



# W. B. MARTIN & ASSOCIATES, INC.

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*well file*

## GEOLOGIC WELL REPORT

Prepared for  
W.B. Martin & Associates, Inc.  
709 North Butler  
Farmington, N.M. 87401

**RECEIVED**  
OCT 26 1992  
OIL CON. DIV.  
DIST. 3

Martin-Whittaker #30  
900'FSL and 1660'FEL  
Section 15, T23N, R4W  
Rio Arriba County, New Mexico

By  
Chip Harraden  
6/14/84

WELL DATA

Well: Martin-Whittaker #30

Operator: W.B. Martin & Associates, Inc.

Drilling Contractor: Four Corners, Rig #9

Location: 900' FSL and 1660' FEL T23N, R4W

Co., & State: Rio Arriba County, New Mexico

Elevation: G.L. 7242'K,B, 7253'

Spud Date: May 23, 1984

T.D. Date: June 10, 1984

Hole Size: 12 $\frac{1}{4}$ " Surface to 268'-drilled with spud mud  
8  $\frac{3}{4}$ " 268' to 5361'-drilled with low solids, low  
water loss mud.  
6  $\frac{1}{8}$ " 5361' to 7240'-drilled with low solids,  
low water loss mud to 6071'; 6071'-7240'-drilled  
with nitrogenated mud

Casing: 9  $\frac{5}{8}$ " J-55 32#/ft set @ 268'  
7" J-55 26#/ft set @ 5358'  
4 $\frac{1}{2}$ " K-55 11.6#/ft set @ 7238'

Drilling Suprvs: W.B. Martin Jr. and Drew Bates

Mud Logging Co.: Rocky Mountain Geo-Engineering Co.

Mud Loggers: Gary Conklin, Nancy Glauner, Cush Copland, & Paul  
Zurek

Open Hole Logging Co: Schlumberger

Engineers: Karl Schwarzenegger & David Maur

Open Hole Logs Run: 1) Intermediate Run; DIL-SFL, BHC Sonic-Com-  
pensated Neutron  
2) T.D. Run' DIL-SFL, Compensated Neutron-Litho  
Density

### HOLE DIFFICULTIES

1. 1900'; abundant shale cavings.
2. 2640' trip; encountered bridges at approximately 1250'.
3. 2830'-2860'; abundant shale cavings.
4. 3375'; hole bridged off.
5. 4040'-4070'; abundant shale cavings.
6. 4760'-4860'; abundant shale cavings.
7. 4849'; lost cone; recovered on first magnet run; hit bridges from 1146' to 1588'; 90' fill on bottom.
8. 5900'; lost circulation- $\pm 25$ bbls.
9. 5986'; lost circulation- $\pm 30$ bbls.
10. 6030'; lost circulation- $\pm 250$ bbls.
11. 6071'; switch to nitrogenated mud system to prevent lost circulation problems:
12. 7062'; lost circulation- $\pm 30$ bbls.
13. 7240'; work bridges to bottom before E-log run.

### HOLE DEVIATION

120' - $3/4^\circ$	3267' - $1\frac{1}{2}^\circ$
180' - $1\frac{1}{4}^\circ$	3765' - $1\frac{1}{4}^\circ$
212' - $1^\circ$	4264' - $1\frac{1}{4}^\circ$
243' - $1^\circ$	4767' - $\frac{1}{2}^\circ$
310' - $\frac{1}{2}^\circ$	5330' - $\frac{1}{2}^\circ$
402' - $\frac{1}{4}^\circ$	5419' - $\frac{1}{2}^\circ$
588' - $\frac{1}{4}^\circ$	5576' - $3/4^\circ$
896' - $\frac{1}{4}^\circ$	5797' - $1\ 1/8^\circ$
1207' - $3/4^\circ$	5986' - $1\frac{1}{4}^\circ$
1365' - $\frac{1}{2}^\circ$	6206' - $3/4^\circ$
1895' - $\frac{1}{2}^\circ$	6458' - $3/4^\circ$
2395' - $1\frac{1}{4}^\circ$	6674' - $1^\circ$
2611' - $1\ 3/4^\circ$	6893' - $1\frac{1}{4}^\circ$
2769' - $1\frac{1}{2}^\circ$	7110' - $1^\circ$

W.B. Martin & Associates, Inc.  
 Martin-Whittaker #30  
 SE $\frac{1}{4}$  Sec. 15, T23N, R4W  
 Rio Arriba County, New Mexico  
 G.L. 7242 'K.B. 7253'

Formation Tops

	<u>Sample Top</u>	<u>E-Log Top</u>	<u>Datum</u>
Pictured Cliffs	2810'	2824'	(+4429')
Huerfanito Bentonite	-----	3106'	(+4147')
LaVentanna	3261'	3282'	(+3971')
Chacra	3602'	3618'	(+3635')
Cliff House	4295'	4304'	(+2949')
Menefee	4356'	4364'	(+2889')
Point Lookout	4920'	4934'	(+2319')
Intermediate T.D.	5361'	5361'	(+1892')
Gallup	5896'	5893'	(+1360')
Tocito	6620'	6626'	(+ 627')
Juana Lopez	6708'	6691'	(+ 562')
Semilla	6742'	6732'	(+ 521')
Greenhorn	6928'	6936'	(+ 317')
Graneros	6998'	7011'	(+ 242')
Dakota "A"	7040'	7041'	(+ 212')
Dakota "B"	7103'	7109'	(+ 144')
Dakota "C"	7157'	7154'	(+ 99')
Dakota "D"	7181'	7182'	(+ 71')
T.D.	7240'	7228'	(+ 25')

## Geologic Summary and Zone of Interest

LaVentanna (3282'-3618')

The top of the LaVentanna on the Martin-Whittaker #30 was picked at 3282'. As in previous Martin-Whittaker wells, the upper LaVentanna sands on the Martin-Whittaker #30 yielded gas increases. These increases are greater in value than on the previous wells. After an initial gas increase at the top of the LaVentanna, total gas reached 50u at 3308'. An associated increase in C<sub>1</sub>-C<sub>4</sub> was also recorded. After returning to a background of 13u at 3328'; total gas rose to 45u at 3343'. The sandstones from which these increases originated are mostly light gray, very fine grain, subrounded to subangular, silty to argillaceous, friable to moderately cemented and calcareous. The DIL shows a negative gamma ray shift and a slight resistivity increase for both of these sandy intervals (3308'-3323' and 3343'-3355'). The BHC Sonic-Compensated Neutron shows a good gas effect for the interval from 3308'-3323'. However, the interval 3343'-3355' shows an initial neutron decrease, but no cross-over.

The lower LaVentanna also has several good increases between 3533' and 3616' ranging from 43u to 70u. A slight increase in the heavy gases was detected with these increases. Although the gamma ray shows some sandy intervals within this zone, the BHC Sonic-Compensated Neutron reveals only a small amount of cross-over between 3586' and 3589'. The sands of the lower LaVentanna section are similar to those in the upper section except that they are slightly more argillaceous. Whether or not the gas increases of the lower LaVentanna are valid shows is questionable due to the fact that several LCM sweeps were run throughout this zone.

In general, the LaVentanna section on the Martin-Whittaker #30 looks favorable as a good gas zone based on the mud log shows and the E-log responses. Further analysis should be done on this zone if it is to be completed in the future.

Chacra (3618'-4303')

As in previous Martin-Whittaker wells, several gas increases were seen in the Chacra interval on the #30 well which was topped at 3618'. One interval, from 3765' to 3773', is notable due to the unproportionally high C<sub>3</sub> and C<sub>4</sub> readings associated with the observed gas increase. At 3765', total gas rose from a background of 10u to a peak of 55u. Total gas returned to 15u by 3773' ending the show. No fluorescence or cut was seen in this interval. The DIL shows a cleaning gamma ray curve and slight SP development for this zone, while resistivity remains low across this interval. The neutron porosity curve goes negative at 3765', however no gas effect was observed when matched up with the sonic porosity curve. With a net sandstone thickness of about 8' this zone, comingled with other Chacra and LaVentanna zones, may add to the behind pipe reserves on the Martin-Whittaker #30. In general the Chacra zones also appear to be more gaseous in the #30 well than in the #35 or #31 wells.

Point Lookout (4934'-5374')

With the top of the massive sandstone section picked at 4934'; the Point Lookout of the #30 well had two good hydrocarbon show zones. The first zone, from 5122' to 5174' after depth correction, has been present in the other #398 lease wells. Labeled as show report #1 on the mud log, three different gas increases were recorded in this interval at 5124', 5148', and 5164'. Total gas went from a background of 8u to a peak of 65u at 5148'. A corresponding increase in C<sub>1</sub> through C<sub>4</sub> was also recorded on the chromatograph. Hydrocarbon fluorescence and cut was described throughout this zone. The fluorescence was scattered (about 20% of the sample) and was yellow green in color. A poor to fair yellow green cut was observed when treated with chloroethene. On the e-logs, the gamma ray shows fairly clean sands which correspond with the gas increases. These sands have a slight negative SP response which range from 10mv to 2mv and decrease in value with depth. The resistivity values for these sands range from 10 ohm meters to 13 ohm meters which increase with depth. The sandstones of the first show zone are predominantly white to salt and peppered, occasionally light gray, very fine to fine grain, subrounded, moderately well sorted, moderately to moderately well cemented, calcareous, glauconitic, and arkosic in part.

The second show zone in the Point Lookout covers the interval from 5214' to 5254' after depth correction (show report #2). Although gas increases have been seen on previous #398 lease wells in this zone, this interval on the Martin-Whittaker #30 exhibits better show quality than the others. From a 13u background above this zone, total gas increased to 50 units by 5212' with a corresponding increase in C<sub>1</sub> through C<sub>4</sub>. At 5226', total gas began dropping off to an eventual background of 10u. Again at 5240', total gas increased and peaked at 35u with a marked increase in C<sub>1</sub> through C<sub>4</sub>. A BGG of 16u was recorded at 5254' after the show. Unlike the previous #398 lease wells, a respectable oil show was seen in this zone. About 20% of the cuttings samples within this zone displayed an even yellow green fluorescence with a trace to fair yellow green milky crush cut. The best cuts were observed in the 5210'-20' and 5230'-40' samples. The e-logs are similar to those in the upper show zone of the Point Lookout except that the resistivity values decreased with depth (14 ohm meters to 10 ohm meters) and SP response was minimal.

In general, oil production potential looks fairly favorable in the lower Point Lookout show zones on the Martin-Whittaker #30. Mud resistivities appear to be low in this formation (between .53 and .82), however they did increase ever so slightly from the beginning of this zone to the bottom of it.

### Mancos (5374'-5893')

The top of the Mancos was picked at 5374' on the Martin-Whittaker #30 where the general gamma ray trend became shalier. Three show zones are present in this shaley marine section: 1) 5505'-5520'; 2) 5594'-5615'); 3) 5682'-5751'. Although we have seen shows in this section before, they seem to come in at different correlated interval. The Mancos shows the Martin-Whittaker #30 correlate best, but loosely, with those on the Martin-Whittaker #35.

The first show zone, 5505'-5520', is marked by four separate gas increases at 5505', 5510', 5512', and 5517'. Total gas peaked at 35u in this interval and the chromatograph readings increased accordingly. These gas increase appear to come from sandy stringers which are white to light gray to salt & peppered, very fine to fine grain, silty in part, subrounded to subangular, moderately well sorted, friable to poorly cemented, very calcareous. A trace of calcite fracture fill is also present. A trace minus light green fluorescence was described at the bottom of this interval with a trace minus light green cut.

The second Mancos show interval from 5594' to 5615' (show report #3 on the mud log) is marked by a good increase in the heavy gases as well as sample fluorescence and cut. Reaching a total gas peak of 80u at 5600', this zone rendered a scattered pin point light yellow fluorescence and a light green milky cut. A trace of calcite fracture fill was described in the samples associated with this interval.

The third Mancos show interval on the Martin-Whittaker #30 covers the interval from 5680' to 5750' (show report #4 on the mud log). From a background of 13u, total gas increased to 55u at the top of the show interval with a good increase in C<sub>1</sub> through C<sub>4</sub>. A trace minus dull green pin point fluorescence was associated with this gas increase, however, no cut was observed. After returning to a background of 10u at 5692', total gas increased again at 5698'. Gradually increasing, a peak of 35u was reached at 5708'. C<sub>1</sub> through C<sub>4</sub> gas values increased accordingly. BCG remained at 25u from 5713' to 5718' before gradually increasing to 40u at 5725'. Again, a good heavy gas response was associated with gas increase. A trace dull orange fluorescence was seen in the samples from 5700' to 5740'. After applying hot chloroethene and crushing the samples, a dull green cut was observed. Another gas increase was seen at 5748' reaching 35u. Despite increases in the C<sub>1</sub> through C<sub>4</sub> values, no fluorescence or cut was associated with this gas increase. The sandstone percentage of this show zone ranged from 20% to 60% in the cuttings samples. The sandstones are light gray to medium gray to white to salt and peppered to brown gray, very fine to fine grain, silty, argillaceous, rounded to subrounded, friable to poorly cemented, moderately to very calcareous with some bladed calcite present. Density porosity values range from 2% to 7% in this zone, averaging between 3% and 4% for this zone.

Due to the mobility of these shows zones throughout the Mancos on the #398 lease Martin-Whittaker wells, two possibilities exist for the origin of the Mancos gas shows. The first possibility is a fractured Mancos section. The second theory is that stray sands, formed by storm deposits, relinquish good hydrocarbons shows. It is quite possible that both these theories come into play in the Mancos show intervals on the #398 lease Martin-Whittaker wells.

#### Gallup (5893'-6626')

The top of the Gallup section on the #30 was marked by lost circulation around 5900'. As in the Martin-Whittaker #35, the upper Gallup on the #30 appears to be a good show interval and possible oil production zone. Labeled as show report #5 on the mud log, this zone occurs between 5906' and 5970'. Five distinct gas increases were recorded at 5906', 5930', 5935', 5950', and 5962'. Ranging from 15u to 120u in total gas value, these increases were marked by good increases in C<sub>1</sub> through C<sub>4</sub>. Although a dull orange fluorescence was observed throughout most of the zone, only the samples from 5920' to 5940' displayed a cut, but only after crushing and the application of 10% HCL solution. The sands of the upper Gallup section on the Martin-Whittaker #30 were described as being white to light gray to salt and peppered to gray brown, fine to very fine grain, silty in part, poorly to moderately well sorted, moderately well cemented, and calcareous. The E-logs show a slight cleaning up on the gamma ray curve throughout this show zone with some clean sands present. Resistivities range from 15 ohm meters to 25 ohm meters over this interval. The intervals from 5930' to 5941' and 5959' to 5970' both had a resistivity of about 25 ohm meters. Due to extensive hole wash-out upwards of 14½" on the caliper, density porosity readings for this zone are mostly erroneous.

As previously mentioned at the beginning of this report, nitrogen was added to the mud at 6071' to lighten the hydrostatic head and alleviate lost circulation problems. Before the nitrogen was added, about 125bbls of drilling mud was lost to the Gallup formation. With the use of nitrogen from 6071' to TD, gas readings became erratic and an increasing amount of cavings was observed in the cuttings samples.

The second zone of interest in the Gallup is the interval from 6234' to 6340' (show report #6 on the mud log). Total gas went from a background of 8u to a peak of 25u across the show interval before returning to a background of 8u. A good increase in the heavy gases was recorded with this show. Although a spotty dull yellow fluorescence was seen, no cut was observed in this zone. The density porosity of this silty shale interval is 3% to 4%.



The third Gallup show interval on the #30 is from 6397' to 6402'. This show is marked by a sharp total gas increase which reached 45u with an associated increase in C<sub>1</sub> and C<sub>4</sub>. Background gas returned to 10u after the show-4u higher than the observed BGG before the show. Although a trace dull yellow fluorescence was seen in conjunction with the gas show, no cut was observed in this shaley interval.

The fourth Gallup show interval on the #30 is from 6446' to 6452' (show report #8 on the mud log). In this predominantly shaley section, total gas went from a background of 6u to a peak of 48u, accompanied by a significant increase in C<sub>3</sub> and C<sub>4</sub>. Background gas slowly trailed off after the show, stabilizing at 9u. The sandstone associated with this gas interval is light gray to white, very fine to silty grain, angular to sub-angular, poorly sorted, poorly cemented, and calcareous. A trace yellow fluorescence was described which had a trace minus yellow crush cut. The gamma ray curve shows this zone to be fairly sandy while the deep induction curve increases in resistivity to 17 ohm meters. Density porosity for this zone is around 3.5%.

#### Tocito (6626'-6691')

The top of the Tocito was picked at 6626' from the E-logs and a sandstone increase in the cuttings samples. A slight gas increase of 2u was recorded at 6676' and remained steady through the Juana Lopez. This change could be caused by numerous things, such as the level of the gas agitator in the possum belly or a change in nitrogen output. A trace of dull yellow fluorescence was described in the 6680'-6690'. However, no cut was observed. Density porosity data is basically invalid throughout the Tocito due to washed out hole conditions. From the available data, the Tocito on the #30 does not appear to be conducive for testing.

#### Juana Lopez (6691'-6732')

Picked from a cleaning gamma curve and an increase in conductivity, the top of the Juana Lopez came in at 6691' on the Martin-Whittaker #30. The only gas increase in this section came in towards the bottom (5' above the Semilla), and will be included in the Semilla write-up. Due to hole washout throughout the Juana Lopez section, the density log data is invalid. Resistivity averaged about 7 ohm meters with a high of 10 ohm meters at 6695' and 6703'. With such limited data it is difficult to evaluate the Juana Lopez zone in the Martin-Whittaker #30.

Semilla (6732'-6936')

The Semilla Sandstone Member of the Mancos Shale came in at 6732' on the E-logs as a clean sandstone. The sandstones of these shallow marine bars are gray to light gray, very fine grain, subrounded, moderately to well cemented and siliceous. The Semilla Sandstone member is 9' thick on the Martin-Whittaker #30 and a slight oil and gas show was associated with these sands. A trace dull yellow fluorescence was described with a very slow cut. A slight increase in C<sub>1</sub> through C<sub>4</sub> was recorded with the oil show. As in the Juana Lopez and Tocito sections, hole washout resulted in inaccurate density log values. A resistivity of 20 ohm meters was reached in the Semilla sandstone. The combined data for the Semilla Sandstone Member on the Martin-Whittaker #30 points to a potentially productive interval between 6732' and 6741'.

An increasingly sandy section was seen in the Lower Mancos shales below the Semilla on the #30 well, ranging from 10% to 40% of the cuttings samples. Although no gas increases were detected, a slight fluorescence and cut was seen in the samples from 6850' to 6870'. The fluorescence was yellow in color and emitted a slow streaming yellow cut. The E-logs show a "hard streak" at the bottom of this interval. This oil show may possibly be related to a limey shale or silty lithology. However, the possibility of it being contaminated cannot be ruled out since no gas increase was observed with the show.

Greenhorn (6936'-7011')

The top of the Greenhorn came in at 6936'. A gas increase was recorded at 6972' reaching 100u. The increase was sharp and was reflected in the C<sub>1</sub> through C<sub>4</sub> readings. A smaller increase was detected at 6978' and registered 25u total gas. A trace of dull yellow fluorescence was observed in the 6970' to 6980' sample, however no cut was seen (show report #9 on mud log). Background gas slowly returned to 8u in the lower Greenhorn indicating "producing" gas and some permeability within the show zone. The possibility of a fracture related gas source should not be ruled out since density porosity is low (2%-4%) and resistivity is high (25-37 ohm meters) through this interval.

Graneros (7011'-7041')

Topped at 7011', the Graneros section on the Martin-Whittaker #30 had a gas show at 7020'. From a background of 4u, total gas rose sharply to 30u. Methane through butane values also increased. BGG remained steady at 13u after the show before tailing off to 6u just above the Dakota. A poor spotty dull green fluorescence was described (show report #10 the mud log), but no cut was observed. A silty or sandy stringer may be responsible for the above gas increase. The sandstone in the Graneros samples are light gray to white, very fine to silty grain, moderately sorted, moderately cemented and calcareous. The E-log data does not reveal much information as to the potential producibility of this zone.

Dakota "A" (7041'-7109')

The top of the Dakota "A" at 7041' is marked by cleaning up of the gamma ray and an increase in sandstone in the cuttings samples. At 7062', 30bbls was lost and background gas decreased from 6u to 4u. Shortly, thereafter, a gas increase was observed at 7070' on the mud log. Peaking at 12u, BGG remained at 8u to 7080' before subsiding. A trace of C<sub>3</sub> and C<sub>4</sub> was detected as was a dull yellow fluorescence. However, no cut was associated with the fluorescence, which persisted into the Dakota "B" sand. Resistivity values range from 14 ohm meters to 18 ohm meters over this interval and density porosity is between 8½% and 3½%. Some SP development also exists across this interval. This combined data warrants testing of the Dakota "A" zone on the Martin-Whittaker #30.

Dakota "B" (7109'-7154')

The Dakota "B" Sand on the Martin-Whittaker #30 came in at 7109' and was picked from the DIL. Due to cavings in the samples, no sandstone was seen on the mud log. Despite a trace yellow fluorescence (possibly mineral) throughout this interval, no gas increases were recorded. As with the "B" sand on the Martin-Whittaker #35, this zone does not appear to be very favorable for oil or gas production.

Dakota "C" (7154'-7182')

Topped at 7154', the Dakota "C" Sand was marked by a slight gas increase. Total gas rose from a background of 2u increasing to a peak of 13u at 7172' on the mud log. A trace of C<sub>4</sub> was observed as was some yellow fluorescence barren of cut. Density porosity ranges from 5% to 7% in this section with resistivity running between 12 and 14 ohm meters. The decision to test the Dakota "C" on the Martin-Whittaker #30 will be left up to the engineer.

Dakota "D" (7182'-7240' (T.D.))

The Dakota "D" Sand top was picked at 7182' on the DIL, and was denoted by a slight increase in total gas. Other gas increases were recorded at 7193' and 7220' on the mud log. The gas increase at 7220' was the best show in the "D" sand reaching 30u and increasing in C<sub>1</sub> through C<sub>4</sub>. No fluorescence or cut was associated with this gas show. From discussions with others, the high resistivity values and good SP responses across this zone are possibly water related. If this is the case, then it may explain why Chace Oil Company is encountering water problems in their production operations. They perforated the Dakota "D" sand on many of their wells which are near the Martin-Whittaker #30. Again, the decision to test the "D" Sand will be left up to the engineers.

In summary, the Martin-Whittaker #30 has many hydrocarbon zones which may warrant testing and completion. As in the Martin-Whittaker #35, the Lower Point Lookout, Mancos, Gallup, and Semilla zones all registered shows worthy of mention on the Martin-Whittaker #30. The Dakota and possibly the Greenhorn and Graneros sections should be further evaluated since shows were observed in them while drilling. The potential for gas production remains in the Pictured Cliffs, LaVentanna, and Chacra sections and should possibly be considered for testing sometime in the future.

Chip Harraden  
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