MERRION OIL & GAS CORPORATION

PAPERS WASH FIELD

FEDERAL 15-2

HORIZONTAL REDRILL

FINAL WELL REPORT

February 1990

I. SUMMARY INFORMATION

Well Name	:	Federal 15 No. 2
Surface Location	:	McKinley County, New Mexico 1960' FNL, 999' FWL Sec 15, T 19 N, R 5 W
Elevations	:	6,616' RKB 6,604' GL
Entrada Sandstone Interval		
Top	:	2,374' FNL, 815' FWL 5,378' MD 5,163' TVD
Base	:	2,730' FNL, 574' FWL 5,809' MD 5,175' TVD
Total Depth	:	5,180' TVD 6,084' MD
Well Status	:	Entrada Sandstone Oil Producer
Rigs		
Preparation	:	Ram Service Co Rig 1
Drilling	:	Walters Drilling Inc. Rig 4
Testing/Completion	:	Unknown
Rig Arrivals		
Preparation	:	November 13, 1989
Drilling	:	January 18, 1990
Testing/Completion	:	February 6, 1990
Time on well		
Preparation	:	21 days
Drilling	:	17 days
Testing/Completion	:	7 days
Well Costs	:	
Preparation	:	$
Drilling	:	$
Testing/Completion	:	$
Total Cost	:	$

II. EXECUTIVE SUMMARY

The Papers Wash oil pool is located in McKinley County, New Mexico, approximately 75 miles southeast of Farmington, New Mexico. It lies in the Chaco Slope province of the San Juan Basin, and was discovered by Dome Petroleum, in October 1976 with the Federal 15 No. 1 well. Papers Wash is typical of Entrada oil pools in the basin, in that it is an oil accumulation in what was once a large Entrada sand dune. The reservoir rock is a very clean, fine to medium grained sandstone with porosity of 25% and air permeabilities between 300 and 800 md. The oil has a gravity of around 32° API, GOR too small to measure, and viscosity of around 8 cp under reservoir conditions. The reservoir drive is base water.

Production histories of this and similar Entrada reservoirs, are characterized by early water cuts which rapidly exceed 99%, often requiring the lifting of fluid volumes in excess of 4,000 BPD to maintain economic oil rates. Well production ceases when the high water cut causes poor economics. The mechanism believed to be responsible for the high water cut during production is the formation of an extensive water cone around the wellbore. This is due to the unfavorable mobility ratio in combination with a thin oil column and the highly permeable reservoir rock, and there is a further possibility that the problem was aggravated by formation damage caused by poor drilling practices.

Based upon studies of previously drilled and tested Entrada wells, there is evidence of severe formation damage, with calculated skins of around +12. The damage mechanism is thought to be principally reduction in relative permeability to oil, due to the increased water saturation around the wellbore caused by filtrate invasion from the drilling fluid. A secondary, and potentially more serious damage mechanism is plugging of the sand face by particles from the mud. Pore sizes measured in a detailed reservoir study of the nearby Eagle Mesa field suggest that the Entrada sandstone may be particularly susceptible to this type of damage.

The objective of the Federal 15 No. 2 horizontal redrill was to determine the economic impact of a horizontal completion on the ultimate recovery of the original oil in place. Intuitive thinking led to the belief that the low unit pressure drawdown of a horizontal wellbore would greatly retard the onset of high water cuts, assuming that the wellbore was placed in a manner which allowed it to avoid intersecting existing water cones, and that it was placed as high as possible above the base of the movable oil.

The Federal 15 No. 2 well was shut in November 1984, after producing almost 120,000 bbls of oil. At the time of shut-in, the well had been producing at a water cut of 99.75%. The well was cased with 7", 23 lb/ft, K-55 grade casing, and had a Reda G-110 electric submersible pump at 3073' on a string of 3-1/2" 9.3 lb/ft J-55 tubing.

Ram Services Rig No. 1 was moved into location on November 15, 1989, to prepare the well for sidetracking through the 7" casing. The 3-1/2" tubing and Reda pump were pulled and laid down, and the well was cleaned out to the Entrada perforations. After running a Schlumberger METT corrosion log in the casing, a cement plug was set above the Entrada perforations. The casing log showed all pipe to be in good condition, except for some minor corrosion around 2,000'. A remedial cement job was then performed in the planned kick-off interval, by perforating at 4,665' and 4610', then setting a cement retainer on wireline at 4,660'. After stinging in and establishing circulation, cement was circulated behind the casing.

After tripping out, the hole was filled with water, and the casing was pressure tested, but took fluid at 2 bbl/min at 700 psi. A 7" packer was run, and the casing leaks were located in the interval between 1,930' and 2,020'. A cement plug was spotted open-ended across the interval, and after pulling out of the plug, the zone was squeezed to 1200 psi. The cement was drilled out, and the casing was pressure tested again, but bled from 1,000 psi to 600 psi in 4 minutes. A dry test indicated fluid entry at about 1 bbl/hr. A bit trip was then made, and the cement was dressed off to the top of the cement retainer.

The well was surveyed with a surface read-out gyro, and a test was made of the Point Lookout formation, by perforating 1,954' to 1,956'. Swabbing failed to produce any oil or gas. Following the test, tubing was run open-ended to 2,020', and injection was established. A balanced plug was set, and after pulling out of the plug, squeezed away to 1500 psi. After WOC, the plug was drilled out and the casing was successfully tested to 1500 psi. The rig was rigged down and moved out on December 5, 1989.

The drilling phase commenced on January 18, 1990, using Walters Drilling Inc., Rig No. 4. Following a slow rig-up, due to heavy snow, an AZ casing whipstock system was oriented to S40°W and used to open a window from 4,637' to 4,649'. This required two days and four runs; a starter mill, two window mills, and a dressing run with a taper mill.

A double bend 4-3/4" downhole motor assembly was picked up and run in the hole to build the angle. The mud system was displaced to a low weight, PHPA polymer mud during the first

bit run. Two runs were made with the assembly, to a depth of 4,987' and an inclination of around 32°, using a conventional steering tool and side entry sub for directional control. At that point, it became apparent that a higher build rate was required to achieve the target, so a short DIR motor with a 3° bent sub was run to continue the angle build. Two runs were made with this motor, to a depth of 5,230' and an inclination of about 65°. At that depth, the motor stalled repeatedly, and was pulled to pick up a new motor. The directional surveys from the steering tool were becoming suspect at that time, as the tool was at it's accuracy limit of 60°.

A new motor was picked up, and while making up the orienting sub, the mule shoe key was dropped in the hole. The assembly was run in the hole to the top of the casing whipstock, and a more accurate survey instrument was run. The well was re-surveyed on the trip in the hole, with the new survey placing the wellbore position higher than previously calculated. This eliminated the need for the higher build rate of the short DIR motor, which was tripped back out of the hole. The double bend motor assembly was re-run, and successfully completed the build at 5,495' and 90° inclination. During the run, the Entrada sandstone was encountered 13' TVD high at 5,378' MD, 5,163' TVD. The angle build interval required a total of 5-1/2 days.

A stabilized steerable motor holding assembly was made up and reamed in through the angle build. New hole was drilled to 5,609' MD, at which point the surveys indicated that the assembly was dropping angle mildly. A trip was made, and the assembly was adjusted to give slight build. Drilling proceeded to 5,738, at which depth the assembly was drilled oriented high side in an attempt to stay higher in the structure. A steering tool was used during the slide, and when pulled, bird's nested the line inside the drill pipe. The pipe became temporarily stuck during the removal of the bird's nest, but was freed quickly with rotation after overpull failed to move it.

Drilling proceeded without incident to 5,809', at which depth a reverse drilling break occurred. Examination of the cuttings samples showed that the well had drilled out of the sand, back in to the overlying anhydrite. Drilling continued to a depth of 6084', where a loss of 400 psi of pump pressure was noted. a survey was taken, and the assembly was tripped out of the hole. It was discovered that the downhole motor had parted at the top saver sub, leaving the motor and the bit in the hole. The lateral reach section of the hole took 3 days.

An overshot was dressed with a 4-3/4" spiral grapple, and run in the hole. The fish was tagged, and appeared to be caught by torque and weight indications, but would not come

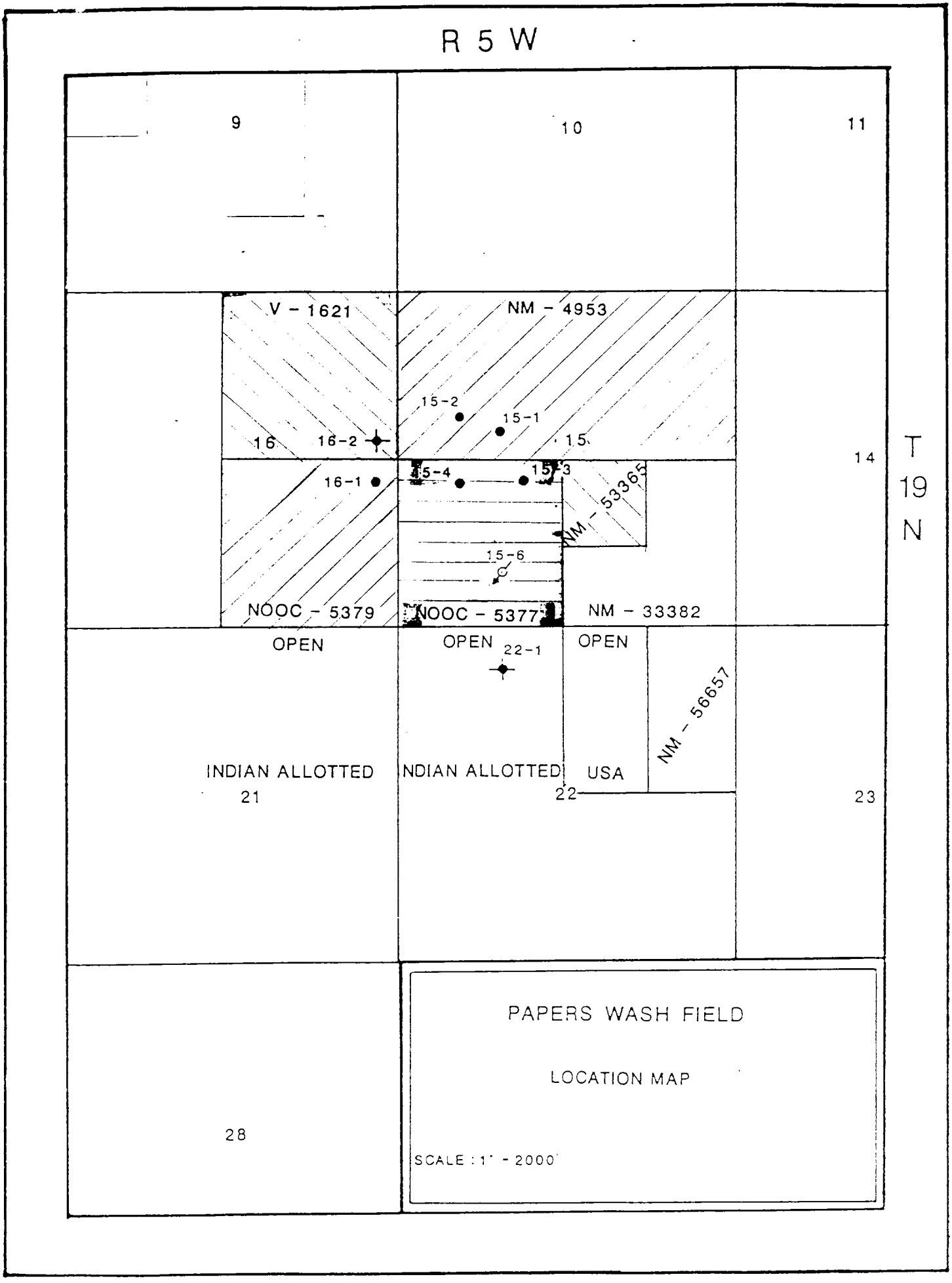
free with 130,000 lbs overpull. The overshot would not release, and a stringshot was run at 1800' to back off the pipe and allow the kelly to be removed, so that a second stringshot could be pumped down the hole to the overshot. The second stringshot relaesed the overshot, and a fishing assembly consisting of an overshot, bumper sub, jars and accelerators was run twice, without success. The problem was thought to be the overshot working alongside the fish, so a new assembly was run with a bent joint of drillpipe between the overshot and the bumper sub. This assembly failed to pass through the window in the 7" casing, and was pulled to reduce the bend. It hung up at the casing whipstock on the second attempt. Fishing operations took 2-1/2 days.

Fishing operations were terminated as being uneconomic, and a taper mill/string mill assembly was run to dress off suspected damage to the top of the whipstock. A bit was then run to bottom, and the hole was conditioned to run casing.

The 4-1/2" liner string, with a pre-perforated interval, CTC external packer and cementing port collar, was made up and run in the hole. The 2-7/8" stinger and cementing swab assembly was run inside the liner, and the liner hanger was made up. the liner was run in the hole on drill pipe, and was washed to bottom from 5738' to 5864'. After circulating, the liner was hung with the hanger at 4568' and the shoe at 5864', and the running tool was released from the liner.

Cement was batch mixed and displaced down the workstring, but while attempting to inflate the CTC packer, the landing seat for the cementing plug sheared out prematurely, allowing the cement to U-tube through the upper pre-perforated liner interval. The inner string was picked up to the port collar, and the displacement was completed, with 240 psi static pressure at the end of the displacement. The port collar was closed, and the inner string pulled to the top of the liner and circulated out. No cement returns were seen.

The drill pipe and tubing were laid down, and a temperature survey was run inside the 4-1/2" liner, encountering cement inside at 5049', and indicating a cement top outside at the same depth. The rig was released at 0600 hrs, February 5, 1990. Total time on the drilling phase was 17 days.


R 5 W
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V - 1621
NM - 4953
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NM - 53365
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NOOC - 5379
NOOC - 5377
NM - 33382
OPEN
OPEN
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NM - 56657
INDIAN ALLOTTED
21
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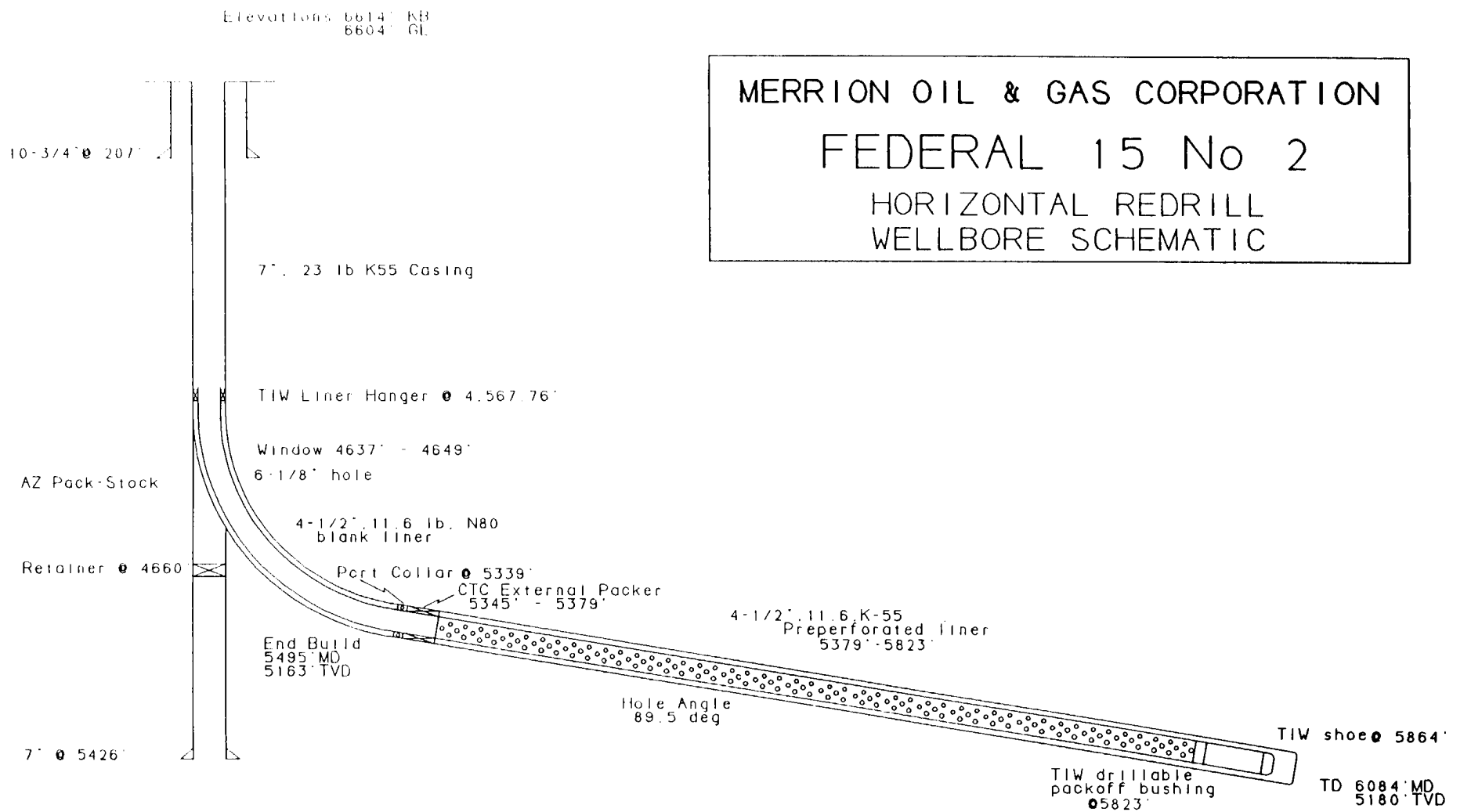
PAPERS WASH FIELD
LOCATION MAP
SCALE : 1" - 2000'

MERRION OIL & GAS CORPORATION

FEDERAL 15 No 2

HORIZONTAL REDRILL
WELLBORE SCHEMATIC



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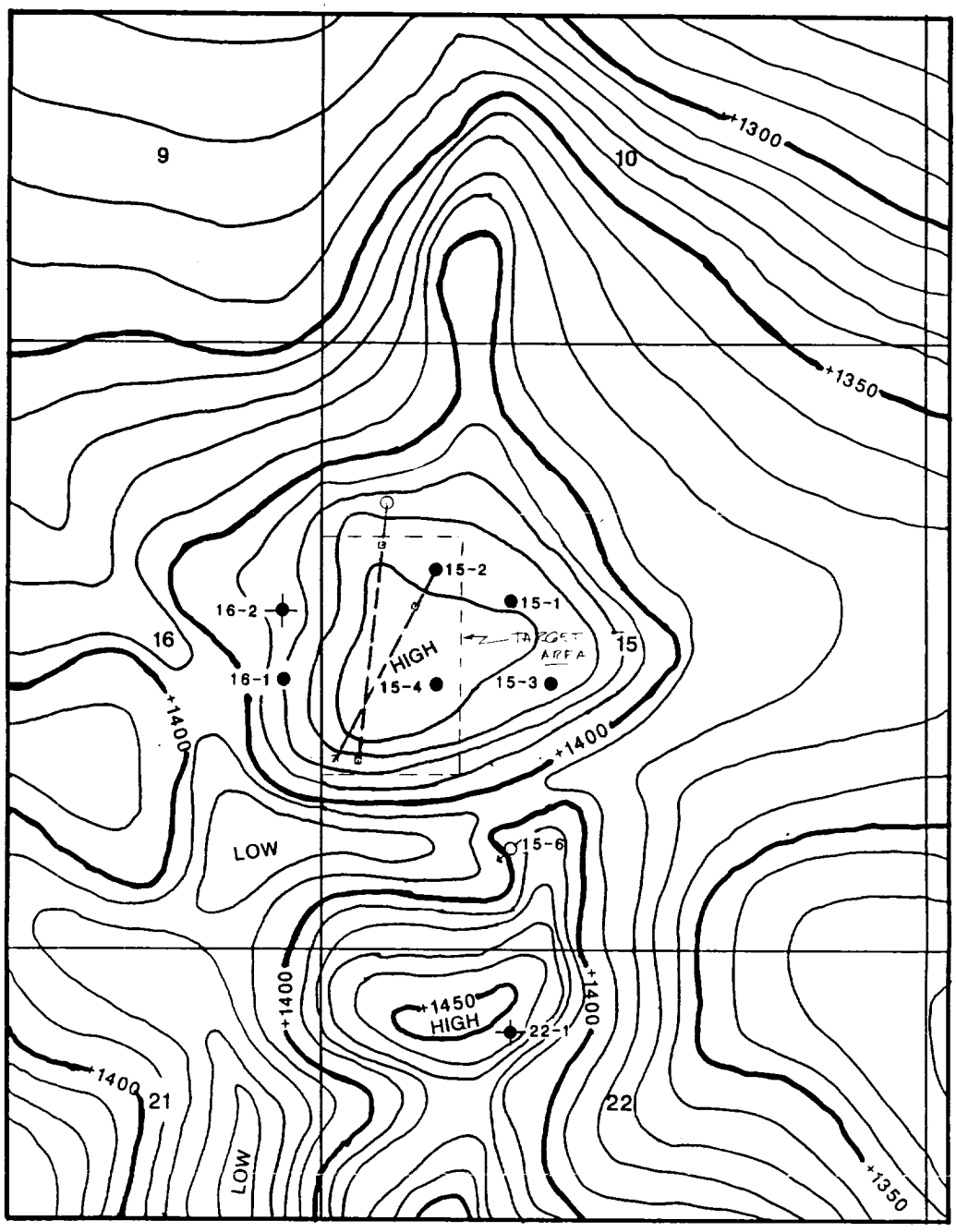
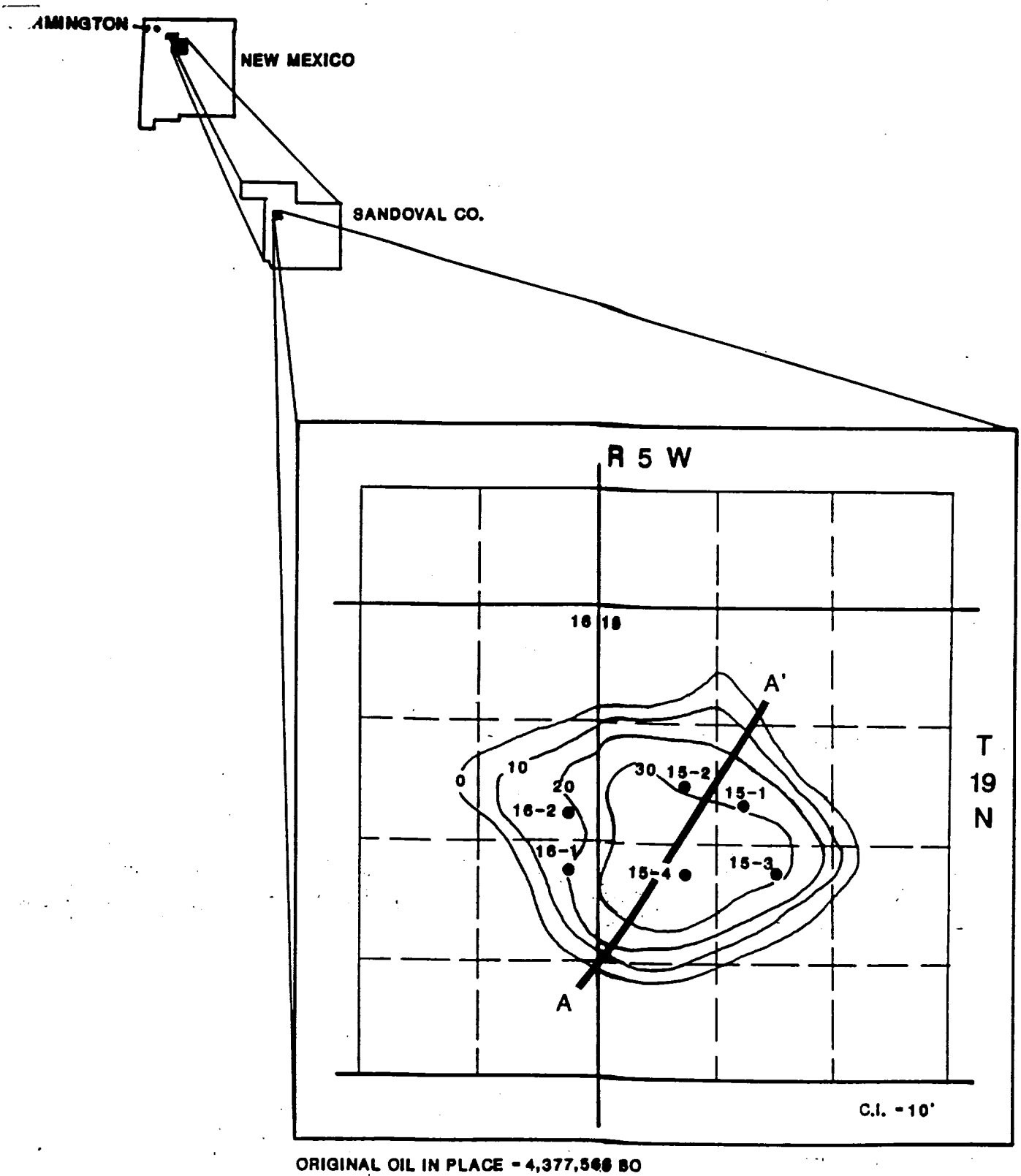


T 19 N

R 5 W

MERRION OIL & GAS CORP.
PAPERS WASH FIELD MCKINLEY CO., NEW MEXICO
ENTRADA STRUCTURE
C.I. = 10' SCALE : 1" = 1000' DATE : 3/88

PAPERS WASH ENTRADA FIELD
LOCATION AND NET PAY ISOPACH



ORIGINAL OIL IN PLACE = 4,377,566 BO

EST. PRIMARY RECOVERY = 1,313,270 BO

Merrion Oil & Gas Corp.
Federal 15-2 Champ MS

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Minimum Curvature Method Traditional Units

Vertical Section Azimuth : 210.00

M.Depth (ft)	Inc. (deg)	Azimuth (deg)	TVD (ft)	V.Sect (ft)	North (ft)	East (ft)	Closure (ft)	DLS °/100
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00
100.00	0.48	87.08	100.00	-0.23	0.02	0.42	0	0.48
200.00	0.27	230.38	200.00	-0.23	-0.11	0.66	1	0.71
300.00	0.50	161.70	300.00	0.28	-0.67	0.61	1	0.47
400.00	0.42	167.02	399.99	0.84	-1.44	0.83	2	0.09
500.00	0.38	161.45	499.99	1.32	-2.12	1.02	2	0.06
600.00	0.42	182.78	599.99	1.87	-2.80	1.11	3	0.15
700.00	0.42	142.77	699.99	2.34	-3.45	1.31	4	0.29
800.00	0.43	71.30	799.98	2.20	-3.62	1.89	4	0.50
900.00	0.60	49.30	899.98	1.42	-3.16	2.64	4	0.26
1000.00	0.62	42.68	999.97	0.40	-2.42	3.40	4	0.07
1100.00	0.60	29.25	1099.97	-0.65	-1.57	4.03	4	0.14
1200.00	0.68	48.97	1199.96	-1.74	-0.72	4.73	5	0.23
1300.00	0.83	18.50	1299.95	-3.01	0.35	5.41	5	0.42
1400.00	0.97	35.02	1399.94	-4.56	1.73	6.12	6	0.29
1500.00	0.82	24.50	1499.93	-6.12	3.08	6.90	8	0.22
1600.00	0.80	12.50	1599.92	-7.50	4.41	7.35	9	0.17
1700.00	0.60	11.00	1699.91	-8.66	5.61	7.60	9	0.20
1800.00	0.38	16.83	1799.91	-9.47	6.44	7.80	10	0.23
1900.00	0.22	62.12	1899.91	-9.96	6.84	8.06	11	0.27
2000.00	0.17	202.83	1999.91	-9.98	6.80	8.18	11	0.37
2100.00	0.58	192.08	2099.90	-9.35	6.17	8.01	10	0.41
2200.00	0.72	178.22	2199.90	-8.33	5.04	7.93	9	0.21
2300.00	0.78	158.52	2299.89	-7.37	3.78	8.20	9	0.26
2400.00	0.78	141.42	2399.88	-6.70	2.62	8.87	9	0.23
2500.00	0.63	149.17	2499.87	-6.18	1.61	9.58	10	0.18
2600.00	0.68	149.67	2599.87	-5.62	0.63	10.16	10	0.05
2700.00	0.62	138.90	2699.86	-5.15	-0.29	10.81	11	0.14
2800.00	0.47	139.78	2799.85	-4.84	-1.01	11.43	11	0.15
2900.00	0.67	152.68	2899.85	-4.39	-1.85	11.97	12	0.24
3000.00	0.38	155.12	2999.84	-3.88	-2.67	12.37	13	0.29
3100.00	0.08	191.55	3099.84	-3.62	-3.04	12.50	13	0.32
3200.00	0.08	216.00	3199.84	-3.49	-3.16	12.44	13	0.03
3300.00	0.33	219.32	3299.84	-3.13	-3.44	12.22	13	0.25
3400.00	0.55	196.70	3399.84	-2.38	-4.12	11.90	13	0.28
3500.00	0.83	177.08	3499.83	-1.31	-5.30	11.80	13	0.36
3600.00	1.22	148.72	3599.82	-0.19	-6.94	12.39	14	0.63
3700.00	1.93	164.70	3699.78	1.51	-9.47	13.39	16	0.83
3800.00	2.42	157.82	3799.71	3.99	-13.05	14.63	20	0.55
3900.00	2.77	165.05	3899.60	6.99	-17.34	16.05	24	0.48

M.Depth (ft)	Inc. (deg)	Azimuth (deg)	TVD (ft)	V.Sect (ft)	North (ft)	East (ft)	Closure (ft)	DLS °/100
4000.00	3.12	166.02	3999.47	10.66	-22.32	17.33	28	0.35
4100.00	2.88	166.48	4099.34	14.44	-27.40	18.57	33	0.24
4200.00	2.58	167.45	4199.22	17.92	-32.04	19.65	38	0.30
4300.00	2.75	165.90	4299.11	21.30	-36.56	20.72	42	0.18
4400.00	2.18	173.40	4399.02	24.55	-40.78	21.53	46	0.65
4500.00	1.97	170.92	4498.95	27.41	-44.37	22.02	50	0.23
4600.00	1.27	153.28	4598.91	29.35	-47.05	22.79	52	0.85
4635.00	0.80	150.00	4633.91	29.69	-47.61	23.08	53	1.35
4676.00	3.00	160.00	4674.88	30.52	-48.87	23.59	54	5.41
4714.00	6.60	176.30	4712.75	32.98	-51.98	24.07	57	10.04
4745.00	10.00	179.60	4743.42	36.78	-56.45	24.21	61	11.07
4776.00	13.30	185.10	4773.78	42.34	-62.70	23.91	67	11.22
4807.00	16.90	188.30	4803.70	49.76	-70.71	22.94	74	11.92
4838.00	20.00	191.40	4833.10	58.98	-80.37	21.24	83	10.49
4870.00	22.10	199.10	4862.97	70.08	-91.42	18.19	93	10.84
4900.00	25.00	202.60	4890.47	81.91	-102.61	13.91	104	10.73
4931.00	28.40	202.70	4918.16	95.72	-115.47	8.54	116	10.97
4962.00	31.90	202.70	4944.97	111.16	-129.83	2.54	130	11.29
4993.00	36.10	203.90	4970.66	128.38	-145.74	-4.33	146	13.72
5024.00	40.30	205.30	4995.02	147.46	-163.16	-12.32	164	13.83
5053.00	44.20	208.30	5016.48	166.92	-180.55	-21.12	182	15.14
5083.00	48.50	210.10	5037.18	188.62	-199.49	-31.72	202	14.98
5117.00	52.30	209.80	5058.85	214.81	-222.18	-44.79	227	11.20
5148.00	56.00	211.70	5077.01	239.93	-243.77	-57.65	250	12.93
5178.00	59.80	211.70	5092.95	265.32	-265.38	-71.00	275	12.67
5216.00	63.90	215.80	5110.88	298.74	-293.22	-89.62	307	14.38
5246.00	66.40	217.10	5123.48	325.79	-315.11	-105.80	332	9.21
5277.00	69.20	218.60	5135.19	354.22	-337.77	-123.41	360	10.08
5309.00	72.70	219.50	5145.64	384.08	-361.25	-142.46	388	11.26
5339.00	74.90	218.80	5154.01	412.52	-383.59	-160.65	416	7.67
5370.00	77.10	217.30	5161.51	442.30	-407.28	-179.19	445	8.51
5401.00	80.40	216.60	5167.55	472.48	-431.57	-197.46	475	10.87
5432.00	84.20	216.10	5171.71	503.01	-456.31	-215.66	505	12.36
5451.00	86.50	216.20	5173.25	521.83	-471.60	-226.83	523	12.12
5484.00	90.00	213.60	5174.25	554.69	-498.65	-245.70	556	13.21
5515.00	90.70	213.20	5174.06	585.63	-524.53	-262.76	587	2.60
5555.00	90.10	212.80	5173.79	625.58	-558.07	-284.55	626	1.80
5610.00	89.60	213.60	5173.93	680.49	-604.09	-314.67	681	1.72
5669.00	89.50	213.60	5174.39	739.37	-653.23	-347.31	740	0.17
5764.00	90.00	214.10	5174.81	834.16	-732.13	-400.23	834	0.74
5857.00	88.60	213.20	5175.94	926.96	-809.54	-451.76	927	1.79
5950.00	88.70	213.60	5178.13	1019.77	-887.16	-502.94	1020	0.44
6012.00	89.60	213.50	5179.05	1081.64	-938.82	-537.20	1082	1.46
6084.00	89.60	213.50	5179.56	1153.51	-998.86	-576.94	1154	0.00

MERRION OIL & GAS CORPORATION

FEDERAL 15 NO. 2 H
1,980' FNL & 990' FWL
Sec. 15, T19N, R5W
McKinley Co., N.M.

STATE OF NEW MEXICO)
)ss
COUNTY OF SAN JUAN)

I, Steven S. Dunn, being first duly sworn, depose and state that the foregoing depth and hole deviation figures are true and correct to the best of my information and belief.

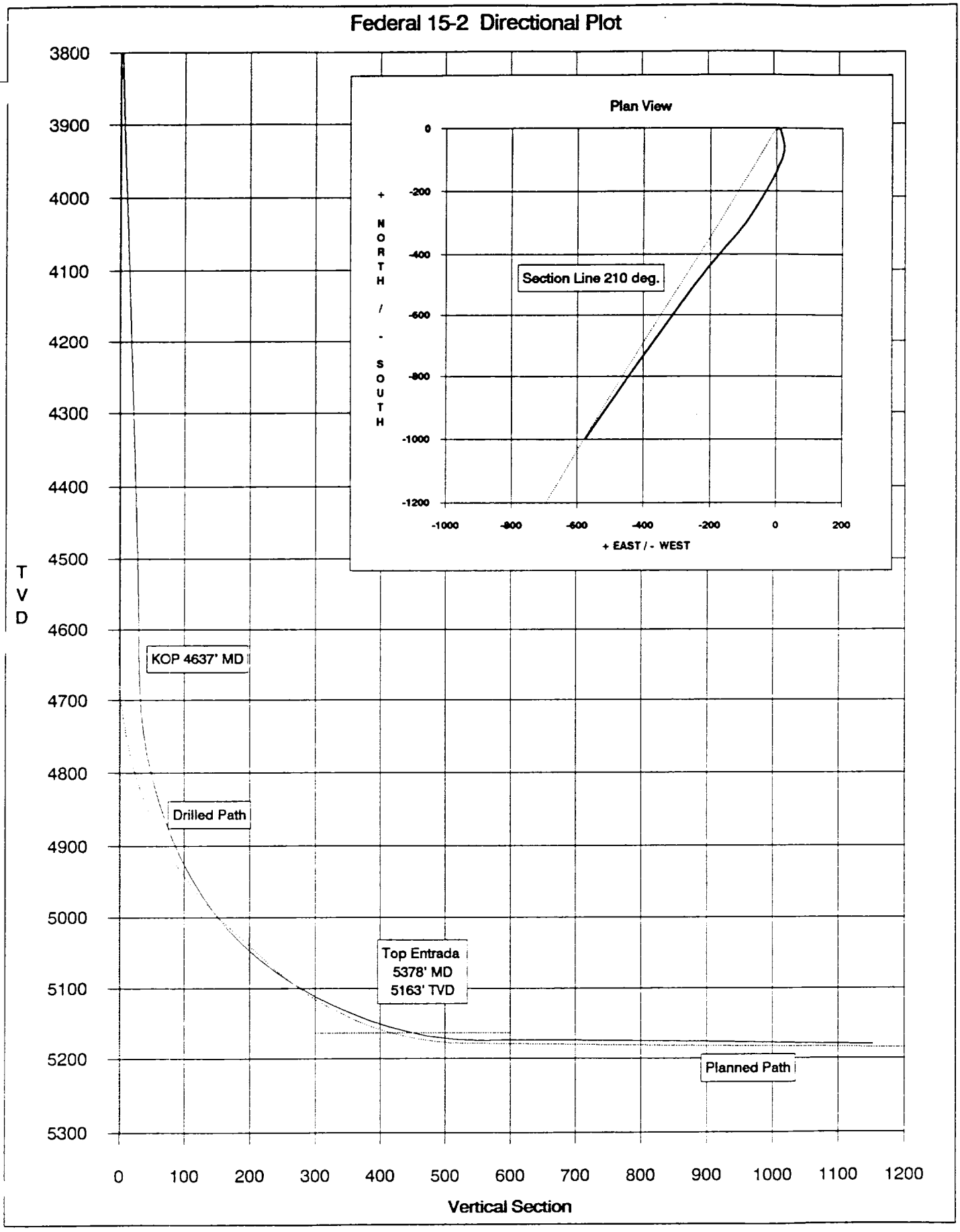
Steven S. Dunn

Subscribed and sworn before me this 9th day of February, 1990.

Notary Public

My commission expires:
3-16-90

Federal 15-2 Directional Plot



Note: All in feet