DQ #1	2310N	860W	9	Yates	08-18-74	8830	D & A	---
Davis NC #1	1980S	660E	11	Yates	11-14-80	9300	Boyd Morrow	NOL
Allison CQ Fed #2	1980S	660W	12	Yates	06-09-79	9260	Boyd Morrow	787,741
Irish Hills JE ST #1	1980N	1980E	12	Yates	12-03-78	9093	Boyd Morrow	988,744
Allison CQ Fed #5	660N	1980W	13	Yates	01-25-80	9320	Boyd Morrow	8,981
Molly #1	990S	990E	13	Hanks	08-22-76	8020	Dagger Draw U-P, North	2,594 BO
Allison CQ Fed #3	660S	2310W	15	Yates	12-08-77	8931	Wildcat Wolfcamp	NOL
Antelope Sink Unit #1	1890N	2070E	18	Sun	07-08-63	8685	Antelope Sink Upper Penn	1,760,758
Yates Fed A #1	660N	660E	21	Amoco	03-08-78	8905	D & A	---
Allison Fed CQ #1	660S	660E	22	Yates	01-05-70	9200	Hoag Tank Morrow Undesignated Abo	27,842 11,544*
Roden GD Fed #1	1980S	660E	23	Yates	01-22-71	9152	Hoag Tank Morrow Hoag Tank Strawn	198,805 170,012
Cone Fed #1	660N	660E	24	Arco	07-13-62	7950	Dagger Draw Upper Penn, North	4,168*

WELLS PENETRATING CISCO PROTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 19S RANGE 24E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Oakason NV #1	660S	2310E	27	Yates	08-23-80	9260	Hoag Tank Morrow	NOL
CC Tank Unit #1	1980N	1980W	28	Yates	04-26-76	8947	Hoag Strawn, West	5,691
Amoco Fed QT #1	1980N	1980W	29	Yates	12-31-80	8850	Siegrest Draw Atoka	NOL
Siegrest JS ST #1	660N	1980W	30	Yates	05-31-78	9360	Siegrest Draw Morrow	451,837
Dee ST #1	1980S	1980E	36	Conoco	09-18-76	9360	Cemetery Morrow	2,784,963
State CO #1	1980S	1980W	36	Yates	06-27-73	9400	P & A	---
State CO #2	1850N	1980E	36	Yates	01-01-78	9427	Cemetary Atoka, North	113,098

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 19S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
BH Matlock #1	660S	1980W	1	Pan Am	01-30-59	9400	D & A	---
Alley #1	2080N	860W	1	Amoco	04-25-80	9362	Boyd Morrow	76,682
Rio Penasco KD #1	660S	1980W	2	Yates	04-06-80	9260	Boyd Morrow	867,227
Rio Penasco KD #2	1680N	1980W	2	Yates	07-10-80	9300	Boyd Morrow	351,867
Federal AK #1	1980S	660E	3	Yates	04-20-60	6100	Penasco Wolfcamp	32,977 BO
Arco 3 Federal #1	1980N	1699W	3	Fasken	05-06-71	9222	D & A	---
Arco 4 Matlock #1	1980S	1980E	4	Fasken	05-10-72	9235	Undesignated Canyon	1,600 BO
Mobil CI Federal #11	1980S	1980E	6	Yates	06-17-80	9360	Penasco Draw Morrow	27,726
Trudy #1	1980S	1980E	7	Conoco	07-03-75	9095	Boyd Morrow	37,046
Johnson BE #1	330N	330E	8	Yates	05-05-67	9222	Boyd Morrow Penasco Draw SA Yeso	343,642 4,374*BO
John 9 Federal #1	1980S	1980W	9	Fasken	06-10-72	9320	Boyd Morrow	2,109,711
Arco 9 Morrison #1	660N	1980E	9	Fasken	12-10-71	9250	Boyd Morrow Boyd Cisco	1,671,083 150,902
Arco 10 Federal #1	1980S	1980E	10	Fasken	09-23-70	9292	Boyd Morrow	522,548*
Arco 10 Federal #2	1980N	1980E	10	Fasken	07-12-72	9293	Boyd Morrow	2,622,187
Rio Penasco MF Federal #1	1980N	1980W	11	Yates	12-05-79	9363	Boyd Morrow	335,297
Federal 11 #1	1980S	1980W	11	Cotton	08-18-79	9300	Boyd Morrow	13,835
Cotton MX Federal #1	810N	2180W	14	Yates	05-16-80	9480	Boyd Morrow	4,065

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 19S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Boyd BN #1	1980N	660E	15	Yates	07-16-68	9420	Boyd Morrow	412,642
Osage-Boyd #1	1980N	660W	15	Hondo	09-29-74	9428	D & A	---
Kincaid ST #1	2080N	1780W	16	Hanks	06-07-77	9354	Dagger Draw U-P, North	2,594*BO
Boyd X #1	990N	990E	16	Coquina	03-11-74	9370	Boyd Morrow	552,871
Barbara Federal #3	1980N	1980W	17	Conoco	10-09-73	7905	Dagger Draw U-P, North	199,910 BO
Julie #1	1980N	990E	17	Conoco	07-20-76	8052	Dagger Draw U-P, North	65,425 BO
Barbara Federal #7	1980S	1980E	17	Conoco	11-18-76	8054	Dagger Draw U-P, North	31,182 BO
Barbara Federal #4	1980S	660W	17	Conoco	12-12-75	8070	Dagger Draw U-P, North	201,837 BO
Barbara Federal #5	1980N	1980W	18	Hanks	04-12-76	9183	Dagger Draw U-P, North	14,831*BO
Barbara Federal #1	1980N	660E	18	Conoco	05-22-71	9040	Dagger Draw U-P, North	262,063 BO
Barbara Federal #6	1980S	1980E	18	Conoco	06-20-76	8170	Dagger Draw U-P, North	204,524 BO
Barbara Federal #2	1980S	1980W	18	Conoco	08-17-72	7954	Dagger Draw U-P, North	93,533 BO
Ross EG Federal #1	1980S	1980W	20	Yates	04-30-75	9450	Undesignated Mississippian Undesignated Morrow	36,989 52,624*
Osage #1	1980N	1980E	21	Coquina	07-12-73	9410	D & A	---
B & B #1	1980N	1980E	22	Antweil	04-01-78	9484	D & A	---
Parino Com. #1	1980S	660E	23	Amoco	11-07-79	9660	D & A	---
Aikman #1	660S	1980W	27	Coquina	01-10-74	9544	D & A	---
Ross IZ #1	1980N	1980W	28	Yates	03-11-78	9460	Cemetery Morrow Cemetery Atoka, North	232* 56,685

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 19S RANGE 25E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
State K 6096 A #1	660S	1980W	28	Getty	02-21-75	9410	Cemetery Morrow	1,349,125
Dagger Draw #2	1969S	629E	30	Hanks	10-09-58	9368	Dagger Draw U-P, North	52,862*BO
Dagger Draw #1	660N	660W	30	Conoco	05-07-70	7860	Dagger Draw U-P, North	53,748 BO
Foster Federal #1	600S	1980W	31	Monsanto	07-01-76	9420	Cemetery Morrow	1,955,038
Kathy Eyre Federal #1	660N	1980W	31	Conoco	09-15-64	9300	Dagger Draw U-P, North	23,107*BO
Albert ST #1	1980N	1980W	32	Monsanto	08-23-77	9628	D & A	---
Albert Federal #1	660S	1980E	32	Monsanto	11-05-76	9566	Cemetery Morrow	345,959
State K 6096 B #1	1650N	1980E	32	Getty	10-23-75	9450	D & A	---
State B #1	660N	1980E	33	Newbourne	01-15-74	9451	Cemetery Atoka, North	364,511
Pan Canadian	1980N	1980W	34	Coquina	10-25-73	9640	Cemetery Morrow Cemetery Atoka, North	2,463,278 28,567*
Irami Federal Com. #1	660S	1980W	34	Huber	03-14-74	9600	D & A	---
Lakewood Unit #1	1980S	660E	34	Stanolind	09-25-52	10486	D & A	---
Gulf Federal #1	1980N	1980W	35	Hilliard	01-30-74	9835	Cemetery Morrow	187,673

* NO 1980 PRODUCTION

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 20S RANGE 21E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Government AJ #1	2310N	1980W	8	Cities	08-04-79	7968	Undesignated Morrow	NOL
Deer Canyon Unit #1	2180N	660W	14	Hilliard	10-21-73	8767	D & A	---
Wildernhel #1	1720S	920W	24	Wilson	08-23-79	8700	D & A	---
Big Sky #1	1980S	1980E	29	Wilson	03-13-73	7915	D & A	---
Crooked Canyon Fed B #1	1980N	990E	35	Exxon	12-27-80	8200	D & A	---

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 20S RANGE 23E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Kewanee ST #1	660 N	660 W	2	Sun	10-25-63	8780	Cass Ranch Morrow	234,087*
Langley Fed #1	990 N	1980 W	4	Beard Oil	07-25-78	8430	D & A	---
Kevin Wildernhel Fed #1	506 N	1980 W	6	Wilson	07-05-79	8660	D & A	---
CC Tank Unit 1 #3	1650 S	1980 E	12	Yates	07-30-76	9080	D & A	---
Buzzard Fed #1	2310 S	1980 W	17	Mesa	05-14-80	8690	D & A	---
Long Draw Unit #1	1880 S	860 E	25	Pan Am.	04-28-64	9396	D & A	---
NW Indian Basin #1-Y	2030 S	1980 W	28	C. Dean	08-21-73	8936	Indian Basin Morrow, NW	149,042

* NO 1980 PRODUCTION

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 20S RANGE 24E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Lloyd Foster AN #1	660N	660W	1	Yates	02-04-65	8240	Dagger Draw Wolfcamp	217,698
Foster FF #1	1980S	1980E	1	Yates	12-19-75	9485	Cemetery Morrow	28,216
Cass Ranch Unit #1	1980N	1980W	3	LaRue	06-11-53	9950	Dagger Draw Atoka	243,783
Gulf Federal #1	1980N	1980W	6	Allied	11-21-70	9175	D & A	---
CC Tank Unit #4	1830S	1980E	8	Yates	02-21-69	9275	Dagger Draw Morrow, West	26,663*
Nix IT Com #1	650S	990E	13	Yates	01-30-78	9500	D & A	---
State D #1	660S	1980W	16	Mark	06-26-75	9100	D & A	---
Foster #1	2130S	1980E	21	Newbourne	03-07-75	9200	Foster Ranch Morrow	122,829
Monsanto Federal #1	660N	660W	21	Carper	05-16-60	9290	D & A	---
Foster Ranch #1	1650S	2220W	22	Hillard	03-14-68	9960	D & A	---
Penny Federal #1	660S	1980W	23	Conoco	04-17-71	7936	Dagger Draw U-P, South	5,643 BO
Len Mayer #1	660N	1980W	24	Monsanto	06-24-77	9550	Cemetery Morrow	232,946
Federal Hobbs	660S	660E	24	Western	11-29-49	11580	P & A	---
Charolette McKay Fed #1	1980N	660E	25	Sun Oil	12-13-79	9690	Undesignated Atoka	13,575
R. S. Federal #1	660N	1980W	25	Coquina	06-14-75	9810	D & A	---
Robin Federal #1	1980N	1980W	26	Conoco	03-11-71	7820	Dagger Draw U-P, South	12,590 BO
Vickie Federal #1	1980N	1980E	26	Conoco	07-01-71	7820	Dagger Draw U-P, South	10,790 BO
Huber 29 Federal #1	2080S	1980E	29	Tesoro	09-10-73	9462	D & A	---
Long Box Unit #1	1980N	660E	30	Inexco	07-30-78	9375	Wildcat Atoka	NOL
State AX #1	660S	660E	32	Bell	01-25-64	9253	D & A	---

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 20S RANGE 24E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
State C #1	1980S	1980W	32	Mark Prod.	01-17-75	9225	D & A	---
Smith Federal #1	1650S	1650E	34	Standard of TX	09-15-68	7845	D & A	---
Preston Federal #1	1900S	850W	35	Conoco	11-23-70	7800	Dagger Draw U-P, South	914 BO
Indian Hills ST #1	1650N	1980E	36	Texas O & G	03-19-78	9640	Cemetery Morrow	1,059,063
Indian Hills ST #2	660S	660E	36	Texas O & G	10-07-78	9947	Cemetery Morrow	34,207

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WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 20½S RANGE 21E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth		Field	Production (Mcf) To 1-1-81
El Paso #1	940S	1980E	35	Yates	01-31-74	8920	P & A		---

TOWNSHIP 20½S RANGE 23E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth		Field	Production (Mcf) To 1-1-81
Federal 34 #1	990S	990E	34	tandard TX	10-09-65	7736	D & A		---

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 21S RANGE 21E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Armstrong Fed. #1	1780N	1730E	9	Wilson	04-23-73	8300	P & A	---
El Paso GS #1	1930S	2080E	11	Yates	11-27-76	8448	Box Canyon Permo-Penn	91,916*
Little Box Canyon Unit #4	1980N	1950E	12	Cities	11-02-77	8320	D & A	---
Little Box Canyon Unit #2	660S	1980E	12	Cities	08-12-77	8370	Little Box Canyon Morrow	181,400
Box Canyon Unit #2	2080N	1980W	13	Yates	01-13-77	8595	Little Box Canyon Morrow	1,410,376
Box Canyon GJ #1	2130S	1650E	13	Yates	07-30-76	8585	Little Box Canyon Morrow Box Canyon Permo-Penn	163,105* 2,931
Box Canyon #3	1980S	1980E	14	Yates	06-02-77	8450	Box Canyon Permo-Penn	440,316
Huber IA #2	660S	1220E	15	Yates	07-18-77	8050	Box Canyon Strawn Box Canyon Permo-Penn	65,159 18,535
Huber IA #1	2310N	1980E	15	Yates	11-21-77	8125	D & A	---
Texas Hill KM #1	1836N	915E	21	Yates	08-30-77	7385	D & A	---
Box Canyon #4 A	660N	1980E	23	Yates	12-23-77	8400	Box Canyon Permo-Penn	1,229,185
Harvey JI Federal #1	1780S	1980E	23	Yates	05-04-78	8365	Undesignated Cisco	NOL
Federal 28 #1	1980N	1980E	28	Pennzoil	08-14-69	9370	P & A	---
Cities JH ST #1	2205N	660W	36	Yates	03-18-78	8895	Box Canyon Permo-Penn	110,142

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WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 21S RANGE 22E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
NW Indian Basin #1	2310S	2450W	2	Moralo	09-16-79	9302	Undesignated Morrow	4,931
Federal HQ #1	990S	1980W	5	Yates	04-14-77	8679	Little Box Canyon Atoka Undesignated Canyon	12,348 12,766
Little Box Canyon #3B	660N	1980E	7	Cities	09-20-77	8390	Undesignated Cisco	174,668
Little Box Canyon #1	1650S	1980E	7	Cities	07-04-75	8350	Little Box Canyon Morrow Box Canyon Permo-Penn	409,254* 44,068
Stinking Draw #1	1383S	695E	10	Yates	03-30-78	9464	D & A	---
Searle ML Fed #1	1980S	2030W	11	Yates	06-30-80	9330	D & A	---
NW Indian Basin #1	1885S	2060W	12	Yates	12-23-76	9353	D & A	---
Stinking Draw Fed #1	1980N	660W	13	Durham	01-27-80	9710	D & A	---
Hilliard LE Fed #1	330N	2310W	14	Yates	05-26-79	9350	Indian Basin Morrow, West	869,829
Hilliard BF Fed #1X	1650N	630E	14	Yates	05-27-67	9350	Indian Basin Morrow, West	2,310,608
Burro Hills Unit #1	660S	1980E	16	Magnolia	08-04-48	11312	D & A	---
Loafer Draw B #1	1980N	860W	17	Cities	12-15-75	8591	D & A	---
Loafer Draw A #1	1980S	1980E	17	Cities	11-19-73	8873	TA	---
WIB Unit #1	2080N	860W	23	Gt. Western	05-02-73	9463	D & A	---
Majors Fed #2-Y	2080S	810E	23	Inexco	06-20-78	9950	Indian Basin Morrow, West	197,728
Arroyo Fed #2	660N	2280W	24	Pet. Dev.	05-11-79	9300	Indian Basin Morrow, West	62,394

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 21S RANGE 22E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Loafer Draw A #1	1650S	1650E	24	Kerr-McGee	05-09-66	7805	D & A	---
Majors Fed #1	1980S	1980W	25	Inexco	11-23-74	9100	D & A	---
Arroyo Fed #1	1980S	1980W	26	Inexco	05-17-77	9630	Loafer Draw Morrow Loafer Draw Strawn	304,768* 22,692
Mahun Fed #1	2250S	786E	27	Pet. Dev.	11-19-77	9550	Undesignated Wolfcamp	2,407*
Cleveland Reese A #1	1880N	1980E	33	Gt. Western	01-20-74	9392	D & A	---
Cleveland Reese #1-Y	670S	1982W	33	Gt. Western	09-19-72	9742	Rocky Arroyo Morrow	230,573*
Cleveland Reese B #1	1980S	660W	34	Gt. Western	03-12-74	9505	D & A	---
Little Indian Basin ES #1	660S	1980E	36	Yates	10-13-75	9521	D & A	---

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WELLS PENETRATING CISCO PORTION OF PERMO-Penn
Eddy County, New Mexico
1-1-81

TOWNSHIP 22S RANGE 21E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Brainerd Fed. IO #1	660N	1980E	1	Yates	11-09-77	9089	Box Canyon Permo-Penn	61,797
Continental Fed. #1	660S	660E	1	Brainerd	06-20-53	10596	D & A	---
HW Bass Fed. #1	470S	850E	5	Continental	07-10-51	5889	D & A	---
Box Canyon Unit #1	560N	660W	12	Marathon	08-29-63	9435	D & A	---

WELLS PENETRATING CISCO PORTION OF PERMO-PENN
Eddy County, New Mexico
1-1-81

TOWNSHIP 22S RANGE 22E

Well	Location N-S	Location E-W	Sec.	Operator	Spud Date	Total Depth	Field	Production (Mcf) To 1-1-81
Cawley Draw #1	1980S	1980E	3	Inman	04-24-65	9515	P & A	---
Rocky Arroyo D #2	1980S	660W	4	El Paso	02-25-74	9325	Rocky Arroyo Canyon	122,842
Cawley Draw #1	837N	2157E	4	Gt. Western	03-18-73	9456	Rocky Arroyo Morrow	281,988
Rocky Arroyo D #1	660S	2180E	5	El Paso	11-02-73	9157	Rocky Arroyo Morrow	240,502
Rocky Arroyo E #1	1980N	2130E	7	El Paso	02-27-73	9258	Rocky Arroyo Wolfcamp	264,618
Rocky Arroyo #1	1980S	1980E	8	El Paso	08-27-71	9380	Rocky Arroyo Morrow Rocky Arroyo Wolfcamp	176,697* 386,016
Rocky Arroyo C #1	1980N	1980W	8	El Paso	10-06-73	9225	Rocky Arroyo Morrow Rocky Arroyo Canyon	27,566* 149,306
Rocky Arroyo A #1	1980N	660W	9	El Paso	12-28-71	9160	D & A	---
Flanigan Fed. #1	2080S	1980W	9	Summit	04-07-76	6200	D & A	---
LA Federal #1	1980S	660E	11	Inexco	10-04-78	9760	D & A	---
LA Federal #2	660N	1980W	12	Inexco	03-26-79	9650	D & A	---

* NO 1980 PRODUCTION