

AMOCO EXPLORATION COMPANY
NO.1-20 RED ROCKS
NE SW SEC.20-T15S-R42W
CHEYENNE COUNTY COLORADO

WELLSITE GEOLOGY
BY
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SUMMARY

The AMOCO Production Company, No.1-20 Red Rocks [NE SW SEC.20-T15S-R42W, Cheyenne Co., CO] was drilled as a wildcat well in the Las Animas Arch, Colorado. The primary objective was the Pennsylvanian Morrow Upper Sand, which the No.1-20 Red Rocks developed as an eight foot sand interval [5128'-5136']. The No.1-20 Red Rocks Upper Sand was drill stem tested while drilling [DST No.1, 5060'-5170', See Pages 9-11], and recovered 975 feet of watery mud and no hydrocarbons. No shows of oil were found in the samples, with only a very weak residual cut indicative of a wet zone. Electric logs showed the Upper Sand to be wet and have fair porosity. A very poorly developed Middle Sand section was interpreted [by the wellsite geologist] to be present in the interval 5164'-5180'. Although the Lower Morrow Lime marker could be interpreted to be at 5164', the presence of interbedded sand stringers within the shale/limestone beds in the interval 5164'-5180' was interpreted to be the very poorly developed Middle Sand interval. No shows were found in the cuttings from this interval and electric logs showed the section to have tight porosity. No drill stem test was run below 5170', which was the base of DST No.1. No other sands developed in the Morrow shale section.

After electric logs, sample cuttings, and drill stem test data through the Upper Sand interval were evaluated, the AMOCO No.1-20 Red Rocks the Upper Sand was interpreted to be a nonproductive interval.

The secondary objectives in the Pennsylvanian Shawnee/Topeka, Lansing Kansas City, Marmaton, and the Mississippian Spergen, developed eight shows. No zones were tested while drilling or after electric logs were evaluated.

On April 2, 1996, the AMOCO No.1-20 Red Rocks was plugged and abandoned.

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WELL DATA

OPERATOR: AMOCO Production Company, Denver, CO.

WELL NAME: No.1-20 Red Rocks.

FIELD NAME / PROSPECT: Wildcat.

LOCATION: 1600'fsl 1450'fwi NE SW SEC.20-T15S-R42W, Cheyenne Co., CO.

ELEVATION: 4025'- Ground; 4037'-KB.

SPUD DATE: 3/19/96.

COMPLETION DATE: 4/2/96.

STATUS: Plugged and abandoned 4/2/96.

HOLE SIZE: 12.250"-610'-Surface; 7.825"-TD[5510'].

CASING: 8.625"-599'-Surface casing; No production casing run.

DRILL COLLARS / PIPE: 6.25" / 4.50".

TOTAL DEPTH: 5510'(-1473') - Driller; 5506'(-1469') Electric Log.

CONTRACTOR: KUDU Drilling Co., Inc., RIG NO.1 Wichita, KS.

GEOLOGIST: Randy Say- RSay Enterprises.

ENGINEER: Ron Pulliam - AMOCO.

MUD COMPANY: Service Mud Company, Denver, CO.

MUD TYPE: NATIVE (SURFACE-3700'); GEL-DRIPAC (3700 - TD[5510']).

MUDLOGGING: Gas detection [HOTWIRE AND CHROMATOGRAPH] monitored by wellsite geologist.

DRILL STEM TEST: DST NO.1 5060'-5170'(110')- Morrow Test Conventional

CORES: None.

ELECTRIC LOGS: Halliburton Energy Services, Woodward, OK.
Engineer: DIXON.

LOGS RUN	INTERVAL
HRI-DFL	40'-5496'
SDL-DSN	2790'-5502'
BCS	40'-5500'
ML	2690'-5502'
QUICK LOOK	3780'-5502'

BIT RECORD, DEVIATION SURVEYS, AND ELECTRIC LOG FORMATION TOPS

NO.	MAKE	TYPE	SIZE	DEPTH OUT	FOOTAGE	HOURS	FT/HR	DEV/DEPTH
1	STC	FDS	12.250	610	610	250	244.00	0.75°-610'
2	SEC	HP11	7.875"	2040	1430	16.75	85.37	3.50°-2040'
3	NETECH	NT2	"	5510	3470	202.0	17.18	1.00°-5510'

DEVIATION SURVEYS

DEVIATION	DEPTH	DEVIATION	DEPTH	DEVIATION	DEPTH
0.75°	610	1.00°	5510		
3.50°	2040				
0.25°	5170				

FORMATION /ZONE	DEPTH (FEET)	DATUM(KB-4037')
Dakota	1550	2487
Cheyenne Sand	1900	2137
Morrison	1942	2095
PERMIAN	2032	2005
Day Creek	2152	1885
Blaine	2396	1641
Cedar Hills	2688	1349
Stone Corral	2846	1191
Stone Corral-BASE	2876	1161
Neva	3438	599
Foraker	3608	429
Shawnee/Topeka	3928	109
Topeka "C"	4108	-71
Lansing Kansas City	4192	-155
Marmaton	4636	-599
Pawnee Member	4656	-619
Fort Scott Member	4706	-669
Cherokee	4772	-735
Atoka	4920	-833
Morrow Shale(SONIC)	5062	-1025
Morrow Shale(STRAT)	5082	-1045
202	5108	-1071
SS	5128	-1091
SS-BASE	5136	-1099
302U	5146	-1109
SS-Middle-Zone	5164	-1127
SS-Middle-Base-Zone	5180	-1143
Lower Morrow Lime)	5186	-1149
MISSISSIPPIAN	5242	-1205
Spergen	5380	-1343
TOTAL DEPTH(DRILLER)	5510	-1473
TOTAL DEPTH(ELECTRIC LOG)	5506	-1469

DAILY DRILLING CHRONOLOGY

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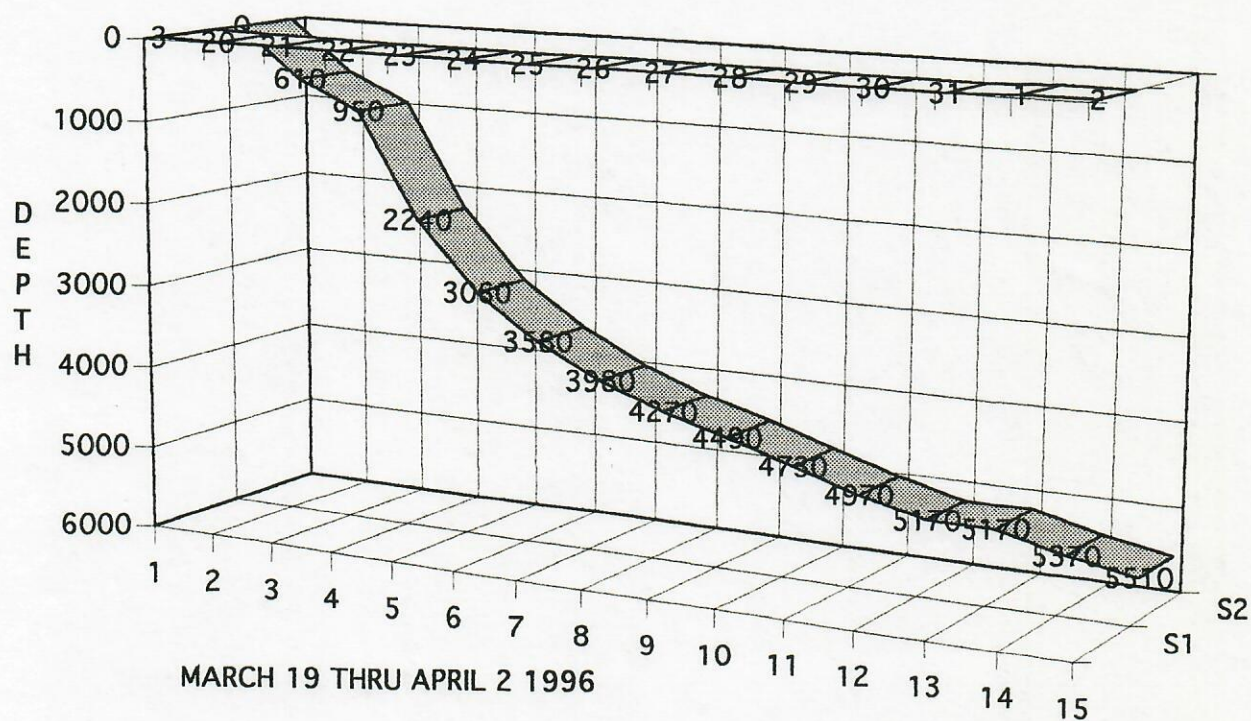
DATE	DEPTH	24HR FOOTAGE	DRILLING ACTIVITIES
3/19	0000	0000	Rig Up, Spud WELL W/NB1 [12.50"], Drlg SURF HOLE. TO 610', CIRC & COND HOLE, RUN SURF CSG [8.625"] TO 599' CMT SURF CSG, W.O.C.
20	610	610	Drlg CMT w/NB2, Drlg.
21	950	340	Drlg.
22	2240	1290	Drlg, TOO H for NB3 at 2040', T.I.H. Drlg.
23	3060	820	Drlg.
24	3580	520	Drlg.
25	3980	400	Drlg.
26	4270	290	Drlg.
27	4490	220	Drlg CFS at 4484', Drlg.
28	4730	240	Drlg.
29	4970	240	Drlg.
30	5170	200	Drlg CFS at 5170', TOO H for DST No.1
31	5170	0000	Pick up DST tools, TIH Run DST No.1, TOO H and Lay Down Tools, TIH w/rrNB3, Drlg.
4/1	5370	200	Drlg.
2	5510	140	DRLG, REACH TD 5510' @ 7:00 P.M. CIRC & COND, TOO H FOR ELOGS, RUN ELOGS, W.O.O., PLUG & ABANDON HOLE

SUMMARY OF POROUS ZONES

SHOW ALL IMPORTANT ZONES OF POROSITY AND CONTENTS THEREOF: CORED INTERVALS AND ALL DRILL-STEM TESTS, INCLUDING DEPTH INTERVAL TESTED, CUSHION USED, TIME TOOL OPEN, FLOWING AND SHUT-IN PRESSURES AND RECOVERIES.

FORMATION	TOP	BOTTOM	DESCRIPTION. CONTENTS. ETC.
Dakota	1550'	1730'	Water Sand
Cheyenne Sand	1900'	1942'	Water Sand
Cedar Hills	2688	2762'	Water Sands
Morrow	5060'	5170'	See attached geologic report for DST No.1 analysis.
Spergen Dolomite	5356'	5510'	

DAILY DRILLING CHRONOLOGY



964AMOCO	AMOCO Production Company										WEBB Resources		
964RSWSG	No.1-20 Red Rocks										Bernal Wallace No.20-1		
	1600'fsl 1450'fwl										NE NE SEC.20-T15S-R42W		
	Cheyenne Co., CO										Cheyenne Co., CO		
	Wildcat 4-2-96										Wildcat 7/29/70 P&A		
	AFE NO.										AFE NO.		
	API NO.05-017-075130000										API NO.		
TIME STRAT	ROCK STRATIGRAPHIC	PROG	SMPL	DATUM-KB	ELOG	DATUM-KB	THICK	ELEV	DIFF.	E-LOG	DATUM-KB	THICK	
				4037		4037		NO.1	NO.2		4044		
	QUATERNARY EOLIAN SAND				SURF								
CRETACEOUS	NOBRARA									SURF			
	FORT HAYS	1007			1074	2963				1064	2980		
	CARLILE				1180	2857				1160	2884		
	CODELL				1180	2857				1160	2884		
	DAKOTA	1474			1550	2487				1528	2516		
	KIOWA				1730	2307				1704	2340		
	CHEYENNE SAND	1805			1900	2137				1850	2194		
JURRASIC	MORRISON				1942	2095				1896	2148		
	MORRISON-LOWER				2032	2005				2002	2042		
PERMIAN	PERMIAN				2032	2005				2002	2042		
	DAY CREEK				2152	1885				2082	1962		
	WHITEHORSE				2170	1867				2110	1934		
	BLAINE SALT	2300			2396	1641				2370	1674		
	CEDAR HILLS	2660			2688	1349				2706	1338		
	HARPER PLAIN				2762	1275				2792	1252		
	STONE CORRAL	2820			2846	1191	30			2870	1174	30	
	STONE CORRAL (BASE)				2876	1161				2900	1144		
	WELLINGTON				2876	1161				2900	1144		
	CHASE	2995			3028	1009				3046	998		
	NEVA				3438	599				3450	594		
	RED EAGLE				3534	503				3556	488		
	JOHNSON				3558	479				3572	472		
	FORAKER				3608	429				3632	412		
	ROOT				3766	271				3790	254		
PENNSYLVANIAN	WAUBUNSEE/VIRGIL	3761			3822	215				3850	194		
	SHAWNEE/TOPEKA	3927			3928	109				3964	80		
	TOPEKA "C"				4108	-71				4130	-86		
	HEEBNER SHALE				4162	-125				4182	-138		
	TORONTO LIMESTONE				4174	-137				4194	-150		
	LANSING KANSAS CITY	4164			4192	-155				4218	-174		
	MARMATON	4640			4636	-599				4666	-622		
	-PAWNEE MEMBER-2NDARY				4656	-619				4694	-650		
	-FORT SCOTT MEMBER-2NDARY				4706	-669				4734	-690		
	CHEROKEE	4753			4772	-735				4798	-754		
	ATOKA	4900			4920	-883				4948	-904		
	MORROW SHALE (SONIC)	5062			5062	-1025	124	25		5094	-1050	98	
	MORROW SHALE (STRAT)				5082	-1045	104	23		5112	-1068	80	
	202												
	SS				5108	-1071							
	SS-BASE				5128	-1091	8						
	302U				5136	-1099							
					5146	-1109							
	SS-MIDDLE				5164	-1127	16						
	SS-MIDDLE-BASE				5180	-1143							
	LOWER MORROW LIME	5142			5186	-1149		-1		5192	-1148		
MISSISSIPPIAN	MISS	5223			5242	-1205		-5		5244	-1200		
	SPERGEN	5356			5380	-1343		19		5406	-1362		
	TOTAL DEPTH (DRILLER)	5506			5510	-1473				5760	-1716		
	TOTAL DEPTH (STRAP)												
	TOTAL DEPTH (ELECTRIC LOG)				5506	-1469				5755	-1711		

TRILOBITE TESTING L.L.C.

OPERATOR : Amoco Prod. Co.
 WELL NAME: Red Rocks # 1-20
 LOCATION : 20-15-42
 INTERVAL : 5060.00 To 5170.00 ft

DATE 3-30-96
 KB 4037.00 ft
 GR 4025.00 ft
 TD 5170.00 ft
 TICKET NO: 9204
 DST #1
 FORMATION: morrow sand
 TEST TYPE: CONVENTIONAL

RECORDER DATA

Mins	Field	1	2	3	4	TIME DATA-----
PF 15 Rec.	11058		2342			PF Fr. 1833 to 1848 hr
SI 30 Range(Psi)	4500.0	0.0	4995.0	0.0	0.0	IS Fr. 1848 to 1918 hr
SF 60 Clock(hrs)	21048		alpin			SF Fr. 1918 to 2018 hr
FS 120 Depth(ft)	5165.0	0.0	5062.0	0.0	0.0	FS Fr. 2018 to 2218 hr

	Field	1	2	3	4	
A. Init Hydro	2479.0	0.0	2472.0	0.0	0.0	T STARTED 1620 hr
B. First Flow	155.0	0.0	89.0	0.0	0.0	T ON BOTM 1830 hr
Bl. Final Flow	277.0	0.0	307.0	0.0	0.0	T OPEN 1833 hr
C. In Shut-in	816.0	0.0	834.0	0.0	0.0	T PULLED 2218 hr
D. Init Flow	361.0	0.0	310.0	0.0	0.0	T OUT
E. Final Flow	466.0	0.0	459.0	0.0	0.0	
F. Fl Shut-in	760.0	0.0	737.0	0.0	0.0	
G. Final Hydro	2457.0	0.0	2403.0	0.0	0.0	
Inside/Outside	0		1			

RECOVERY

Tot Fluid 975.00 ft of 558.00 ft in DC and 417.00 ft in DP
 100.00 ft of heavy mud trace water 100% mud
 217.00 ft of watery mud 30% water 70% mud
 150.00 ft of mud cut water 80% water 20% mud
 508.00 ft of water 100% water
 0.00 ft of
 0.00 ft of
 0.00 ft of
 0.00 ft of

SALINITY 0.00 P.P.M. A.P.I. Gravity 0.00

BLOW DESCRIPTION

I.O.- surface blow built to B.O.B. in 11 min.

I.S.I.- no return

F.F.- surface blow built to B.O.B. in 25 min.

F.S.I.- no return

SAMPLES:
 SENT TO:

Test Successful: Y

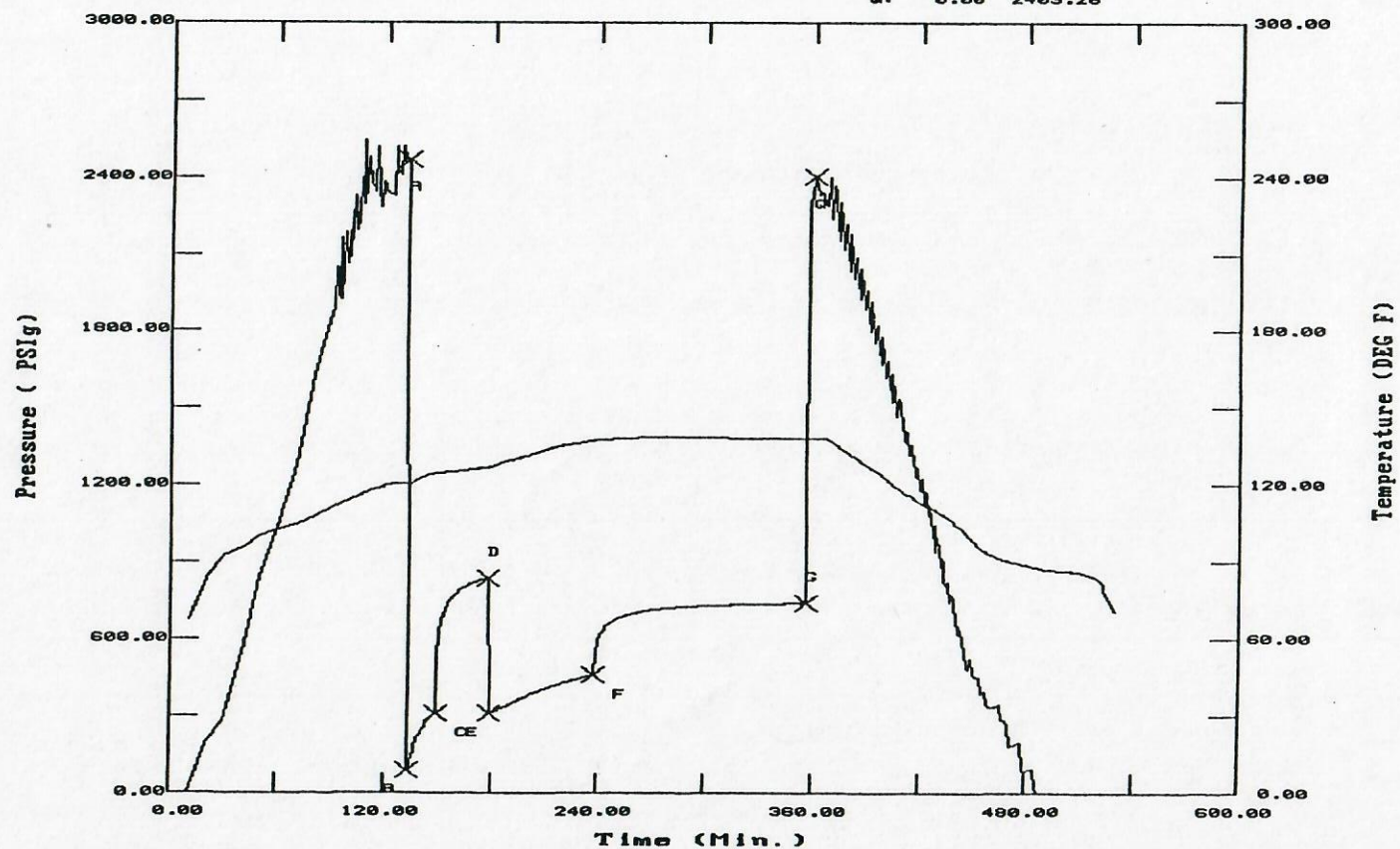
MUD DATA-----
 Mud Type chem
 Weight 9.00 lb/cf
 Vis. 57.00 S/L
 W.L. 5.60 in³
 F.C. 0.00 in
 Mud Drop N
 Amt. of fill 0.00 ft
 Btm. H. Temp. 138.00 F
 Hole Condition fair
 % Porosity 0.00
 Packer Size 6.75 in
 No. of Packers 2
 Cushion Amt. 0.00
 Cushion Type
 Reversed Out N
 Tool Chased N
 Tester Shane McBride
 Co. Rep. SamCarmac Kudu
 Contr. 1
 Rig #
 Unit #
 Pump T.

SAMPLER: 4000cc TOTAL VOLUME; 3800cc [95%]-Water/ 200cc [5%]-Mud; No oil or gas.
 700lbs-Pressure; Rw=0.15 @ 60°F, CL=54,000ppm.

TEST HISTORY

9204 DST#1 Red Rocks # 1-20 Amoco Prod.

	t (Min.)	P (PSig)
A	0.00	2472.59
B	0.00	89.88
C	15.00	307.34
D	30.00	834.49
E	0.00	310.27
F	59.00	459.33
G	119.00	737.80
Q	0.00	2403.26



*** TOOL DIAGRAM *** CONVENTIONAL

WELL NAME: Red Rocks # 1-20

LOCATION : 20-15-42

TICKET No. 9204 D.S.T. No. 1 DATE 3-30-96

TOTAL TOOL TO BOTTOM OF TOP PACKERS 30

INTERVAL TOOL

BOTTOM PACKERS AND ANCHOR 16

TOTAL TOOL 46

DRILL COLLAR ANCHOR IN INTERVAL

D.C. ANCHOR STND.Stands Single Total

D.P. ANCHOR STND.Stands 1 Single Total 94

TOTAL ASSEMBLY 140

D.C. ABOVE TOOLS.Stands6 Single Total 558

D.P. ABOVE TOOLS.Stands48 Single 1 Total 4501

TOTAL DRILL COLLARS DRILL PIPE & TOOLS .. 5199

TOTAL DEPTH 5170

TOTAL DRILL PIPE ABOVE K.B. 29

REMARKS:

GAS;

OIL;

WATER;3,800 ml.

MUD;200 ml.

PRESSURE; 700/65

TOTAL: 4,000

Chlorides in system 2,400 RW2.6 @ 69°F
Chlorides in sampler 54000 RW.15@ 60 °F

P.O. SUB

C.O. SUB 1'

5030

S.I. TOOL 5'

5036

sampler 3'

5039

HNV 5'

5044

JARS 5'

5049

SAFETY JOINT 2'

5051

PACKER top

5055

PACKER bottom

5060

DEPTH 5060

STUBB 1'-perf

5061

ANCHOR alpine recorder

5062

8'-perf

5070

1' c.o.

5071

94' drill pipe

5164

T.C.
DEPTH

1' c.o.

5165

ak-1 recorder

5165

BULLNOSE 5' bullplug

5170

T.D.

5170

SHOW EVALUATION

OVERVIEW

The AMOCO Exploration Company No.1-20 Red Rocks [NE SW SEC.20-T15S-R42W, Cheyenne Co., CO] was drilled as a wildcat well in the Las Animas Arch, Colorado. The primary objectives were the Pennsylvanian Morrow Sands, commonly referred to as Upper, Middle, and Lower Sands. The secondary objectives were the Pennsylvanian Topeka, Marmaton and Lansing Kansas City, and the Mississippian and Spergen formations. The offset/control well was the WEBB Resources No.20-1 Bernal Wallace NO.20-1 [NE SE SEC.20-T15S-R42W], which did not develop any Morrow Sand. The AMOCO No.1-20 Red Rocks developed an eight foot Upper Sand at 5128'-5136'(-1091'), and was drill stem tested [DST NO.1 5060'-5170', See Pages 9-11].

Samples were circulated at 5170' to evaluate the UPPER Sand Zone and DST NO.1 was run. DST NO.1 recovered 975 feet of watery mud with no trace of oil or gas. Samples were circulated at 5210' after drilling resumed to evaluate the Middle and possible Lower Morrow Sands. It was determined from the lack of sample shows and adequate porosity not to test the poorly developed Morrow Sands in the interval 5170 to 5210. The UPPER Sand was a medium to coarse grained, subangular, moderately sorted, sand with fair to good porosity, and only a rare trace of milky diffuse cut. The samples did not have any oil stain or fluorescence, which DST No.1 confirmed by the lack of hydrocarbons. The Middle Sand interval was very poorly developed and was interpreted by the wellsite geologist to be thin coarse to medium grained, tightly cemented sand stringers interbedded within shale and limestone beds. No sample shows were found in the cuttings and no drill stem test was run either while drilling or after electric logs were evaluated. The Lower Morrow Limestone came in at 5186'(-1149') and no Lower Morrow Sand interval developed, even though there was sand present in the samples. No other drill stem tests were run in the Morrow section and the Morrow Shale section was deemed nonproductive.

STRUCTURE

Structurally, the AMOCO No.1-20 Red Rocks [NE SW SEC.20-T15S-R42W] was 23 foot high to the reference offset/control well, the WEBB Resources [NE NE SEC.20-15S-R42W] at the top of the Morrow Shale(STRAT) [5082'(-1045') versus 5112'(-1068')].

SECONDARY OBJECTIVES

The other secondary objectives, the Pennsylvanian Topeka, Lansing Kansas City, Marmaton, Atoka, and the Mississippian Spergen developed six zones with sample shows. No zone was tested after electric log and sample data were evaluated. See SHOWS NO.1-8 listed below.

STATUS

The AMOCO Production Company No.1-20 Red Rocks was plugged and abandoned on April 2, 1996 after samples, electric log, and drill stem test data were evaluated.

FORMATION AND SHOW ZONE LISTING

The ensuing Show Evaluation listings are in the order they were drilled. They are categorized either by formation name and or by common zone designation.

FORMATION AND ZONE LISTING

The wellsite geologist began sample descriptions at 3500 feet. The interval 3500' to the top of the SHAWNEE/TOPEKA at 3928'(+109'), included the PERMIAN formations the Red Eagle, Johnson, Foraker, Root, and the Waubunsee at the top of the Pennsylvanian. No sample shows were found in the cuttings from 3500' to 3928', with a few zones of porosity developing. No drill stem tests were run over this interval after samples and electric log were evaluated.

SHAWNEE/TOPEKA 3928'(+109').

PENNSYLVANIAN

The Shawnee/Topeka interval was 264 feet thick with interbedded limestones and shales and an increase in dolomites through the porosity zones. Typically, the Shawnee/Topeka has three porosity zones which can develop shows. These three zones are the Topeka "A", "B", and "C", or upper, middle, and lower [TOPEKA "C"] porosity zones. Background gas was 4-6 units through the entire interval. The drilling rate background was 4.5 min/ft with the drilling breaks at 1.0-2.0 min/ft. Three shows developed in the Shawnee/Topeka section, in the upper "A" Shawnee/Topeka at SHOW NO.1 [4030'-4036'[6'-Thick], the Middle "B" Shawnee at SHOW No.2 [4038'-4052'[14'-Thick], and in the Topeka "C" zone at SHOW No.3 [4142'-4162'[20'-Thick]. None of the zones were drill stem tested either while drilling or after electric logs were evaluated.

SHOW NO.1 3982'-3998'(16')(+55'). 1.50'/ft vs 4.0'/ft.

TG=9 U; C1=26 U; C2=2 U.

LITHOLOGY: LS mg-y-wh-tan gran-xfxl firm-occ vfri mfos w/calc infill vchky mtrx mdolo gran slpyr.

POROSITY: FR-occ G(gran).

OIL STAIN: Rare tr tan sat stn, no live oil.

FLOR: 20% mot m-ltyel.

CUT: 20% immed m-occ pale yel diffuse strm cut.

RESIDUE: Myel flor res.

SHOW NO.2 4038'-4052'(14')(-1'). 2.0'/ft vs 4.5'/ft.

TG=8 U; C1=6 U; C2=2 U.

LITHOLOGY: LS mot ltgy-tan occ dkgy xfxl-gran fri dolo occ suc slfos w/chk & slty mtrx.

POROSITY: P-FR(gran-occ oomold).

OIL STAIN: None.

FLOR: 10% myel.

CUT: 10% slow ltyel diffuse cut.

RESIDUE: Pale yel flor res.

TOPEKA "C" 4108'(-71').

SHOW NO.3 4142'-4162'(20')(-105'). 3.0'/ft vs 5.0'/ft.

TG=6 U; C1=5 U; C2=None.

LITHOLOGY: LS tan-mgy xfxl-occ gran vfri-mfirm dolo mfos w/chk mtrx occ shly slty.

POROSITY: P(gran-oomold).

OIL STAIN: None.

FLOR: TR myel.

CUT: TR weak mlky cut.

RESIDUE: None.

FORMATION AND ZONE LISTING

LANSING KANSAS CITY 4192'(-155').

PENNSYLVANIAN

The Lansing Kansas City section was 444 feet thick and contained three show zones [SHOWS NO.4-6]. The Lansing is an interval of interbedded limestones and shales with occasional dolomitic stringers. Lansing porosity zones are usually fossiliferous and oomoldic and SHOW NO.3 fits into this pattern. Background gas through the Lansing averaged 6-8 units, with drilling rates at 5.0'/ft and drilling breaks at 1.0 to 3.5'/ft. SHOW NO.1 was a poor show with poor to fair oomoldic porosity and a trace of oil stain, with 10 percent fluorescence and cut. SHOW NO.2 was a poor show with poor to good porosity and no oil stain and only a trace of fluorescence and cut. SHOW NO.6 had fair oomoldic porosity, no oil stain, and only a trace of fluorescence and cut. SHOWS NO.4-6 did not warrant testing while drilling or after electric logs were evaluated.

SHOW NO.4 4228'-4240'(12')(-191'). 2.5'/ft vs 5.5'/ft.

TG=6 U; C1=5 U; C2=None.

LITHOLOGY: LS mot wh-ltgy litho-xfxl gran vfes w/chk mtrx occ ool text slpyr & dolo.

POROSITY: P-FR(oomold-gran).

OIL STAIN: TR ltan sat stn, no live oil.

FLOR: 10% mot ltyel.

CUT: 10% slow weak mlky-ltyel cut.

RESIDUE: None.

SHOW NO.5 4346'-4360'(14')(-309'). 4.0'/ft vs 5.5'/ft.

TG=7 U; C1=5 U; C2=2 U.

LITHOLOGY: LS ltan-occ brn ltgy gran-xfxl firm-fri mfes w/calc infill vchky mtrx sldolo gran carb.

POROSITY: FR-occ G(oomold-occ gran).

OIL STAIN: None.

FLOR: TR myel.

CUT: TR weak mlky crush cut.

RESIDUE: None.

SHOW NO.6 4468'-4482'(14')(-431'). 1.5'/ft vs 5.5'/ft.

TG=8 U; C1=6 U; C2=2 U.

LITHOLOGY: LS mot wh-vltgy gran-litho vfri vfes w/chk mtrx occ slty pyr sldolo & shly.

POROSITY: G-FR(oomold).

OIL STAIN: None.

FLOR: TR ltyel-pale yel.

CUT: TR weak mlky crush cut.

RESIDUE: None.

MARMATON FORMATION 4636'(-599')

PENNSYLVANIAN

The Marmaton Formation was 136 feet thick and contains two members, the middle Pawnee Member [4656'(-619')] and the lower Fort Scott Member [4706'(-669')]. Sometimes an upper Marmaton porosity zone develops with shows. The Marmaton is generally composed of interbedded limestone and thin shales, with an increase in dolomite over the lower section. Background gas through the Marmaton averaged 12-16 units. In the No.1-20 Red Rocks, no sample shows were found in the cuttings. No zone warranted testing after electric logs were evaluated.

FORMATION AND ZONE LISTING

CHEROKEE 4772'(-735'). PENNSYLVANIAN

The Cherokee Formation was 148 feet thick and contained the usual interbedded black to dark gray-brown, highly organic shales, limestones, and an increase in the amount of limey dolomite, with traces of pyrite and chert. No shows were found in the Cherokee Formation. The usual pattern of gas increases through the Cherokee organic shales developed with background gases ranging from 20 units to a maximum of 34 units.

ATOKA 4920'(-883'). PENNSYLVANIAN

The Atoka Formation was 142 feet thick and was comprised of interbedded black shales with dark limestones and dolomite stringers. An increase in pyrite and chert was noted over the Cherokee interval. The Atoka Formation had high gas readings ranging from 12 to 32 units and was composed primarily of methane. The No.1-20 Red Rocks Atoka section also developed two show zones in the Atoka section, in dolomitic limestone intervals. SHOWS NO.7 and 8 had a trace of tan saturated oil stain, but porosity was poor and granular. Neither show warranted testing while drilling or after electric logs were evaluated.

SHOW NO.7 4926'-4942'(16')(-889'). 3.5'/ft vs 6.5'/ft.

TG=28 U; C1=24 U; C2=10 U; C3=2 U.

LITHOLOGY: LS mot lttan-gy-occ dkgy gran-xfxl mfirm & hd-occ fri dolo & suc w/mfos zones w/chk mtrx slpyr.

POROSITY: FR-P-occ frac Ø.

OIL STAIN: Rare TR sat oil stn(dolo).

FLOR: 10% mot myel.

CUT: 10% very weak mlky diffuse crush cut.

RESIDUE: Pale yel flor res.

SHOW NO.8 4972'-4986'(14')(-935'). 3.5'/Ft vs 6.0'/ft.

TG=28 U; C1=22 U; C2=10 U; C3=TR.

LITHOLOGY: LS dkgy-occ tan microxl-gran mfirm-occ fri vdolo w/intbd dolo strgs carb & shly slpyr occ fos w/chk mtrx.

POROSITY: P-TT.

OIL STAIN: TR tan sat stn on dolo ls.

FLOR: TR mot ltyel.

CUT: TR slow mlky crush cut.

RESIDUE: Very pale flor yel res.

MORROW SHALE(SONIC) 5062'(-1025') LOWER PENNSYLVANIAN

MORROW SHALE(STRAT) 5082'(-1045').

The Morrow Formation was 104 feet thick in the NO.1-20 Red Rocks, and was the primary objective. The Morrow Formation consisted of black to gray marine shales and lighter colored shales in the valley fill sequences. The sandstone that does develop in the Morrow is found within these valley fill sequences. The primary objective was the Upper Sand, with the possible potential of the Middle and Lower Sand. The No.1-20 Red Rocks developed an eight foot Upper Sand [5128'-5136'(-1091')], which was drill stem tested [DST No.1 5060'-5170']. DST No.1 recovered 975 feet of drilling muddy water, with no oil or gas.

FORMATION AND ZONE LISTING

MORROW SHALE(SONIC) 5062'(-1025'). LOWER PENNSYLVANIAN

The Upper Sand was clear to white, with a trace of feldspathic light yellow grains, subangular, moderately, medium to very coarse grained sand. The cementation was siliceous to calcareous, with a trace of quartz overgrowths. The matrix contained kaolinite clay and very finely disseminated pyrite. Porosity ranged from fair to good with tight sand from cementation. No oil stain was found in the samples and only a rare trace milky diffuse cut. No hydrocarbons were recovered from DST NO.1. The pipe recovery was 975 feet of watery mud and no trace of oil or gas. See the MORROW UPPER SAND below for a detailed sample description.

The Middle Morrow Sand Zone [5164'-5180'(16')] was very poorly developed and was present only as thin interbedded stringers within shale and limestone beds. The samples had clear to white, medium to coarse grained, angular, moderately sorted sand with an increase in calcite cement and quartz overgrowths. Evidence of shale partings and limestone interbeds was found in the cuttings, along with very finely disseminated pyrite. The electric logs did not show the presence of sand in the interval 5164'-5180', and the Lower Morrow Lime could be interpreted as 5164'(-1127'). But, the presence of sand in the cuttings through this interval was interpreted by the wellsite geologist to indicate the nearby development of a true Middle Sand body. No shows were found in the sand from the interval 5164'-5180'. And no drill stem test was run either while drilling or after electric logs were run. Listed below is a description of the Middle Morrow Sand Zone.

MORROW UPPER SAND 5128'-5136'(8')(-1091'). 2.0' to 3.5'/ft vs 5.5'/ft.

TG=14 U; C1=12 U; C2=2 U.

LITHOLOGY: SS clr-wh-occ ltyel/pk(felds); 30%-uncon/70%-clus; fri-firm; sbang-sbrd; msrt m-vcg-occ fg(top); sil & calc cmt; occ qtz ovrghs; kao cly infill; tr pyr.

POROSITY: G-FR-occ TT(cmt).

OIL STAIN: None.

FLOR: None.

CUT: Rare trace mlky diffuse cut on clus, non on uncon grs.

RESIDUE: None.

MORROW MIDDLE SAND ZONE 5164'-5180'(16')(-1127'). 3.0' to 4.5'/ft vs 5.5'/ft.

TG=18 U; C1=16 U; C2=2 U; C3=TR.

LITHOLOGY: SS clr-wh-gy; cg-mg; 60%-uncon/40%-clus; fri-firm; sbang-sbrd; msrt sil & calc cmt; occ qtz ovrghs; kao cly infill; tr pyr; SS strgs intbedded within SH mot m-dkgy-occ ltgygn sft plty fis & pyr carb,

POROSITY: P TT(cmt).

OIL STAIN: None.

FLOR: None.

CUT: None.

RESIDUE: None.

LOWER MORROW LIME 5186'(-1149') LOWER PENNSYLVANIAN

The Lower Morrow was 56 feet thick and contained no shows. Background gas ranged from 6 to 12 units. The lithology of the Lower Morrow consisted mainly of chalky and moderately fossiliferous, and sometimes slightly sandy limestone, with a decrease in the amount of shale from the Morrow section. No sample shows were found in the No.1-20 Red Rocks.

FORMATION AND ZONE LISTING

MISSISSIPPIAN 5242'(-1205').

UPPER MISSISSIPPIAN

The MISSISSIPPIAN was a tan to gray chalky fossiliferous and sandy limestone with thin interbedded shales. Background ranged from 8 to 10 units. No shows were found in the 138 feet penetrated in this section.

SPERGEN 5380'(-1343').

MISSISSIPPIAN

The Spergen Formation consisted of interbedded limestone and granular dolomites with thin shale stringers. The top of the Spergen was marked by the typical increase in chert and in percentage of dolomite. No shows were found in the 130 feet of Spergen penetrated in the No.1-20 Red Rocks, which reached a total depth of 5510'(-1473') in the Spergen dolomites.
