

DRILLING AND COMPLETION HISTORY

CONSOLIDATED OIL & GAS, INC.

GOVERNMENT ARNSTEIN NO. 1 - 18  
San Juan County, New Mexico

July 11, 1960

Location: 1750' F/SL, 1750' F/ WL  
Section 18, T31N - R12W, N. M. P. M.

Elevation: 5853' Ground  
5865' K. B. - all measurements from K. B.

Spud: May 24, 1960

Drilling Completed: June 14, 1960  
Well Completed: June 25, 1960

Total Depth: 6865' Drilled  
6835' Plug Back

Casing:

Surface 9-5/8", 32# H-40 cemented at 185' w/150 sx  
2% CaCl<sub>2</sub> cement

Production 5-1/2", 17# J-55 cemented at 6864' w/225 sx  
6% gel thru shoe, and 175 sx 50% Pozmix, 12%  
Gilsonite cement thru stage collar at 4868'.  
Top of cement 5690' first stage, 4160 second  
stage.

Tubing 1-1/2" EUE CW hung at 6695'

Logs: McCullough Gamma Ray-Neutron & Cemtron

Cores and Drillstem Tests: None

Formation Tops: (Log)

Pictured Cliffs	2178'	(/ 3687')
Mesa Verde	3762'	(/ 2103')
Cliffhouse	3840'	(/ 2025')
Menefee	4008'	(/ 1857')
Pt. Lookout	4557'	(/ 1308')
Mancos	4903'	(/ 962')
Greenhorn	6601'	( - 736')
Dakota	6704'	( - 839')

Producing Perforations: 6707' - 6742' 6796' - 6800'  
6746' - 6765' 6811' - 6828'  
6772' - 6786'

Treatment: Sand-Water frac w/ 82,000 lbs. 20-40 mesh  
sand, 95,000 gal. water, 1,500 gal. BDA acid

Initial Potential: Flow volume thru 3/4" choke, 3050 MCFD;  
Calculated Absolute Open Flow Potential  
4550 MCFD.

WELL: GOVERNMENT ARNSTEIN NO. 1 - 18  
 (1750' F/SL & 1750' F/WL, Section 18 - T31N - R12W)

FIELD: Undesignated Dakota

COUNTY: San Juan STATE: New Mexico

ELEVATIONS: 5853' GD  
5865' KB

5/23/60

Moving on rotary tools.

5/25/60

Drilling at 1525'. Drilled 1337', shale. Presently drilling with Bit No. 2 using water. Deviation 1 degree at 1340'.

5/26/60

Drilling at 2575'. Drilled 1050', shale and sand. Drilling with Bit No. 4. Mud 8.9 - 42. Deviation 3/4 degree at 1950', and 3/4 degree at 2414'.

5/27/60

Drilling at 3135'. Drilled 560', shale and sand. Presently drilling with Bit No. 5. Mud 9.1 - 44 - 6.8. Deviation 1 degree at 3038'.

5/28/60

Drilling at 3536'. Drilled 401', sand and shale. Present operation drilling with Bit No. 7. Mud 9.3 - 53. Bit No. 6 made 101' in 12 hours.

5/29/60

Tripping at 3743'. Drilled 207', sand and shale. Mud 9.3 - 60 - 6.8 - 2/32nds - 8.5 - 5% oil. 3/4 degree at 3540'.

5/30/60

Drilling at 3943'. Drilled 200', sand and shale. Mud 9.3 - 58 - 6.8 - 9.

5/31/60

Drilling at 4174' with Bit No. 11. Made 230' in sand and shale. Mud 9.3 - 62 - 7 - 2/32nds - 9 - 5% oil.

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6/1/60

Drilling at 4361'. Drilled 187', sand and shale. Presently tripping for Bit No. 13. Mud 9.3 - 55 - 7 - 2/32nds - 9 - 4% oil.

6/2/60

Drilling at 4640' with Bit No. 14. Drilled 277', shale and sand. Mud 9.2 - 63 - 7 - 2/32nds - 9 - 5% oil. 1 1/2 degrees at 4500'.

6/3/60

Drilling at 4792'. Drilled 152', sand and shale. Presently tripping for Bit No. 16. Mud 9.1 - 61 - 7.8 - 2/32nds - 9.5.

6/4/60

Drilling at 5,002'. Drilled 210', sand and shale. Presently drilling with Bit No. 17. Mud 9.1 - 57 - 9 - 2/32nds = 9.5 - 3% oil.

6/5/60

Drilling at 5,307'. Drilled 305', sand and shale. Tripping for Bit No. 19. Mud 9.1 - 65. 1 1/2 degrees at 5100'.

6/6/60

Drilling at 5575'. Drilled 268', sand and shale. Presently drilling with Bit No. 20. Mud 9.2 - 62 - 9 - 2/32nds = 9.5.

6/7/60

Drilling at 5887' with Bit No. 21. Drilled 312', shale and sand. Mud 9.2 - 62.

6/8/60

Drilling at 6173'. Drilled 286', shale and sand. Presently drilling with Bit No. 22. Mud 9.4 - 65. Deviation 1 degree at 5825'.

6/9/60

Drilling at 6425' with Bit No. 23. Drilled 252', shale and sand. Mud 9.5 - 65. Deviation 3 degrees at 6250'. Bit No. 23 drilled 223' in 14-3/4 hours.

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6/10/60

Drilling at 6516' with Bit No. 24. Drilled 81', sand and shale. Mud 9.3 - 70. 10-1/2 hours lost circulation at 6466'. Pulled 25 stands for plugged bit. Drilled 6466' to 6492' with part returns. Lost all returns at 6492', and made trip for plugged bit.

6/11/60

Drilling at 6735'. Drilled 219', shale and sand. Mud 9.1 - 89. Presently tripping for Bit No. 25. Bit No. 24 made 272' in 16-1/4 hours. Dakota top indicated at about 6700'.

6/13/60

Total Depth 6860'. Circulating for log. Mud 9.8 - 89 - 8.1.

6/14/60

Total Depth 6865'. Ran Radioactivity Log which provided indications of excellent Dakota sand development. Sand indications for this well are as good as those of any wells in the Northwest Bianco Area.

Presently running 5-1/2" casing.

6/15/60

Total Depth 6865'. WOC. Moving off rotary tools. Ran 6889' (214 joints) 5-1/2", 15.5#, J-55 casing, set at 6864'. Cemented with 225 sacks with 6% gel. Bumped plugs at 3,000 psig. Checked floats OK.

Stage collar at 4799'. Centralizers at 6850', 6813', 6713', 6620', 4832', 4769', 4505' and 4450'. Umbrellas at 4830', 4503' and 4448'.

Cemented second stage through stage collar with 175 sacks (50-50 pozmix with 4% gel with 12-1/2 lbs. Gilsonte per sack).

Full returns noted throughout job.

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6/16/60

Waiting on completion rig.

6/21/60

Moving on completion rig.

6/22/60

Drilling cement plug above stagecollar.

6/23/60

Perforating. Drilled out cement, stage collar and cleaned out to PBTD of 6835'. Ran Cemotron Log and established top of lower cement at 5690' and upper cement stage in the interval 4330' to 4160'.

6/24/60

Preparing to proceed with third stage of frac job. Review of sand-water fracturing to date as follows:

Stage No. 1:

Perforated with 2 bullets and 2 jets per foot 6811' to 6828', 6796' to 6800', 6772' to 6786'. Staged away 750 gallons 15% breakdown acid in three stages with a one-hour soak after each stage. First stage injected at 1300 psig, final stage at 600 psig. Began fracturing at 2250 psig at 37 bpm with 1/2 lb. sand per gallon, rapidly increasing to 1 lb. per gallon. Injected 20,000 lbs. at these conditions. Increased sand to 1-1/4 lbs. per gallon with immediate pressure increase to 2400 psig. Reduced sand rapidly to 1 lb. per gallon but pressure continued building to 2750 psig after 30,000 lbs. sand injected with 33 bpm. Pressure then rapidly increased to 3650 psig and a sandout occurred.

Stage Summary:

28,000 lbs. (20-40 mesh) sand into formation  
35,000 gal. Water  
750 gal. 15% BDA  
2250-3600 psig  
35 bpm

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6/24/60 - (Continued)

An attempt was made to break sand block by backflowing in order that a bridge plug might be set above the perforations in preparation for the second stage of the frac. However, solid sand fill up was found in the lower 250' of hole and it was necessary to go in with tubing and clean to bottom. Before coming out with tubing, displaced 750 gallons additional DBA on bottom.

Stage No. 2:

Perforated with 2 jets and 2 bullets per foot as follows: 6746-6765', 6707' to 6742'. Soaked away breakdown acid in three stages - initial pressure 640 psig, with final stage going on vacuum. Began fracing at 2150 psig at 38 bpm. Injected 10,000 lbs. sand under these conditions at which point a failure of one of the Dowell pumps occurred. The sand was overflushed into the formation and the operation was shut down pending replacement of Dowell equipment. Standing pressure 1000 psig in 5 minutes.

Stage Summary:

10,000 lbs. (20-40 mesh) sand into formation  
16,000 gal. water  
750 gal. BDA  
2150 psig  
38 bpm

Note: Because of the indications of the first frac stage, it was decided to attempt the next stage with all perforations open and no bridge plug in place.

6/25/60

Running completion tubing after cleaning out 630' of frac sand following third stage of frac job.

Stage No. 3:

Started injecting at 2250 psig at 38 bpm - continued these conditions for 10,000 lbs. sand - dropped 50 balls with gradual pressure increase to 2450 psig. After 20,000 lbs. sand injected, dropped 25 balls with pressure increase to 2850 psig immediately with increase to 3000 psig after 30,000 lbs. sand in. Pressure fluctuated between 2900 and 3000 psig for another

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6/25/60 - (Continued)

5,000 lbs. sand injection, after which time 25 additional balls were dropped. Before these balls hit, an additional 25 balls were dropped. Pressure increased to 3100 psig and then rapidly to 3700 psig when last balls hit. Flushed sand with 60 barrels water and finally ceased pumping at 3800 psig. Standing pressure was 2100 psig immediately, 800 psig in 5 minutes. Well was backflowed and died in about 1 hour.

Stage Summary:

44,000 lbs. (20-40 mesh) sand into formation  
44,000 gal. Water  
2250-3800 psig  
31 bpm average

6/26/60

Blowing well for initial cleanup. Ran 1-1/2" EUE completion tubing as follows: 212 joints - 6684' - set at 6695' KB. Jet collars at 5183', 5688' and 6193'.

Swabbed well in. It was very lively from the beginning, with 100 psig casing pressure after one run - well kicked off on its own after five runs. Now unloading strongly with lots of frac water and some sand being returned.

6/27/60

Shut in since 6:00 p.m. Will run preliminary 3-hour choke test today. Well continued to unload yesterday with heavy water slugs with flow rates measured between 2 and 4 MMCFD. Had 900 psig on casing when shut in. Wellhead pressure this a.m. was 1705 psig, casing, and 1700 psig tubing.

6/28/60

Shut in for pressure buildup and additional blowing for cleanup. Preliminary Potential Test yesterday through 3/4" choke provided the following results:

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6/28/60 - (Continued)

Flow Period	Tubing Pressure	Casing Pressure
1 Hour	230	1207
2	215	1109
3	* 200	1018

\* Actual choke flow rate 2850 MCFD.

7/10/60

Shut in after making multi-point potential test yesterday following a 12-day initial shut in period.

3/4" Positive Choke:

Time	Bomb Reading at 6810 feet	Casing Pressure	Tubing Pressure	Temperature
0	2400 psig	1860	1869	-
15	1875	1605	801	64
30	1796	1510	483	62
45	1713	1407	353	67
60	1496	1365	303	68
120	1376	1279	264	70
180	1370	1205	* 220	73

\*3050 MCFD

1/2" Positive Choke:

0	1388	1215	568	79
30	1376	1200	495	80
60	1361	1188	475	77
90	1357	1178	485	76
120	1351	1180	* 484	76

\*3100 MCFD

WELL: GOVERNMENT ARNSTEIN NO. 1-18

6/25/60 - (Continued)

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WELL: GOVERNMENT ARNSTEIN NO. 1-18

7/10/60 - (Continued)

3/8" Positive Choke:

0	1372	1188	812	77
30	1376	1176	658	76
60	1380	1177	* 655	77

\* 2310 MCFD

Well blew fairly dry except during period on 3/8" choke, when flow stream included a wet fog.

Calculated Absolute Open Flow 4550 MCF/day.

# OPEN FLOW TEST DATA

DATE July 11, 1960

Operator <b>CONSOLIDATED OIL &amp; GAS, INC.</b>		Lease <b>GOVERNMENT ARNSTEIN</b>	
Location <b>1750' F/SL &amp; 1750' F/WL of Sec. 18</b>		County <b>SAN JUAN</b>	State <b>NEW MEXICO</b>
Formation <b>DAKOTA</b>		Pool <b>UNDESIGNATED</b>	
Casing: Diameter <b>5-1/2</b>	Set At: Feet <b>6864'</b>	Tubing: Diameter <b>1-1/2 EUE</b>	Set At: Feet <b>6695'</b>
Pay Zone: From <b>6707'</b>	To <b>6828'</b>	Total Depth: <b>6835' PB</b>	
Stimulation Method <b>Sand Water Frac</b>		Flow Through Casing	Flow Through Tubing <b>X</b>

Choke Size, Inches <b>3/4</b>		Choke Constant: C <b>14,1605</b>			
Shut-In Pressure, Casing, PSIG <b>1860</b>	+ 12 = PSIA <b>1872</b>	Days Shut-In <b>7</b>	Shut-In Pressure, Tubing PSIG <b>1869</b>	+ 12 = PSIA <b>1881</b>	
Flowing Pressure: P PSIG <b>220</b>	- 12 = PSIA <b>232</b>		Working Pressure: P <sub>w</sub> PSIG <b>1205</b>	+ 12 = PSIA <b>1217</b>	
Temperature: T °F <b>73</b>	n = <b>0.75</b>		F <sub>p</sub> (From Tables) <b>1.015</b>	Gravity <b>0.70</b>	

CHOKE VOLUME = Q = C x P<sub>i</sub> x F<sub>i</sub> x F<sub>g</sub> x F<sub>p</sub>

$$Q = 14,1605 \times 232 \times .9877 \times .9258 \times 1.015 = \underline{\quad 3050 \quad} \text{ MCF/D}$$

$$\text{OPEN FLOW} = Aof = Q \left( \frac{P_c^2}{P_c^2 - P_w^2} \right)^n$$

$$1/2'' \text{ choke} = 6.1155 \times 4\% \times .9850 \times .9877 \times 1.053 = 3100 \text{ MCF/D}$$

$$3/8'' \text{ choke} = 3.3210 \times 667 \times .9850 \times .9877 \times 1.076 = 2310 \text{ MCF/D}$$

$$Aof = Q \left( \frac{3504384}{2052359} \right)^n = 1.70749^n$$

$$Aof = \underline{\quad 4550 \quad} \text{ MCF/D}$$

TESTED BY \_\_\_\_\_

WITNESSED BY \_\_\_\_\_

*SE Farnar*