

## Chronology of the Catclaw Draw Morrow Pool Development

- ▶ December 27, 1965 - Atlantic Refining Co. (ARCO) completed the Pure Federal No. 1 as the discovery well in Section 11, T21S-R25E, Eddy County, New Mexico.
- ▶ June 21, 1971 - With Order No. R-4157 the NMOCC created the Catclaw Draw Morrow Pool. It determined a standard GPU be 640 acres with 1650' setbacks.
- ▶ September 13, 1973 - The Division extended special pool rules with R-4157-A and R-4157-B continued those rules.
- ▶ January 15, 1974 - Order R-4704 found that two gas purchasers in the pool were causing violations of correlative rights by non-ratable pipeline takes. Eleven wells were completed in the pool and capacity of these wells was much greater than market demand.
- ▶ April 1, 1974 - By Orders R-4704 and R-1670-0 Catclaw Draw became a prorated gas pool.
- ▶ January 9, 1980 - In Order R-4157-C technical testimony found lack of Morrow sand continuity with an average well draining between 281-353 acres. Additional wells were needed to recover unrecoverable gas reserves. It downspaced gas proration units to 320 acres and changed well setbacks to state-wide 660' from side and 1980' from end boundaries.
- ▶ August 26, 1981 - Order R-4157-D rescinded R-4157-C and returned field to previous 640 acre spacing due to possible loss of leases of former communitized 640 acre GPU's as this would impact correlative rights.
- ▶ Field re-development period 1980-1982 with 7 new wells completed.
- ▶ March 27, 1995 - Order No. R-10328 suspended gas prorationing in pool.
- ▶ October 29, 1995 - Texaco spuds E.J. Levers No. 2, completed January 15, 1996.

NEW MEXICO  
CIL CONSERVATION DIVISION

MOC EXHIBIT 9

CASE NO 11723 (do novo)

Keith Williams 10/97.

LARGE FORMAT  
EXHIBIT HAS  
BEEN REMOVED  
AND IS LOCATED  
IN THE NEXT FILE

# Producing Characteristics and Depositional Environments of Lower Pennsylvanian Reservoirs, Parkway-Empire South Area, Eddy County, New Mexico<sup>1</sup>

NEW MEXICO

Eddy County, New Mexico<sup>1</sup>

OIL CONSERVATION DIVISION

A. D. JAMES<sup>2</sup>

MOC EXHIBIT 11

CASE NO. 11723 (NOVO)

ABSTRACT

The Parkway-Empire area, on the Northwest shelf of the Permian basin about 15 mi (24 km) northeast of Carlsbad, New Mexico, produces gas from stratigraphic traps within four Lower Pennsylvanian zones: lower and middle Morrow sandstones, Atoka sandstones, and Strawn limestones.

The lower Morrow sandstones, which occur at about 11,400 ft (3,470 m), are interpreted to be a prograding fluvial-deltaic sequence of channels and point bars with a northwest source. They trend toward the southeast, generally normal to the Morrowan paleoslope. The lower Morrow sands are separated from the middle Morrow sandstones by a widespread, dark-gray, organic lagoonal shale. In southeastern New Mexico, middle Morrow sandstones are a transgressive series of marine beaches and bars deposited along the northeast-trending ancient shoreline. Stratigraphic traps are created in the lower and middle Morrow sandstones by variations in cementation and depositional patterns. Productive Atoka sandstones occur at approximately 10,700 ft (3,260 m) and appear to be a series of prograding barrier bars deposited along the northeast-trending shoreline. Strawn limestones produce from a series of small, low-relief algal banks developed along northeast depositional strike. The Strawn limestones occur between 10,250 and 10,500 ft (3,120 and 3,200 m).

The area is economically attractive. Payout of a typical well occurs in 1.2 years with a rate of return of 78.1%. Pennsylvanian completions in this area have typical ultimate recoveries of approximately 1.5 bcf ( $42 \times 10^6 \text{ m}^3$ ) of gas and 22,000 bbl ( $3.5 \times 10^6 \text{ L}$ ) of condensate. The stacked nature of the reservoirs causes a success rate of 85.2% for this area. The high success rate, good production, and attractive economics make this area of the Morrow trend an important exploration target.

## INTRODUCTION

The Parkway-Empire area is located on the Northwest shelf of the Permian basin in central Eddy County, New

Mexico, about 15 mi (24 km) northeast of Carlsbad (Figure 1). It consists of eleven or more designated pools (fields).<sup>3</sup> Two discovery wells have led to aggressive development. The first of these, Southland Royalty Company 1 Parkway State located in Sec. 15, T19S, R29E, was completed from middle Morrow sandstones on August 24, 1978, for a flowing potential of 2,714 MCFGD ( $77 \times 10^6 \text{ m}^3/\text{day}$ ). As of December 31, 1982, cumulative production was 1.3 bcf ( $37 \times 10^6 \text{ m}^3$ ) of gas and 20,000 bbl ( $3.5 \times 10^6 \text{ L}$ ) of condensate. The second well, Southland Royalty Company 1 Empire Federal State Commission located in the SW<sup>1</sup>/<sub>4</sub> of Sec. 27, T18S, R29E, was completed from an Atoka sandstone in June 1980, for a calculated absolute open flow (CAOF) of 1,800 MCFGD ( $51 \times 10^3 \text{ m}^3/\text{day}$ ). It had produced 1.3 bcf ( $37 \times 10^6 \text{ m}^3/\text{day}$ ) of gas by December 31, 1982, when it was flowing 1,200 MCFGD ( $34 \times 10^3 \text{ m}^3/\text{day}$ ). This well was originally completed in the lower Morrow in May 1980, where it produced a small amount of gas before being plugged back to the Atoka. Since these two wells were drilled, about 30 additional wells have been drilled, extending the various Parkway and Parkway West pools north to the Empire South pools to form one large producing area. Besides Southland Royalty Company, major operators in the area are Petroleum Corporation of Texas, Threshold, Amoco, Conoco, and Hondo (ARCO).

The Parkway-Empire South area produces gas from four Pennsylvanian zones and oil from several Permian zones. The Pennsylvanian production occurs from four distinct sequences: lower Morrow sandstones, middle Morrow sandstones, Atoka sandstones, and Strawn limestones.

Permian productive zones include Wolfcamp carbonates, Bone Spring carbonates, San Andres carbonates, Grayburg carbonates, and Queen and Seven Rivers sandstones. The Wolfcamp and Bone Spring carbonates have not yielded commercial quantities of oil. The Queen, Seven Rivers, Grayburg, and San Andres sediments produce oil from 1,800 to 2,500 ft (550-760 m) in large portions of the study area. These zones are economic objectives and are being developed in portions of the study area. Economically, the significant production in this area is gas occurring between 10,200 and 11,500 ft (3,100 and 3,500 m) in the Strawn, Atoka, and Morrow. As of December 31, 1982, cumulative production from these zones in 99 wells in the Parkway-Empire South area was 109 bcf ( $3.09 \times 10^9 \text{ m}^3$ ) of gas and 1,600,000 bbl ( $260 \times 10^6 \text{ L}$ ) of condensate. The

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<sup>1</sup>Manuscript received, September 20, 1984; accepted, April 17, 1985.

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Jack W. Becher and Michael G. Metcalf helped develop the regional concepts used in this paper. They prepared the regional environmental maps, and Metcalf prepared the Atoka net sand isopach map. Statistical production data were compiled by E. R. Andrews. Gilbert R. Barragan drafted the figures, and Neita G. Baccus and Janet C. George typed the drafts and final manuscript. All these people are employees of Southland Royalty Company. Special thanks is given to these individuals for their help and efforts and to Southland Royalty Company, who permitted publication of this study.

<sup>3</sup>The state of New Mexico designates pools rather than fields. In productive areas, each producing zone is assigned a separate pool name, such as Parkway Atoka West and Empire Morrow South.

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A. D. JAMES<sup>2</sup>

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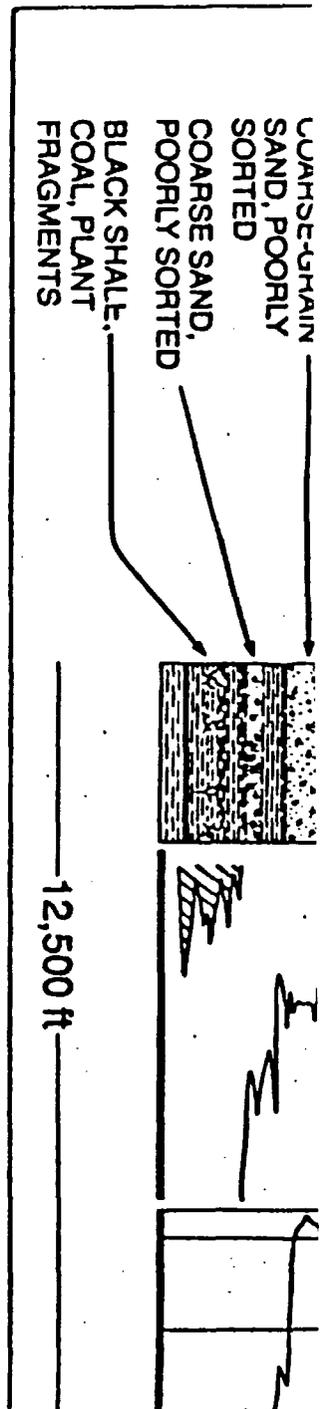


Figure 10—Core description and lithology, and porosity and permeability plots based on density. Company 1 Empire Federal 22 well.

ity porosity and permeability is difficult, but in general the thicker sandstones tend to have better porosity and permeability. To define middle Morrow reservoirs, a net effective porosity thickness map, Figure 12, was prepared.

Gas production in the middle Morrow sands is related not to structure but to porosity development. Areas with approximately 10 or more net feet (3 m) of effective porosity should be productive. Producing wells in both the lower and middle Morrow sandstones have porosities generally ranging between 8% and 14%. In contrast to the lower Morrow sandstones, water production rarely occurs from the middle Morrow sands.

Cumulative middle Morrow production in the mapped area was 41.1 bcf ( $1.16 \times 10^9 \text{ m}^3$ ) of gas and 553,000 bbl ( $90 \times 10^6 \text{ L}$ ) of condensate from 53 wells as of December 31, 1982.

Examples of five logs of the Morrow section in the study area are shown in Figure 13. These logs show typical curve shapes for point bars and channels. Note the bell-shaped gamma-ray curve in the lower Morrow of the Coquina 1 Bass State well. This curve has a sharp bottom with a gradual upward increase in radioactivity. These gamma-ray responses are typical for point bars. Observe also the box-like shape of the gamma-ray in the lower Morrow of the

The interpretation of a m  
stones.

Figures 14 and 15 are cross sections of the Morrow study area. These cross datum at the base of the l and fill depositional rel sandstones. The cross se tional trend of the lower l the depositional trend o sandstones.

An interesting channe of cross section AA' (Fig sands and shales, and cut sissippian sediments. Ab this channel is a middle relationship of older an caused by the differential shales discussed earlier. than sandstones, and thi channel to sag, forming channels remained withi into the middle Morrow ure 15) has a lower Mor

**MEWBOURNE OIL COMPANY  
AUTHORIZATION FOR EXPENDITURE**

Prospect: Cat Claw Draw Well Name & No. Cat Claw Draw "1" Federal #1  
 Field: Cat Claw Draw Location: 2310' FEL & 660' FSL  
 Section: 1 Block: \_\_\_\_\_ Township: 21S Range: 25E  
 County: Eddy State: N.M. Proposed Depth: 10,700'

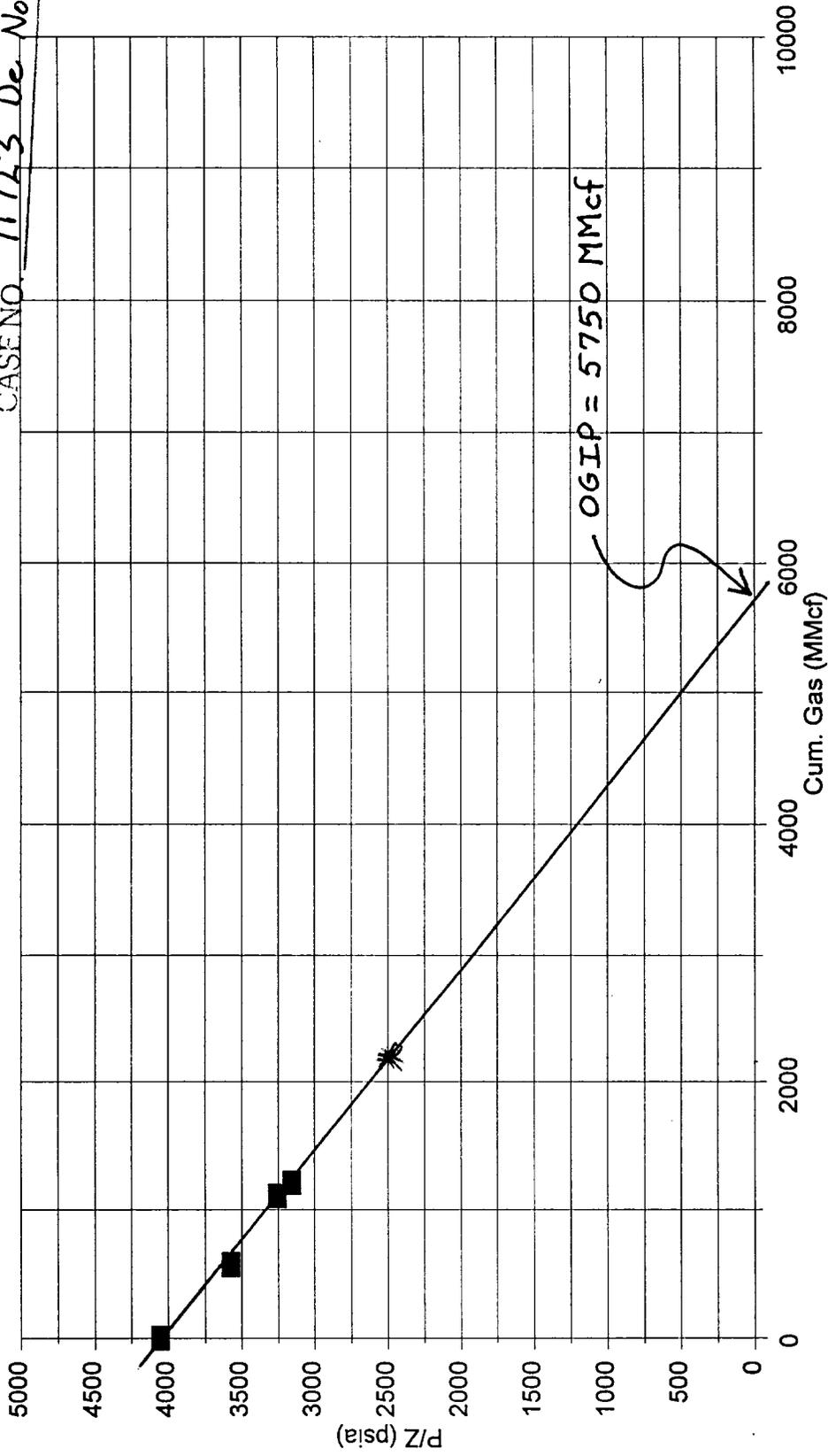
DESCRIPTION		Cost To Casing Point AFE NO.	Completion Cost AFE NO.
INTANGIBLE COST 180			
300	Permits and Surveys	\$1,500	\$800
301	Location, Roads and Surveys	\$20,000	\$5,000
302	Footage or Turnkey Drilling	\$268,000	
303	Day Work	\$14,000	
304	Fuel, Water and Other	\$17,500	\$500
305	Completion / Workover Rig		\$10,000
306	Mud and Chemicals	\$19,000	
307	Cementing	\$15,000	\$22,000
308	Logging and Wireline	\$18,000	\$8,000
309	Casing-Tubing Services	\$2,100	\$8,000
310	Mud Logging	\$5,000	
311	Testing	\$4,300	
312	Treating		\$10,000
313	Coring		
320	Transportation	\$2,000	\$6,100
321	Welding and Construction Labor	\$2,000	\$400
322	Contract Supervision		
330	Equipment Rental	\$6,000	\$5,000
334	Well / Lease Legal / Tax	\$6,500	\$2,000
335	Well / Lease Insurance	\$8,000	
350	Intangible Supplies	\$250	\$250
360	Pipeline ROW and Easements		\$2,000
367	Pipeline Interconnect		\$5,000
375	Company Supervision	\$20,000	\$10,000
380	Overhead Fixed Rate	\$5,000	\$5,000
399	Contingencies 2%	\$8,600	\$2,000
Total Intangibles		<b>\$442,750</b>	<b>\$102,050</b>
TANGIBLE COST 181			
Conductor Casing			
	Surface Casing 13 3/8" @ 400'	\$6,400	
	Intermediate Casing 9 5/8" @ 2,200'	\$26,000	
	Production Casing 5 1/2" @ 10,700		\$68,000
	Production Casing		
	Tubing 2 7/8" @ 10,700'		\$35,000
860	Drilling Head	\$3,700	
865	Tubing Head		\$2,500
870	Upper Section		\$4,000
875	Sucker Rods		
880	Packer, Pump & Other Subsurface		\$7,000
885	Pumping Unit & Prime Mover + Electricity		
890-1	Tanks (Steel & Fiberglass)		\$6,000
890-5	Separation Equipment (fired, Non-fired)		\$8,500
898	Metering Equipment		\$4,200
900	Line Pipe		\$7,800
905	Valves		\$2,000
906	Miscellaneous Fittings & Accessories		\$8,000
910	Production Equipment Installation		\$4,000
920	Pipeline Construction		\$13,000
Total Tangibles		<b>\$36,100</b>	<b>\$170,000</b>
Date prepared: September 9, 1997		<b>\$478,850</b>	<b>\$272,050</b>
Prepared by: Erik L. Hoover		<b>TOTAL WELL COST</b>	
Company Approval:		<b>\$750,900</b>	
Date Approved:		EXHIBIT <u>13</u>	
Joint Owner Approval:		CASE NO. <u>11723 De Novo</u>	
Joint Owner Interest:			

NEW MEXICO  
OIL CONSERVATION DIVISION

### E J Levers #2 Gas Material Balance

EXHIBIT ~~14~~ 14

CASE NO. 11723 De Novo



—■— P/Z

E J Levers #2

M. Morrow                      Perfs: 10,236 - 10,272      Gas Gravity: 0.585      BHT: 175 F

Date	Cum Gas (MMcf)	Measured		Est SIBHP (psia)	Z	P/Z (psia)
		SITP (psig)	SIBHP (psia)			
1-13-96	0	2897	3686		0.909	4055
8-23-96	577	2508		3193	0.893	3576
12-27-96	1110	2275		2897	0.889	3259
1-23-97	1212	2200		2803	0.888	3157