

FORMATION LOG

Deep Rock #14 Calbeck
 Twp 24 N R 33-26E-13W
 Pratt County, Kansas
 Elevation: 1961 Derrick Floor
 1963 Rotary Bushing

5 5/8" surface casing 0-833'
 5 1/2" casing 833-1046'
 Commenced: 1-24-52
 Completed: 3-20-52

Note: All measurements are taken from the top of the rotary bushing.

Depth	Formation Description	Remarks
0 - 45	Sandy clay	Drillers log 0-3500'
45 - 260	Sand	
260 - 455	Red beds and shale	
455 - 833	Red beds	
833 - 847	Anhydrite	Stone Correl
847 - 855	Shale	
855 - 1220	Shale and red beds	
1220 - 1835	Shale, shells and salt	
1835 - 2000	Limestone and shale	
2000 - 2815	Limestone and shale	
2815 - 2995	Shale and limestone	
2995 - 3190	Limestone and shale	
3190 - 3500	Limestone and shale	
3500 - 3526	Limestone, tan to buff, crystalline to finely crystalline, some colites	Sample log 3500 - T.D.
3526 - 3586	Limestone as above, oolitic and vugular porosity.	No show. Probably water.
3586 - 3594	Limestone, tan, dense	
3594 - 3596	Shale, gray and brown	
3596 - 3613	Limestone, brown, dense	Heebner
3613 - 3619	Shale, brown black micaceous	Leavenworth
3619 - 3622	Limestone, brown, gray, dense	Snyderville
3622 - 3631	Shale, gray-green and brown	Toronto
3631 - 3652	Limestone, white to buff, finely crystalline. probably shaley	
3652 - 3672	Shale green and green-gray to brown silty	Top Douglas
3672 - 3712	Sand dark brown to brown-gray, fine micaceous, subrounded to subangular.	
3712 - 3775	Shale, gray-green and brown, silty, micaceous streaks fine sand	
3775 - 3781	Limestone, brown to brown-gray, crystalline to dense	Brown Lansing
3781 - 3801	Shale, gray and brown, streaks limestone as above	

(2) Formation Log: Deep Rock #14 Calbeck

<u>Depth</u>	<u>Formation Description</u>	<u>Remarks</u>
3801 - 3810	Limestone, white to buff, finely crystalline to dense.	Lansing
3810 - 3822	Shale, gray-green	
3822 - 3825	Limestone, as above	
3825 - 3835	Limestone, gray-brown sub-crystalline mottled, trace fine vugular porosity	Good odor, tract stain no free oil. DST
3835 - 3841	Limestone, as above, no porosity	
3841 - 3843	Shale, green-gray	
3843 - 3848	Limestone, as above	
3848 - 3851	Shale and limestone streaks	
3851 - 3866	Limestone, light tan to buff, finely crystalline, very finely oolitic, poor vugular porosity	Trace stain
3866 - 3876	Limestone, brown dense, and light gray to brown sub-crystalline	
3876 - 3878	Shale, green	
3878 - 3885	Limestone, gray dense, chert gray opaque	
3885 - 3889	Shale, green and limestone streaks as above	
3889 - 3897	Limestone light gray to buff. Granular streaks, good pin-point porosity	Slight trace stain
3897 - 3905	Streaks limestone and shale	
3905 - 3916	Limestone, tan to brown, very finely sacrose spotted fine vugular porosity	Fair stain
3916 - 3930	Limestone gray to brown dense to sub-crystalline, chert, gray to tan opaque; streaks fair vugular and fine pin-point porosity	Spotted stain
3930 - 3934	Limestone, as above, no porosity	
3934 - 3940	Limestone, as above, some vugular porosity; chert, gray, opaque, figured	No show
3940 - 3947	Limestone, gray to brown mottled sub-crystalline to dense	
3947 - 3951	Shale, green and brown	
3951 - 3955	Limestone, tan to brown, sub-crystalline, oolitic good vugular and inter-oolite porosity	Good odor, slight show free oil, some gilsonitic stain. DST.
3955 - 3962	Limestone, as above, no porosity	
3962 - 3968	Shale, green and brown	
3968 - 3974	Limestone gray to tan, sub-crystalline, some oolites, fair porosity	Trace odor. Fair show free oil. DST.
3974 - 3981	Limestone as above, no porosity	
3981 - 3984	Shale, green and brown	
3984 - 3990	Limestone, tan to gray, finely crystalline fossiliferous, oolitic good vugular porosity	Fair show free oil. Fair odor. DST
3990 - 3998	Limestone, gray to tan, dense	
3998 - 4008	Limestone, tan to brown, finely crystalline, good oolitic porosity	Good show free oil. Good odor. DST.

<u>Depth</u>	<u>Formation Description</u>	<u>Remarks</u>
4008 - 4018	Limestone, tan to brown, dense to lithographic	
4018 - 4022	Limestone, gray to tan, very finely sucrose spotted vugular porosity	Spotted stain
4022 - 4026	Limestone, gray to brown, sub-crystalline, to dense	
4026 - 4030	Shale gray and brown	
4030 - 4040	Limestone as above, trace porosity 4032-34	No show
4040 - 4049	Limestone, tan to brown, dense, chert gray to tan opaque	
4049 - 4054	Shale and limestone streaks	
4054 - 4065	Limestone as above, some oolites. Trace fine vugular porosity	Trace spotted stain
4065 - 4070	Shale, gray and brown	
4070 - 4079	Limestone as above, possibly some porosity 4076-79	Possible trace stain
4079 - 4092	Limestone as above. Chert gray to tan, opaque to translucent, milky, possible trace of porosity 4086-92. Possible trace stain	
4092 - 4098	Limestone, gray to brown finely crystalline oolitic, streaks shale, gray, green and brown	
4098 - 4110	Limestone, tan to gray to brown, sub-crystalline to dense.	
4110 - 4114	Shale, brown and green	
4114 - 4119	Limestone as above	Base Kansas City
4119 - 4132	Shale, brown, green and gray. Trace brown opaque chert. Some limestone streaks.	Warmatch
4132 - 4140	Limestone, brown dense	
4140 - 4146	Shale as above	
4146 - 4150	Limestone, gray to gray-green, finely crystalline, very large oolites	
4150 - 4152	Shale, brown and green	
4152 - 4168	Limestone, gray to brown, dense, chert salmon to rust, gray opaque to translucent	
4168 - 4172	Shale as above	
4172 - 4186	Limestone and chert as above, possibly some shale streaks	
4186 - 4196	Shale, gray, green and brown, possibly some limestone streaks	
4196 - 4202	Chert, white, vitreous, chins; pale green devitrified; salmon to gray, opaque to devitrified	Mississippi; Trace free oil. DET.
4202 - 4235	Chert, gray, tan, opaque vitreous; white and green devitrified. Much shale red and gray-green	Some dead black stain no odor or free oil. DET.
4235 - 4245	Shale, gray-green and brown. Some silver-gray, micaceous	Hinderhook

(4) Formation log: Deep Rock #14 Calbeck

<u>Depth</u>	<u>Formation Description</u>	<u>Remarks</u>
4245 - 4260	Chert, white, china; tan, amber, brown, yellow, vitreous to devitrified	Fair odor, no free oil. DFT.
4260 - 4289	Shale, gray-green and brown, some black-green shiny. Possibly some chert, streaks gray finely crystalline limestone	
4289 - 4320	Chert, white, vitreous, china, much salmon chert vitreous semi-transparent, brown devitrified, porous fractured.	Viola. Fair odor. Trace free oil
4320 - 4322	Shale, black-green shiny some chert	
4322 - 4326	Limestone, light gray to white sub-crystalline to finely crystalline some with large clear sand grains	
4326 - 4329	Shale bright green sandy	Simpson
4329 - 4338	Sand, white, brown and green, poorly sorted, medium	Trace odor, spotted stain. DFT
4338 - 4348	Sand as above, much green shale, some dolomitic sand	
4348 - 4360	Dolomite, tan to gray, coarsely crystalline to finely crystalline rhombohedral. Fair vugular porosity	Spotted stain. DFT.
4360 - 4363	Shale, green sandy	
4363 - 4370	Sand, gray, tan and green, dolomitic, fair porosity.	Spotted stain.
4370 - 4428	Shale, green to gray; streaks sand and dolomite	
4428 - 4432	Dolomite tan to light gray sub-crystalline; dolomite, buff, medium to coarsely crystalline rhombohedral some vugular porosity	Arbuckle. Trace stain
4432 - 4437	Dolomite as above, little if any porosity	
4437 - 4439	Shale, light green	
4439 - 4443	Dolomite as above, very little porosity	
4443 - 4444	Shale, light green	
4444 - 4450	Dolomite, light gray, to brown, sub-crystalline to finely sucrose, oolitic, good oolitic porosity	Good show free oil - good odor and stain
4450 - 4455	Dolomite, tan to brown, dense; chert gray to brown, opaque	
4455 - 4465	Dolomite, tan to gray, medium to finely crystalline rhombohedral. Fair vugular porosity	Fair to good show free oil. Good odor. DFT.
4465 - 4467	Dolomite as above, very little porosity	
4467	Total Depth	

Core Record

The following cores were taken on the #14 Calbeck:

- Cored 4287 - 4303 Recovered 2' - dark gray shale and chert nodules. Show live oil in chert.
- Cored 4303 - 4309 Recovered - handful of chert nodules - white to blue-gray. Vitreous opaque, some brown devitrified chert, fractured. Show of free oil in chert.

Drill Stem Tests

The following drill stem tests were taken on the #14 Calbeck:

Lansing

- (1) 3816 - 40 Zone #1
Open 45 minutes, good blow at start, decreased to small blow by end of test. Recovered 75' gas and 45' gas cut mud - trace of oil. Bottom hole pressure - 0 (15 minutes).
- (2) 3947 - 76 Zones #5 and #6
Open 30 minutes - small blow which quit in 11 minutes. Recovered 30' slightly gas cut mud - trace of oil. Bottom hole pressure - 0 (15 minutes).
- (3) 3981 - 4013 Zones #7 and #8
Open 45 minutes - fair blow which decreased to small blow by end of test. Recovered 60' slightly gas cut mud. Trace of oil. Bottom hole pressure - 200 pounds (15 minutes).

Mississippian

- (4) 4186 - 4205 Upper chert break (1st Missi)
Open 45 minutes - good blow throughout test. Recovered 1620' gas - 40' heavily oil cut mud. Bottom hole pressure - 1120 (15 minutes).
- (5) 4205 - 32 Main Mississippian chert section.
Open 30 minutes - weak blow which quit in 10 minutes. Recovered 30' mud - no oil, gas or water. Bottom hole pressure - 0 (15 minutes)

Minderhook

- (6) 4242 - 63 Chert section (formerly called upper Viola chert)
 Open 45 minutes (2 packers) small blow which died in 4 minutes.
 Hoisted up tool and reset packer several times.
 Had a small blow each time for 3 to 4 minutes.
 Recovered 60' mud with odor of gas. No oil or water - no
 visible sign of gas.
 Bottom hole pressure - 0 (15 minutes).

Note: The above test was first tried with one packer from
 4239-63, but the packer failed to hold.

Simpson

- (7) 4326 - 52 Upper Simpson sand and top 3 feet of sandy dolomite.
 Open 30 minutes - small blow which quit in 5 minutes.
 Recovered 30' mud - no oil, gas or water.
 Bottom hole pressure - 0 (15 minutes).

Arbuckle

- (8) 4452 - 67 Zone #3
 Open 1 hour - strong blow throughout test.
 Recovered 630' gas
 60' heavily oil cut mud
 60' muddy oil
 30' clean oil
 Bottom hole pressure 1245 pounds (15 minutes).

COMPLETION DATA

San Lane - calls Gamma Ray-Neutron log.
 Several sets of perforations were made in the Viola chert and
 were squeezed off because of water.
 The final completion data is as follows. (See report for details).

Perforated 4309-17 w/32 cone shots.
 Perforated 4309-17 w/24 bullets. Had 1 1/2 gallons oil per hour
 and 1/2 gallons water per hour.
 Pumped 30 barrels oil into formation under pressure.
 Acidized with 100 gallons. (Had previously acidized with 500 gallons,
 200 gallons and 3000 gallons before and between the various
 squeeze jobs)
 Hydrafrac - double treatment. (Had previously hydrafrac twice
 between squeeze jobs)
 Completed for pump potential of 140 barrels oil and no water per day.

Samples examined and log compiled by Wendell E. Johns and
 Willis Jack Magathan.

TIME LOG

WENDELL S. JOHNS

Deep Rock #14 Calbeck
SE/SW/NE; 33-26³-13^W
Pratt County, Kansas
Elevation: 1961 Derrick floor

Note: All measurements are taken from the top of the rotary bushing, which is 2 feet above the derrick floor.

1' time log starts at 3500		
Depth	Time	Remarks
3500 - 10	2-2-2-2-3-2-3-3-3-2	
20	3-2-2-2-3-2-2-2-2-1	Trip 3518
30	1-2-1-2-2-2-1-1-1-1	
40	1-1-2-2-2-2-1-1-1-1	
50	1-1-1-1-1-1-1-1-1-1	
60	1-1-1-1-1-1-1-1-1-1	
70	1-1-1-1-1-1-1-1-2-2	
80	3-2-2-1-1-1-1-1-1-1	
90	1-1-1-1-1-1-2-2-3-3	
3590 - 3600	3-2-4-4-2-1-3-4-3-2	
3600 - 10	3-3-3-3-1-1-2-2-3-4	
20	3-4-4-2-1-1-1-1-1-2	Heckner 3613
30	5-5-2-2-1-1-2-2-3-4	Toronto 3628
40	3-5-5-3-5-5-4-3-3-3	
50	3-2-2-2-3-3-3-3-3-3	
60	4-4-2-3-3-1-1-2-2-2	
70	2-2-3-3-3-3-3-2-2-1	
80	2-3-2-2-2-1-1-1-1-1	
90	2-1-1-1-1-1-1-1-1-1	
3690 - 3700	1-1-1-1-1-1-1-1-1-1	
3700 - 10	1-1-1-1-1-1-1-1-1-1	
20	1-1-2-2-2-2-2-2-2-2	
30	2-2-2-2-2-2-2-3-2-2	
40	2-3-2-4-2-3-3-3-3-3	
50	3-4-4-4-4-3-2-2-3-3	
60	3-2-3-2-2-2-2-3-3-2	
70	3-2-3-3-3-3-3-3-3-3	
80	2-2-2-3-3-4-4-4-4-4	Brown Lansing 3773
90	4-3-3-3-3-3-4-4-4-3	
3790 - 3800	2-3-2-3-4-3-3-3-3-3	
3800 - 10	3-4-6-6-5-5-4-5-4-5	Lansing 3801
20	4-5-6-6-4-8-7-6-4-3	
30	3-3-4-7-7-5-6-5-4-4	
40	3-4-3-4-4-6-5-4-4-5	
50	4-3-3-4-5-5-4-3-3-3	
60	3-2-2-3-3-3-2-1-1-4	
70	2-3-4-4-2-3-4-6-6-6	
80	4-7-8-8-8-9-8-8-6-3	
90	8-8-8-9-11-15-10-8-8-8	Circ. 1 1/2 hrs. @ 3840 New bit 3840

(2) Time Log: Deep Rock #14 Calbeck

<u>Depth</u>	<u>Time</u>	<u>Remarks</u>
3890 - 3900	10-10-10-9-7-3-7-7-6-6	
3900 - 10	8-8-5-5-6-4-5-4-5-5	
20	5-4-6-4-4-5-8-10-11-11-	
30	9-9-9-8-7-7-8-7-7-7	
40	8-10-8-15-4-4-4-5-5-4	Trip 3934
50	7-6-7-7-8-8-8-7-4-3	
60	4-5-5-6-4-6-6-6-7-8	
70	14-10-7-8-8-8-7-7-6-5	
80	5-4-3-5-6-7-5-4-5-6	Circ. 1 1/2 hrs. = 3976 New bit 3976
90	5-5-2-3-3-5-5-4-3-3	
3990 - 4000	4-5-5-7-6-3-5-5-3-2	
4000 - 10	2-1-1-2-2-2-3-3-5-2	
20	4-4-6-7-7-7-8-5-3-4	Circ. 1 1/2 hrs. 4013 New bit 4013
30	3-3-6-7-6-6-6-5-4-5	
40	4-5-4-5-5-4-5-5-6-6	
50	8-7-7-5-6-7-7-7-8-8	
60	13-8-7-8-8-9-7-6-6-7	
70	8-10-10-8-9-9-10-10-11-20	
80	11-8-7-10-9-7-7-6-6-8	
90	9-11-12-12-11-14-8-10-7-8	
4090 - 4100	6-7-8-8-11-9-8-8-8-5	
4100 - 10	5-7-9-8-10-7-7-8-8-9	
20	8-10-10-10-10-10-10-10-10-9	
30	9-10-10-10-10-10-10-10-10-10	
40	5-4-7-7-10-10-10-7-11-11	Trip 4190
50	5-7-8-4-4-3-6-6-7-8	
60	7-7-8-10-9-7-11-10-8-8	
70	8-8-8-7-6-6-6-7-6-7	
80	10-3-5-4-7-7-7-5-6-9	
90	8-11-13-12-13-14-13-12-12-9	
4190 - 4200	10-12-12-11-14-15-13-12-10-10	Mississippi 4196
4200 - 10	14-12-12-12-14-4-3-4-13-9	Circ 1 1/2 hrs. = 4205 New bit = 4205
20	4-7-8-4-4-6-6-3-3-4	
30	3-3-3-6-5-6-4-5-5-5	
40	6-8-6-5-5-6-9-10-11-10	Circ. 1 1/2 hrs. = 4232 Kinderhook 4235 Viola 4245
50	10-10-7-7-6-5-5-4-4-4	
60	5-4-5-5-5-4-5-5-6-5	
70	5-6-8-5-9-8-7-8-5-5	Circ 1 1/2 hrs. 4263 New bit = 4263
80	9-6-9-9-6-10-9-7-7-7	
90	7-7-7-5-6-5-7-8-9-8	
4290 - 4300	7-7-8-7-5-3-3-7-10-15	Circ. 1 1/2 hrs = 4290 Circ. 1 1/2 hrs. = 4297 Cored 4297-4303
4300 - 10	20-25-14-13-20-20-17-20-18-2	Circ. 1 1/2 hrs. = 4303 Cored 4303-4309 Circ. 1 1/2 hrs. = 4309 New bit = 4309

(3) Time Log: Deep Rock #14 Calbeck

Depth	Time	Remarks
4300 - 20	4-4-5-6-4-3-3-3-5-7	
30	7-7-11-11-10-11-8-8-10-7	Simpson 4326
40	8-4-8-7-8-8-5-9-6-7	
50	5-6-5-5-6-6-6-7-8-10	
60	8-8-5-5-5-10-7-7-6-8	Circ. 1 1/2 hrs. @ 4352 New bit 4352
70	4-4-7-3-3-3-2-3-2-2	
80	4-4-4-6-7-7-8-5-4-7	
90	5-9-7-5-6-8-8-7-8-8	
4390 - 4400	8-8-6-6-8-8-8-8-8-7	
4400 - 10	10-8-8-9-8-10-8-6-5-6	
20	9-8-9-8-8-10-7-13-13-11	
30	12-11-11-11-10-8-8-7-11-12	Aruckle 4428 Circ. 1 1/2 hrs. @ 4430
40	9-8-11-11-12-12-12-11-11-10	
50	10-9-9-11-4-3-4-5-8-7	
60	10-11-11-11-13-9-10-12-10-18	Circ 1 1/2 hrs @ 4458
67	11-9-9-9-8-12-14	Circ. 1 1/2 hrs. @ 4467
R.T.D.	4467	

Time log condensed by Willis Jack Magathan