The Union Oil Company of California - Arne Saari No. 1 was spudded June 30, 1952; drilled to a total depth of 4499 feet, found dry and plugged August 14, 1952. Three drill stem tests were taken and five cores were cut. Electric, laterolog, gamma ray, and the microlog were run by Schlumberger.

Logging Record:
Schlumberger electric log - Run one, 8/11/52, 412-4500
Schlumberger laterolog - Run one, 8/12/52, 2000-4496
Schlumberger microlog - Run one, 8/11/52, 2000-4497
Schlumberger gamma ray - Run one, 8/12/52, 2000-4498

Coring Record:
#1 2090-2105, #2 2190-2200, #3 2293-2308, #4 2308-2328, #5 2485-2510

Drill Stem Tests:
DST #1 (Devonian) - Tested interval from 2469 1/2 to 2510. Open 2 hours. Shut in 15 min. Recovered 120' muddy water, 420' salt water, 120' drilling mud. Hydrostatic pressure 1100 psi, initial flow pressure 50 psi, final flow pressure 300 psi, and shut in pressure 715 psi.

DST #2 (Devonian) - Tested interval from 2534 1/2 to 2575. Open 2 hours. Shut in 15 min. Recovered 120' muddy water, 390' salt water, 30' drilling mud. Hydrostatic pressure 1070 psi, initial flow pressure 35 psi, final flow pressure 300 psi, and shut in pressure 715 psi.

DST #3 (Silurian) - Tested interval from 3275 to 3315. Open 2 hours. Shut in 30 min. Recovered 210' drilling mud, 420' saltwater. Hydrostatic pressure 1675 psi, initial flow pressure 50 psi, final flow pressure 310 psi, and shut in pressure 1175 psi.

Casing Record:
Set 10 3/4" surface casing at 412.29 feet with 172 sacks cement plus 3 sacks Calcium Chloride.

Plugging Record:
<table>
<thead>
<tr>
<th>Interval Plug Set</th>
<th>Sacks Cement</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 4499-4430</td>
<td>20</td>
</tr>
<tr>
<td>#2 3805-3735</td>
<td>20</td>
</tr>
<tr>
<td>#3 3330-3260</td>
<td>20</td>
</tr>
<tr>
<td>#4 2520-2450</td>
<td>20</td>
</tr>
<tr>
<td>#5 1770-1700</td>
<td>20</td>
</tr>
</tbody>
</table>
Formation tops were determined from samples and electric logs. Doubtful or obscure formation tops were not picked. Color names are from the 1948 Rock Color Chart distributed by the National Research Council.

**FORMATION TOPS**

Cretaceous System
- **Niobrara formation** 940
- **Greenhorn formation** 1330
- **Dakota group sandstones** 1708

Jurassic System
- **Piper limestone ?** 2153

Triassic System?
- **“Spearfish” formation** 2370

Devonian System
- **“Nisku” formation** 2488
- **Duperow formation** 2563
- **Souris River formation** 2890
- **Dawson Bay formation** 3197
- **Winnipegosis formation** 3289
- **Ashern formation** 3390

Silurian System
- **Interlake group** 3436

Ordovician System
- **Stoney Mountain formation**
  - **Upper member** 3608
  - **Lower member** 3691
- **Red River formation** 3772
- **Winnipeg formation**
  - **Shale member** 4355
  - **Sandstone member** 4460

**Total Depth** 4499

- **0-40** Sand and gray silt. Sand consists of medium-coarse grained and pebbles of white and clear, subrounded to angular quartz; subrounded; white and yellow gray dolomite; gray chert; fragments of feldspar, quartz, and biotite; and fragments of greenstone.
- **40-140** Sand, as above, plus much medium gray, massive shale.
- **140-280** Shale, medium gray, massive, silty, spongy, with sand and silt as above.
- **280-770** Shale, medium gray, massive, micro-micaceous, resinous. Much cement at 410-430. Few fragments siliceous iron-carbonate at 650-800.
- **770-870** Shale, as above, with very light gray, biotitic bentonite. Shale also becomes lumpy and spongy.
- **870-960** Shale, dark gray, soft, flaky, spongy, earthy. Light gray bentonite.
- **960-1060** Shale, medium gray, very calcareous, massive to spongy, earthy.
- **1060-1340** Shale, medium gray, lumpy, massive, spongy with dark gray, flaky shale.
1340-1490 Shale, medium dark gray, massive to disaggregated, very calcareous, "white specks". With calcite prisms and shell fragments. Globigerina.

1490-1580 Shale, medium dark gray, massive to flaky, spongy, micritic, slightly calcareous. Light gray bentonite.

1580-1730 Shale, medium gray, medium dark gray, massive to flaky, lumpy, silty. Traces of very fine-grained, calcareous cemented, light gray sandstone at 1580-1600 and 1690-1720.

1730-1830 Sandstone, white, clear grains of medium to very coarse grained, pitted, frosty to vitreous quartz, angular to rounded. Traces gray chert, pyrite. Trace of rounded anhydrite (white) fragments at 1780-1800.

1830-1840 Shale and sand. Medium gray shale, massive and granules of pitted, vitreous, angular clear quartz.

1840-1880 Shale, medium gray, flaky, lumpy, spongy and cemented, calcareous, very light gray, fine-grained quartzose sandstone.

1880-1900 Limestone, light gray, dense, crystalline to dense fragmental, fossil fragments. With medium gray shale as above. The limestone grades into calcareous fine-grained quartzose sandstone.

1900-1930 Sandstone, fine grained, very light gray, calcareous cement, quartzose sandstone with green mineral. Medium and light gray shale, as above.

1930-1960 Shale, medium to light gray shale, lumpy, spongy to massive. With small amounts of red brown calcareous shale, massive and light green bentonite.

1960-1970 Limestone, light gray, crystalline, fragmental, dense, fine-coarse-grained, carbonaceous streaked. With shale as above.


2000-2040 Shale, medium gray, non-calcareous, lumpy and spongy. Red-brown and light green-gray shale as above. Circulation at 2019, samples consist of medium gray shale, red and green gray shales, and sandy limestone to very calcareous fine-grained, light gray sandstone.

2040-2065 Shale, red brown, massive, slightly calcareous. With medium gray shale.

2065-2090 Shale, clayey, pale red gray, very calcareous, lumpy with light green gray calcareous clayey shale. With very light gray, fine, dense, limestone fragments.

2090-2090 Circulation, 30 minutes, limestone very light gray to white, fine crystalline to sublithographic. Shale as above.

Core #1 2090-2105 - (9' recovered) -1 1/2' shale, pale reddish gray silty. 2' sandstone and silt; light, yellowish-gray, very fine grained quartzose sandstone and silt. 1' limestone, light yellow gray, dense, sublithographic. 5' shale, light green gray and pale red-gray, calcareous, massive, slightly micaceous. End of core.

2105-2155 Shale, green gray, firm, splintery, calcareous, red brown shale, same. With fragments of sandy limestone and limestone, as above. Few fragments of yellow brown silty shale. Very calcareous, very light gray clay and clayey, sublithographic, soft, limestone at 2140-2150. Trace anhydrite.
2155-2165 Limestone, pinkish gray, dense, very fine grained, sublithographic.
2165-2180 Limestone, light yellowish gray, very fine grained, microgranular. Shaly interval at 2165-2170. Some anhydrite (white) at 2175 and below.
2180-2190 Limestone, light yellowish gray, fine grained, granular, dense.

Core #2
2190-2200 - (10' recovered) Limestone, light yellowish gray, dense, very fine grained to sublithographic. Quartz grains in a few streaks. End of core.
2215-2220 Sandstone, white, medium-grained, rounded, anhydrite cemented, quartzose. With red. brown calcareous shale. 30 minute circulation at 2215.
2220-2235 Limestone, light yellowish gray, very fine grained, crystalline, shaly. Small amount of red brown shale.
2235-2250 Limestone, light yellowish gray, shaly, very fine grained.
2250-2265 Limestone, light yellowish gray, very fine grained, crystalline, shaly. Small amount of red brown shale.
2265-2285 Limestone, as above, with white crystalline anhydrite, light gray shale.
2285-2290 Shale, light green gray, traces red brown, calcareous, lumpy. With anhydrite, as above.

Core #3
2293-2308 (15' recovered)
2293-2296 Anhydrite, gray shale and light yellowish gray dolomite, very fine grained. Interbedded.
2296-2299 Shale, pale red, with anhydrite.
2299-2305 Shale, light green gray, with blebs and veins of anhydrite.
2305-2308 Anhydrite, gray, with light yellow gray dolomitic limestone, very fine grained.

Core #4
2308-2328 Shale, gray red, with streaks of anhydrite.
2313-2315 Anhydrite, with interbedded dolomite, light yellowish gray, dense.
2315-2317 Shale, gray red, small amount of green gray shale and anhydrite streaks.
2317-2323 Anhydrite and dolomite, as above, with some interbedded red shale.
2323-2328 Anhydrite, with small streaks of gray shale and light yellowish gray, dense dolomite. End of core.
2328-2370 Anhydrite, crystalline, dense, white. With red brown massive shale and traces of green gray shale.
2370-2380 Shale, grayish red, slightly calcareous, massive, lumpy, with inclusions of anhydrite and green gray shale.
2380-2395 Silt, moderate reddish orange, slightly calcareous and fine-medium grained, subrounded-rounded, frosted, pink, clear quartz grains. Inclusions of anhydrite.
2395-2415 Silt, as above. Small amounts sand as above.
2415-2470 Silt and sand as above, much anhydrite and anhydrite cement.
2470-2485 Sand as above, plus silt and anhydrite as above.
2486-2486 Circulation 30 minutes, limestone, very pale orange, fine grained, to sublithographic, dense.
Core #5 2485 - 2510 (25' recovered)

2485-2497 Limestone, light yellowish gray to brownish gray, fine grained, granular, with anhydrite streaks and calcite filling in veins. Stylolites.

2497-2503 Limestone, dolomitic, light brownish gray, fine to medium grained, granular.

2503-2504 Dolomite, light brownish gray, fine to medium grained, granular.

2504-2506 Shale, red and dolomite, light brownish gray, fine grained, alternating bands.

2506-2509 Shale, pale red and yellow gray, streaks of dolomite, as above.

2509-2510 Limestone, light brownish gray, very fine grained, dense. Anhydrite streaks.

2510-2555 Limestone, pinkish to pale yellowish brown, fine grained, granular, dense, trace of shell fragments, and dense, very fine grained limestone.

2555-2565 Shale and silt, pale reddish brown, massive, calcareous.

2565-2570 Limestone, as above. Shale as above.

2570-2590 Dolomite, light brownish gray, medium grained, granular, intergranular porosity filled somewhat with anhydrite.

2590-2600 Shale, light red, silty. With fine medium grained, rounded quartz grains (frosted) and dense, fine grained grayish pink limestone.

2600-2610 Limestone, pinkish gray, pale red, fine grained, dense slightly vuggy.

2610-2620 Limestone, grayish pink, fine grained, crystalline, dense with some medium grained crystals.

2620-2635 Limestone, dolomitic, grayish orange pink, pale red, fine grained, microsucrosic. With pale red silty shale and loose grains of fine coarse, rounded quartz.

2635-2685 Limestone, moderate orange pink, fine grained, microsucrosic to medium grained, sucrosic, dense. Traces of vugs, anhydrite inclusions.

2685-2710 Dolomite, limey, pale red, light brownish gray, fine-medium grained, granular, anhydrite filling. Intergranular and vuggy porosity.

2710-2725 Anhydrite, light brownish gray to white, dense and moderate orange pink silty, calcareous shale.

2725-2745 Dolomite, limey, light brownish gray, granular, fine-medium grained, vuggy and intergranular porosity filled with anhydrite.

2745-2750 Dolomite, limey, light brownish gray, crystalline, fine grained, dense. Somewhat vuggy.

2750-2760 Anhydrite and dolomite, fine grained, pale red to light brownish gray.

2760-2800 Limestone, pinkish gray and light brownish gray, fine grained, microsucrosic to sublithographic with some fragments medium grained, granular, and fragmental. Traces of anhydrite and anhydrite filling. Some vuggy and intergranular porosity.

2800-2830 Limestone, light brownish gray, fine grained, crystalline, dense, somewhat vuggy and fine - medium grained, granular, with intergranular porosity.

2830-2860 Limestone, pinkish gray, fine grained crystalline, dense to microsucrosic, vuggy porosity.

2860-2880 Dolomite, limey, light brownish gray, crystalline, sucrosic, with inclusions of anhydrite.
2880-2900  Limestone, grayish orange pink, fine grained, crystalline, sucrosic with few grains rounded, frosted quartz grains and red staining.
2900-2910  Limestone, dolomitic, light brownish gray, fine grained, sucrosic.
2910-2915  Limestone, grayish orange pink, fine grained, crystalline, dense with red brown silty, calcareous shale.
2915-2955  Dolomite, limey, grayish orange pink, fine grained, sucrosic. With moderate reddish brown, massive calcareous shale and traces of green gray massive shale and white crystalline anhydrite.
2955-2980  Dolomite, limey, pale red, fine-medium grained, sucrosic and granular. Some anhydrite filling.
2980-2995  Limestone, dolomitic, pale red, fine grained, sucrosic. With much red brown, massive, calcareous shale. Trace green gray calcareous shale.
2995-3000  Limestone, dolomitic, pale red, fine grained, sucrosic to sub-lithographic.
3000-3055  Anhydrite, white, dense, crystalline. With red brown and medium gray massive, calcareous shale.
3055-3070  Dolomite, limey, pale red, fine grained, sucrosic, inter-crystalline porosity.
3070-3075  Limestone, grayish pink, very fine grained, crystalline to sub-lithographic.
3075-3090  Anhydrite, coarse grained, dense, crystalline. With much red brown, medium gray shale and dolomite, as above.
3090-3120  Limestone, grayish pink, pale red, fine grained, sucrosic.
3120-3150  Anhydrite, white, coarse grained, crystalline, dense. With red brown shale, massive.
3150-3155  Limestone, grayish pink, very fine grained crystalline, sub-lithographic.
3155-3190  Dolomite, pale red, fine-medium grained, sucrosic, vuggy and interstitial porosity. Trace red brown shale at 3185-3190.
3190-3250  Limestone, grayish orange pink, dense, crystalline, sub-lithographic. With traces fragmental dense limestone and gypsum. The limestone becomes less dense at 3230-3250.
3250-3275  Silt, moderate reddish orange. With dense coarse crystalline anhydrite.
3275-3310  Limestone, dolomitic, grayish orange pink, fine grained, sucrosic, porous. Anhydrite inclusions. Some pinpoint porosity.
3310-3345  Dolomite, limey, light brownish gray, fine-medium grained, granular. Vuggy and pinpoint porosity.
3345-3355  Limestone, grayish pink, dense, sublithographic to coarse grained, fragmental dense. With traces of brachiopod fragments.
3355-3375  Dolomite, limey, pale red, fine-medium grained, granular.
3375-3380  Limestone, grayish pink, fine grained to sublithographic.
3380-3390  Dolomite, pale red, fine grained, sucrosic to dense, crystalline, limey.
3390-3400  Anhydrite, dense, crystalline, and dolomite, as above.
3400-3425  Silt, grayish red. Anhydrite, dense, as above. Traces pinkish gray chert and light green gray shale.
3425-3430  Anhydrite, pinkish gray to white, dense, crystalline and very fine grained, microsucrosic, pinkish gray dolomite, limey.
3430-3490  Dolomite, pinkish gray, limey, very fine grained, microsucrosic, anhydrite inclusions. Some dense with vuggy porosity and sugary fragments extremely vuggy. Traces light green gray shale.
3490-3505 Dolomite, pinkish gray, very fine grained, microsucrosic to very dense, sublithographic, cherty.
3505-3525 Dolomite, pinkish gray, fine grained, sucrosic. With streaks of dense, microsucrosic to sublithographic, pinkish gray dolomite.
3525-3530 Silt, red brown and pinkish gray, very fine grained, dense, microsucrosic dolomite.
3530-3540 Dolomite, light yellowish gray, very fine grained, microsucrosic to sublithographic, vuggy and somewhat cherty.
3540-3570 Dolomite, light yellowish gray, very fine grained, microsucrosic, dense.
3570-3580 Dolomite, pale red, dense, microsucrosic to sublithographic. Trace of red brown shale.
3580-3595 Dolomite, white, grayish orange pink, dense, very fine grained, microsucrosic to sublithographic. The fragments show much solution and resultant recrystallization. Cherty.
3595-3605 Silt, moderate reddish orange and massive, red brown shale. Dolomite, as above. Trace of rounded, frosted, coarse grained quartz.
3605-3630 Dolomite, light pale red, very fine grained, microsucrosic to sublithographic. Some fragments are pale red.
3630-3645 Silt and shale, red brown. With rounded, frosted quartz grains and pale red to light gray dolomite with fine-medium quartz grains.
3645-3690 Dolomite, grayish orange pink, fine grained, crystalline, dense.
3690-3700 Limestone, medium light gray, fine grained, subcrystalline, dense, shaly, grading into coarse grained, fragmental.
3700-3770 Limestone, medium light gray, fragmental, fossil fragments (brachiopod shells), with matrix of fine grained sucrosic limestone, shaly. Bryozoan fragments. Traces light gray calcareous shale and pyrite at 3760-3770.
3770-3780 Limestone, fine grained, subcrystalline, light gray, dense.
3780-3810 Limestone, light gray to pinkish gray, very fine grained, subcrystalline.
3810-3835 Dolomite, limey, moderate orange pink, fine grained, microsucrosic.
3835-3840 Limestone, very light gray, coarse grained, fragmental and fine grained subcrystalline.
3840-3885 Dolomite, pinkish gray, very fine grained, subcrystalline. With fragments having pinpoint porosity and traces of fragmental chips.
3885-3895 Dolomite, as above, except becoming microsucrosic and porous.
3895-3935 Limestone, dolomitic, light gray, pinkish gray, fine grained, subcrystalline to limey dolomite, microsucrosic to sucrosic.
3935-3960 Limestone, shaly, light gray, fragmental, coarse grained to fine grained, subcrystalline.
3960-3975 Dolomite, pinkish gray, fine grained, subcrystalline to microsucrosic.
3975-4025 Dolomite, grayish orange pink, fine-medium grained, sucrosic to very fine grained subcrystalline, limey. Some vuggy porosity from 4010-4025.
4025-4050 Limestone, very light gray, very fine grained, subcrystalline to small amounts medium-coarse grained, fragmental, and pinkish gray, fine grained, sucrosic, limey, dolomite. Traces residue, no cut.
4050-4065 Limestone, pale yellowish brown, dense, fine grained, crystalline.
4065-4080 Limestone, light gray, very fine grained, crystalline. With dolomite, light gray, limey, fine grained, sucrosic.
Limestone and dolomite, as above. With light red, waxy calcareous shale and medium gray, platy, calcareous shale. Trace bryozoan fragments.

Limestone, light gray, fine-medium grained, fragmental, rounded, shaly. With anhydrite filling. Medium gray shale.

Limestone, dolomitic, light gray, fine-medium grained, fragmental rounded to crystalline, sucrosic, shaly, porous. Traces brachiopod fragments.

Limestone, light gray, fine grained, shaly, subcrystalline, dense to fine-coarse grained, fragmental, shaly, dense, dolomitic.

Limestone, light gray, fine-coarse grained fragmental, dense, shaly to fine-grained, dense, subcrystalline. Inclusions of pyrite and greenish gray shale. Small amount of crinoid stem fragments.

Samples missing.

Shale, greenish gray, massive, platy, fissile.

Sandstone, fine - medium - coarse, clear, rounded loose quartz grains with about one-third the grains cemented together by a brown iron silicate.

Shale, sandstone, as above, plus pinkish gray, dense, sub-crystalline fine grained limestone.

Sandstone, light gray, white, fine-medium grained, rounded, anhydrite cemented, clear-frosted, loose quartz grains. Shale as above.

Sandstone, as above, with much pink to clear feldspar, quartz, biotite, and dark amphibole. Much pyrite.

Total Depth.