

Cities Service Oil Company
 Ryan A-#1
 SW NW NE 24-5S-32W
 Rawlins County, Kansas

Contractor : Red Tiger Drilling
 Drilling Commenced : 14 March 77
 Drilling Completed : 30 March 77

Elevations : KB 2949
 GL 2944

Set 8-5/8" casing to 275'

Circulated for samples : 3826' for 1/2 hr.
 3860' for 1/2 hr.
 3876' for 3/4 hr.
 3916' for 3/4 hr.
 3960' for 1 hr.
 3973' for 1 hr.
 3980' for 3/4 hr.
 4050' for 3/4 hr.
 4095' for 3/4 hr.
 4098' for 1 hr.
 4125' for 1 hr.
 4280' for 3/4 hr.
 4317' for 1 hr.
 4320' for 1 hr.
 4550' for 1 hr.
 4650' for 1 hr.

Cored Intervals : None.

Samples start @ 2000'.

2000-15	SS, white to lt. gray, glauconite, pyrite, med. to crse. g., well sorted, friable, sl. calc.
2015-25	Shale, lt. tan to gray.
2025-45	SS, lt. tan, f. to vfg., well sorted, friable to well-compacted near base.
2045-55	Shale, lt. tan to gray, kaolinitic.
2055-75	SS, white to lt. tan, crse. g., rounded to sub-rounded, friable,
2075-2100	Shale, green, kaolinitic.

CHEYENNE SANDSTONE 2100 (+849)

2100-62	SS, white, med. to crse. g. upper, angular to sub-roundrd w/Kaolin matrix, becomes better sorted, med to f. g. near base, calc.
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MORRISON FORMATION 2162 (+787)

2162-2240	Shale, varicolored, green, tan, dk. tan.
2240-55	Shale, dk. brn., blocky.
2255-2270	Chert, orange, white, yellow.
2270-2290	Shale, lt. to dk. green, lustrous.
2290-2300	Anhydrite, white to pink.
2300-2346	Anhydrite, ss, sh. Anhy. white to pink, ss brn., f. to med. g., wellsorted, sh. green to dk. brn., calc.

BLAINE GYPSUM 2346 (+602)

2346-55	Gypsum, clear.
2355-2405	Alternating red sh., siltstone, sh. sl. calc. w/green inclusions.
2405-2480	Alternating anhyd., red sh., siltstone; anhyd. prevalent in upper, sh., siltstone in mid., red sh. arenaceous, anhyd. prevalent lower.
2480-2630	Shale, w/anhyd., sh. red to red-brn., becoming sdy near base, platy, w/minor amts anhyd. near middle, white, hard.

CIMARRON (STONE CORRAL) ANHYDRITE 2630 (+318)

2360-2670	Anhyd., wh. to pink, w/minor amts. lt. green to gray sh.
2670-2970	Shale, silty shale, varicolored, red siltstones, SS varicolored from lt. tan to red brn., mostly well-sorted f. to crse. g. Thin stringers anhydrite near mid-section.
2970-87	SS, clear glauconite, w/white gyp. near base, upper sands sub-angular, unconsolidated, v. crse. g., middle sd. approx. 50% glauc. matrix, t. to med. g., friable, good $\emptyset$. Lost circulation @ 2980, full returns after one hour.

FORT RILEY 2987 (-38)

2987-95	Dol. limestone, gray to lt. pink, vf. xln., poor $\emptyset$ N.S.
2995-3011	Poor samples.
3011-3025	Dol. limestone, gray to pink, vf. xln., no $\emptyset$ N.S.
3025-75	Poor samples.
3075-95	SS, brn. to red-brn., fg, fair $\emptyset$.
3095-3100	Dol. limestone, gray to white, fractured, w/Fe stains, fair $\emptyset$, N.S.
3100-10	Shale, lt. gray, platy, calc.
3110-15	Limestone, lt. tan to gray, med. xln. fair $\emptyset$, N.S.
3115-31	SS, lt. tan to red brown, f. to med. g., well-sorted, Fe-oxide matrix, good $\emptyset$.
3131-55	Poor samples.
3155-70	SS, red-red brn., f.g., fair $\emptyset$.
3170-3220	Poor samples.

COTTONWOOD LIMESTONE 3220 (-271)

3220-3230	Limestone, lt. tan, f. xln., foss., no $\emptyset$, N.S.
3230-88	Shale, green to buff., platy in part to silty, mid-sect. calc.

NEVA LIMESTONE 3288 (-339)

3288-96	Limestone, white to tan, arenaceous, fair Ø, N.S.
3296-3304	Shale, lt. gray to buff., v. calc.
3304-08	Limestone, lt. tan, f. xln., no Ø, N.S.
3308-20	SS, br. to red brn., hematic, f.g., good Ø, N.S.
3320-24	Limestone, white to pink, crse. xln, cherty, poor to fair Ø, N.S.
3324-30	Shale, gray, calc.
3330-48	SS, gray, vf g., micaceous, good Ø, N.S.
3348-58	Shale, sdy sh., gray, sl. calc.

RED EAGLE LIMESTONE 3358 (-409)

3358-68	Limestone, gray to dk tan, f. xln, fair Ø, N.S.
3368-86	SS, dk. gray, vf xln, poor Ø, N.S.
3386-94	Limestone, Lt. to dk. gray, vf xln, no Ø, N.S.
3394-3410	Shale, lt. gray, arenaceous, calc.

FORAKER LIMESTONE 3410 (-461)

3410-16	Limestone, tan to pink, w/chert, arenaceous, good Ø, SSDO, No Cut.
3416-22	Shale, lime green, calc.
3422-28	Limestone, dk. gray, carbonaceous, shaly at base, no Ø, N.S.
3428-34	Limestone, Maroon, med. xln, w/ white calcite inclusions, fair to good Ø, N.S.

INDIAN CAVE SANDSTONE 3434 (-484)

3434-46	SS, red to red brn., ferruginous, becoming shaly near base, ss sl. calc., shaly sand non-calc., good Ø, N.S.
3446-86	Shale, red to red brn., ferruginous, sl. calc., w/ sand near base, ss red, shaly, non-calc.
3486-3540	SS, interfingered w/ shale, shaly sands, SS red brn. to lt. tan, fine to med. g., well sorted, good Ø, N.S. Shales gray to green, carbonaceous where dark, some sandy, w/ calcite matrix, v. calc., sl. foss. (brachs).
3540-46	Limestone, gray to blk., upper darker, w/ calcite phenocrysts, no Ø.
	Limestone, lt. gray, med. granular, fair Ø, N.S.
3546-84	Shale, black, resinous, v.f. platy, v. calc.

TARKIO LIMESTONE 3584 (-635)

3584-3640	Limestone, grey to black, carbonaceous, med. granular in sparry calcite matrix, fair Ø, SSDO, no cut. Limestone, lt. tan, coarse xln, v. foss., fair Ø, N.S. Limestone, lt. gray, carbonaceous, med. gran, to lt. tan (sandy, flinty), fair Ø, N.S. All interbedded w/ thin dark shales.
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- 3640-50 Shale, gray to dk. gray, blocky, v. calc.
3650-80 Limestone, lt. gray, carbonaceous, med. gran. to white,
lt. tan lower. Upper LS has good Ø, N.S., lower LS
arenaceous, fair Ø, N.S.
3680-99 Shale, lt. gray to lt. green, chalky, v. calc., grades
into shy lime at base.

TOPEKA LIMESTONE 3699 (-751)

- 3699-3704 Limestone, gray, w/ hematitic sdy inclusions, fractured,
v. friable, fair Ø, N.S.
3704-29 SS, lt. tan, w/ minor amts. glauconite, fine to med. g.,
calc. cement, sli. foss., fair to good Ø, VSSDO, No Cut.
3729-38 SS, brn. to red. brn., argillaceous, ferrug. matrix,
f. g., good Ø, N.S.
3738-48 Shale, blue green to sky blue, sdy, calc.
3748-98 Limestone, lt. tan, chalky, med. xln, v. foss (oolites,
fusel.) fair Ø, N.S.
Limestone, white to lt. tan, med. xln, sparsely foss.,
fair to good Ø, N.S.
Limestone, gray to dk. gray, m. xln, v. foss, fair Ø, NS.
3798-3800 Limestone, dk. gray, crse xln, SSFO, fair cut.
3800-08 Shale, red brn, silty, calc.
3808-14 Limestone, lt. tan, med. xln, fair to good Ø, NS.
3814-26 Shale, lt. green to maroon.
Strap 2' < board

DST #1 3783-3826 (43' anchor)
30-60-30-60
1st op. WB
2nd op. WB
Rec. 45 mud
FP 36-55, 55-55
ISIP 1242, FSIP 1205
IHP 1941, FHP 1941

- 3826-38 Limestone, lt. tan to cream, med. xln, minor amts. brn.
shale, fair Ø, NS.
3838-46 Limestone, tan to pink, fractured, med. xln, good Ø,
VSSDO, No Cut.
3846-52 Limestone, lt. tan, arenaceous, med. xln, minor amts.
pyrite, good Ø, N.S.
3852-70 SS, lt. gray to white, fine to med. g., good Ø, N.S.

HEEBNER SHALE 3870 (-921)

- 3870-76 Shale, black, resinous, platy, v. calc.
3876-83 Limestone, blue to blue gray, med. xln, sparsely foss.,
fair Ø, N.S.
3883-3904 Shale, brown to red brown, silty, blocky, calc.

TORONTO LIMESTONE 3904 (-955)

3904-10 Limestone, white to lt. tan, med. gran., good Ø, SSDO,
No Cut. 2.5 unit methane and wet gas kick @ 3904.
3910-16 Shale, blue-blue gray, blocky.
3916-19 Shale, brn., silty, v. calc.

LANSING 3919 (-970)

"A" ZONE:

3919-33 Limestone, white to lt. tan, crse, xln, abundant forams,
poor to fair Ø, SSDO.
3933-47 Shale, brn-red brn., silty, blocky, dense, sl. calc.

"B" ZONE:

3947-52 Limestone, white to cream, forams, good moldic Ø, GSFO,
good cut. Lost circ. @ 3948 for 10 hours. Could not
run DST.
3952-60 Shale, dk. brn., conglomeratic, poorly sorted sands,
v. calc.
3960-64 Limestone, white to lt. tan, granular, fair to good Ø,
GSDO, FSFO, fair cut.

DST #2 3960-3973 (13' anchor)
30-60-30-60
1st op. WB-FB/5"
2nd op. FB/10"
Rec. 250' MSW w/ oil specs
FP 18-73, 82-128
ISIP 1324, FSIP 1315
IHP 1904, FHP 1886

3964-66 Limestone, white to cream, clean, dense, f. xln, poor
to fair Ø, N.S.
3966-73 Limestone, lt. tan, med. xln, good Ø, N.S.
3973-78 Shale, dk. gray to black, laminated, lt. gray streak,
sl. calc. 4 unit methane and wet gas kick @ 3975.
3978-84 Limestone, lt. gray, f. xln, poor to fair Ø, N.S.
3984-96 Shale, dk. gray to dk. green, w/ secondary euhedral
calcite.

"C" ZONE:

3996-98 Limestone, lt. tan to lt. gray, fine to med. xln, poor
to fair Ø, GSDO, SSFO, poor cut.
3998-4002 Shale, brn., silty, calc.
4002-08 Limestone, lt. gray, vf xln, no Ø, NS.
4008-13 Shale, brn to red brn, silty, calc.
4013-18 Limestone, lt. tan to pink, vf granular, becoming dense,
fair Ø, NS.
4018-25 Limestone, dk. tan, med. xln, sparse foss., fair to good
Ø, NS.
4025-32 Chert, lt. tan to lt. red; shale, lt. gray, blocky, calc.

"D" ZONE:
4032-66

Limestone, lt. to dk. gray, vf gran. to med. xln, poor to fair Ø, NS.
Limestone, dk. brn to lt. gray, med. gran. to med xln, v. foss., poor to fair Ø, NS.
Limestone, cream to lt. tan, sparry to granular, argillaceous, fair to good Ø, friable, NS.
Limestone, lt. tan, (sparry) med. xln to dk. gray argillaceous, stylolitic, poor to fair Ø, NS.

DST #3 3996-4050 (54' anchor)
15-30-30-45
1st op. SB throughout
2nd op. SB throughout
Rec. 2450' MSW
FP 201-748, 776-1150
ISIP 1370, FSIP 1370
IHP 1960, FHP 1941

4066-86 Shale, upper dk. gray to brn-red brn. middle and base, silty, calc.

"E" ZONE:
4086-89

Limestone, lt. tan, f. to med. xln, poor Ø, SSFO, fair cut. 2 unit methane and wet gas kick @ 4086.

4089-94 Limestone, lt. gray, med. xln, sparse foss., good to very good moldic, vuggy Ø, GSFO, streaming cut. 3 unit gas kick @ 4088.

4094-98 Limestone, white, med. xln, v. foss., fair moldic to vuggy Ø, VSSFO, fair cut.

DST #4 4068-98 (30' anchor)
15-30-30-45
1st op. SB after 3 min.
2nd op. SB after 3 min.
Rec. 440' gas in pipe
690' clean gassy oil - 32° API @ 60° F.
126' heavily oil cut mud - 60% oil, 40% mud
FP 129-183, 192-356
ISIP 1315, FSIP 1297
IHP 1978, FHP 1960

4098-4115 Shale, dk. brn. to maroon, silty, calc.

"G" ZONE:
4115-17

Limestone, lt. gray (blue gray), f. xln, poor to fair Ø, NS.

4117-25 Limestone, lt. gray-lt. tan, crse gran., v. foss. w/ good moldic Ø, GSFO, good cut. 5 units background (methane only) @ 4125-4200.

DST #5 4117-25 (8' anchor)
Misrun - tool plugged
DST #6 4098-4125 (27' anchor)
Misrun - packer failed

- 4125-30 Limestone, cream, becoming dk. gray near base, med. xln, forams, brachs replaced by second. calcite, pinpoint Ø. N.S.
- 4130-42 Shale, brn-red brn. upper to lt.-dk. gray lower, calc., hard.

"H" ZONE:

- 4142-56 Limestone, dk. gray, med. xln to dk. gray, f. xln near base, separated by 2' lt. gray shale, foss., fair Ø, NS.

BASE KANSAS CITY 4156 (-1207)

- 4156-64 Shale, lt. blue-gray, calc., becoming dk. gray, arenaceous, calc.
- 4164-66 Shale, brn. to red brn., granular, v. calc.
- 4166-72 Shale, lt. gray, v. calc.
- 4172-89 Limestone, white to lt. gray, med. xln upper to v.f. xln lower, fair Ø upper to poor Ø lower, N.S.
- 4189-4202 Shale, varicolored, red-dk. gray, silty, calc.
- 4202-09 Limestone, crm to lt. gray, gran. to med. xln, shaly, fair to good Ø, N.S.
- 4209-57 Shale and shy Lm, lt.-dk. gray, calc. shale, to lt. to dk. gray Shy Lm, lime granular to med. xln, fair Ø, N.S.
- 4257-62 Shale, dk. gray to black, carbonaceous, resinous, blocky, calc.

FORT SCOTT 4263 (-1370)

- 4263-76 Limestone, dk. gray, med. xln, argillaceous near top, less shaly f. xln near base, foss., fair to good Ø upper to tight Ø lower, N.S.
- 4276-94 Shale, blk, resinous, blocky.
- 4294-4301 Limestone, lt. to dk. gray, med. xln, sparse foss., fair to pinpoint Ø, N.S.
- 4301-03 Limestone, lt. tan to brn, med. xln, w/ fair to good moldic Ø, FSFO, Good Cut. 1 unit methane kick @ 4303.
- 4303-06 Shale, lt. gray, resinous, v. calc.
- 4306-11 Limestone, dk. gray, dense, f. xln, fair Ø, N.S.
- 4311-16 Limestone, white to cream, med. gran. to crse xln, good moldic Ø. FSFO, good cut.
- 4316-20 Shale, dk. gray, calc.

DST #7 4286-4320 (34' anchor)

15-30-30-45

1st op. SB after 4 min.

2nd op. SB after 4 min.

Rec. 100' gas in pipe

520' clean gassy oil - 35° API @ 60° F.

180' gassy oil cut mud - 70% mud, 30% oil

FP 55-128, 146-280

ISIP 1187, FSIP 1187

IHP 2126, FHP 2108

- 4320-30 Shale, varicolored, lt. to dk. gray to maroon, resinous, calc.
- 4330-46 Limestone, white to lt. gray upper to dk. gray lower, separated by thin lt. gray shale. Upper has fair to ppt. $\emptyset$, lower good $\emptyset$, N.S.
- 4346-59 Shale, w/ shaly lime, shales lt. to dk. gray, to red brn., LS. lt. tan, good $\emptyset$, N.S.
- 4359-76 Limestone, white to dark tan upper to gray-blue gray lower, separated by thin blue gray shale. Upper lime fair $\emptyset$, lower tight, N.S.
- 4376-86 Shale, lt. to dk. gray, platy, v. calc.
- 4386-92 Limestone, upper lt. gray to lower white, f. to med xln, upper fair $\emptyset$, lower good $\emptyset$, N.S.
- 4392-95 Shale, red brn, blocky, silty, calc.
- 4395-4430 Limestone, lt. gray upper to dk. gray lower, separated by thin shale (dk. gray).
Upper LS has fair $\emptyset$, N.S., lower LS vfg-med. gran, fair $\emptyset$, VSSFO, fair cut. (Poss. sluff)
- 4430-36 Shale, red brn, maroon, v. calc.

BASAL PENN CONGLOMERATE 4336 (-1387)

- 4336-4473 Conglomerate, arkosic (dk. brown), poorly sorted sands, loose red shales, chert lt. yellow - clear.

MISSISSIPPI 4473 (-1524)

- 4473-4503 Dol. LS, white, cherty to med. xln, sparry dol., fair $\emptyset$. N.S. 1 unit methane @ 4473.
- 4503-46 Limestone to dol. LS, lt. to dk. tan, med. xln throughout. Fair $\emptyset$, N.S.
- 4546-62 Dolomitic Limestone, white, sparry to cherty, med. xln, fair $\emptyset$, N.S.
- 4562-67 Limestone, lt. tan, med. xln, oolitic biosparite, w/ minor amts. shale, med to crse xln, fair $\emptyset$, N.S.
- 4567-80 Dolomitic Limestone, white to lt. yellow, oolitic, cherty in part, becoming dense, fair $\emptyset$, VSSDO. No cut. (near base).
- 4580-96 Dolomitic Limestone, lt. yellow to lt. gray, sparry, fair $\emptyset$, N.S.

ARBUCKLE 4596 (-1647)

- 4596-4650 Dolomite, white to yellow, cherty, fine-med. granular (sucrosic), fair to good $\emptyset$, VSSDO @ base, NO CUT (poss. sluff).
Lost cir. for 3 hours at bottom hole.

RTD 4650

LOG TOPS:

Cimarron (Stone Corral)	2632 (+ 317)
Neva	3287 (- 338)
Foraker	3407 (- 458)
Topeka	3698 (- 749)
Heebner	3870 (- 921)
Lansing	3919 (- 970)
BKC	4156 (-1207)
Ft. Scott	4265 (-1316)
Cherokee	4321 (-1372)
Mississippi	4468 (-1519)
Arbuckle	4592 (-1643)
LTD	4646 (-1697)

SCHLUMBERGER SURVEYS: Dual Induction Laterlog
CNL FDC w/ Gamma Ray & Caliper
Integrated Borehole Compensated Sonic

Ran Pipe: 4/1/77

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GEOLOGISTS