Summary of the Amerada Petroleum Corporation - Scoria Unit #1
Billings County, North Dakota
Well No. 1508 - Permit No. 1520
by Jay Garske
April 1958

Amerada Petroleum Corporation - Scoria Unit #1. Location: Center NE/4 NE/4 Section 10 T. 139 N., R. 101W. Elevation: 2626 K.B. Total Depth 9476 feet. Plug Back Depth 9280 feet.

The Amerada Petroleum Corporation - Scoria Unit #1 was spudded August 16, 1957 and completed December 28, 1957 as a new oil discovery. The well was completed dually (Madison and Heath) for a combined initial production total of 348 barrels of oil per day.

Logs: Laterolog-3 Gamma ray, microlaterolog, and gamma ray-neutron.

Cores: 7992-8026 (Heath), cut 3 feet, recovered 27 feet.

Tests:


DST #2: 7650-7790. Open 1 hour and 5 minutes, 3/4" choke, 1000' water cushion. Strong air blow immediately decreasing to weak blow in 1 hour, SI 30 minutes. Recovered: 1000 feet of mud cut water cushion, 5510 feet of mud cut salt water. Pressures: IHP 4720#, IFP 2600#, FFP 3530#, BHP 3540#, FHP 4680#.

DST #3: 7949-7956. Open 26 minutes, 3/4" choke, 1000' water cushion. Strong air blow immediately, water cushion to surface in 4 minutes, nitrogen gas to surface in 6 minutes. Shut in 30 minutes. Recovered: 4 feet above water cushion, 4 feet of highly gas cut slightly salt water cut black oil with trace of oil on top. Pressures: IHP 4855#, IFP 2490#, FFP 2940#, BHP 3475#, FHP 4985#.

DST #4: 7964-7990. Open 1 hour and 30 minutes 3/4" choke, 1000' water cushion. Air immediately, weak blow increasing to strong blow in 2 minutes. Gas to surface in 48 minutes, strong blow for remainder of test. Shut in 30 minutes. Recovered: 5500 feet of highly gas cut and water cushion cut black oil, 500 feet of highly gas cut and slightly mud cut black oil. Estimated 95% oil. Pressures: IHP 4900#, IFP 600#, FFP 1735#, BHP 3460#, FHP 4890#.

DST #5: 8178-8222. Open 1 hour and 30 minutes, 3/4" choke, 1000' water cushion. Strong air blow immediately, water cushion to surface in 46 minutes, salt water to surface in 1 hour and 25 minutes. Flowed 16 barrels of water cushion and estimated 2 barrels salt water to pit. Shut in 30 minutes. Recovered: 8192 feet of salt water. Pressures: IHP 5035#, IFP 2420#, FFP 3650#, BHP 3710#, FHP 4970#.


DST #8: 9171-9236. Open 4 hours, 3/4" choke, 2000' water cushion. Air immediately, weak blow gradually increasing to fair blow in 1 hour. Increased to strong blow in 1 hour and 40 minutes, gas to surface in 3 hours and 11 minutes, gas blow decreased to weak blow too small to measure. Shut in for 30 minutes. Recovered: 3000 feet of highly oil and gas cut slightly mud cut water cushion, estimated 35% oil, 1000 feet of free oil, brownish green in color, and 110 feet of highly oil and gas cut drilling mud, estimated 15% oil. Pressures: IHP 5650#, IFP 980#, FFP 1525#, BHP 3660#, FHP 5650#.

Perforations:
Perforated 9298-9368 with 4 shots per foot, acidized with 2000 gallons; swabbed 106 barrels of salt water with slight trace of oil; squeezed perforations with 125 sacks.

Perforated 9213-9258 with 4 shots per foot and acidized with 2000 gallons; flowed 231 barrels of oil and 11 barrels of water in 23 hours on 24/64" choke, tubing pressure 100, GOR 546/1, API gravity 39.8; flowed 58 barrels of oil and 88 gallons of water in 5 hours on 24/64" choke, TP 105.

Perforated 7958-7976 with 4 shots per foot, acidized with 500 gallons; flowed 0 barrels of oil in 6 1/2 hours. Nitrogen gas flow 1065 MCF per day; squeezed perforations with 75 sacks.

Perforated 7966-7976 with 4 shots per foot; flowed 109 barrels of oil in 13 hours on 18/64" choke, TP 1800; API gravity 34.6, GOR 5201/1; flowed 11 barrels of oil in 2 hours on 18/64" choke, TP 1800; flowed 102 barrels of oil, 0 barrels of water in 12 hours on 18/64" choke, TP 1700; API gravity 34.6, GOR 10,205/1; flowed 147.47 barrels of oil, no water in 24 hours on 18/64" choke, TP 1775; flowed 137 barrels of oil, no water in 24 hours on 18/64" choke, TP 1775; flowed 120 barrels of oil, no water in 24 hours on 18/64" choke, TP 1800; flowed 123 barrels of oil in 24 hours on 18/64" choke, TP 1750; flowed 122.33 barrels of oil in 24 hours on 18/64" choke, TP 1775. Squeezed perforations 7966-7976 with 125 sacks.

Perforated 7973-7979 with 4 shots per foot; flowed 123.5 barrels of oil, 12 gallons of water in 18 hours on 14/64" choke, TP 1600-1825, GOR 4702/1; flowed 31 barrels of oil, no water in 5 hours on 14/64" choke, TP 1850, GOR 4000/1.

Acidized Madison perforations 9213-9258 with 500 gallons.
Completion Data:
On a 24 hour Madison test, using a 16/64” choke, the well flowed 151 barrels of oil (17% water). Gas-oil ratio 433/1, API gravity 39.6, shut in pressure 1000#.

On a 24 hour Heath test using a 16/64” choke, the well flowed 197 barrels of oil (no water). Gas-oil ratio 9137/1, API gravity 38.4, shut in pressure on tubing 2100#, on casing 2350#.

Permanent type production packer set at 9198’.

Casing Record:
Set 9 5/8” surface easing at 627 feet with 450 sacks of cement. Set 7” casing at 9474 with 1000 sacks of cement.

Formation tops were determined from samples and electric logs, corrected to the electric logs. Doubtful or obscure formations were not picked. Colors and descriptive numbers were taken from the Goddard, et. al., 1951 Rock Color Chart distributed by the Geological Society of America, New York, N.Y.

FORMATION TOPS

Cretaceous System
Pierre formation 1735
Greenhorn formation 4482
Basal Cretaceous sandstones 5425

Jurassic System
Swift formation 5763
Rierdon formation 6233
Piper limestone 6445

Triassic System
Spearfish formation 6618

Permian System
Minnekahta formation 7140
Opeche salt 7223

Pennsylvanian System
Minnelusa formation 7490

Mississippian System
Heath formation 7950
Kibbey sandstone 8192
Kibbey limestone 8331
Charles formation 8471
Nesson pay equivalent 9057
Fryburg pay equivalent 9213

0-4310 Missing.
4310-4460 Shale, greenish gray 5GY6/1 to light olive gray 5Y6/1 and medium dark gray to grayish black, fissile to lumpy, compact, bentonitic in part.
4460-4640 Shale, medium dark gray to grayish black, compact, some with soft white calcareous specks, some light olive gray 5Y6/1, lumpy, bentonitic shale and few pieces of fine fragmental limestone, soft, crumbly, light brown 5YR6/4.
4640-4970  Shale, dark gray to black and greenish gray, fissile, compact, and much lumpy, spongy, bentonitic shale, light olive gray 5Y6/1 to olive gray 5Y4/1.
4970-5060  Shale, black, fissile, compact and some olive gray shale as above.
5060-5430  Shale, dark gray to grayish black, fissile, compact, and some light olive gray 5Y6/1 compact shale.
5430-5450  Shale, as above, and few pieces of very fine grained, moderately well cemented, very light gray sandstone.
5450-5600  Shale, grayish black to black, fissile, compact, and little sandstone as above.
5600-5670  Shale as above, and little light greenish gray 5GY8/1 to greenish gray 5GY6/1 and light olive gray 5Y6/1 shale, fissile to lumpy, compact.
5670-5710  Shale, medium dark gray to grayish black, fissile, compact, little light olive gray 5Y6/1 compact shale, little fine grained, friable white to very light gray sandstone, with probable gypsiferous cement, and few fragments of light bluish gray chert.
5710-5730  Shale and sandstone, as above.
5730-5750  Shale and sandstone as above, and few fine to medium, subangular to rounded, vitreous to frosted colorless loose quartz grains.
5750-5780  Shale, greenish gray 5GY6/1, lumpy, spongy, to fissile, compact, and some dark gray, fissile, compact shale.
5780-5820  Shale as above, and little very fine grained, sandstone, friable to moderately well cemented, glauconitic in part, light greenish gray to yellowish gray 5Y8/1.
5820-5860  Missing.
5860-5880  Shale, light olive gray 5Y6/1 to olive gray 5Y4/1, lumpy, spongy.
5880-5940  Shale, as above, and some medium gray to black, fissile, compact shale.
5940-6020  Shale, medium gray to black, and greenish gray, fissile, compact.
6020-6050  Shale, as above, and little very fine grained sandstone, well cemented, glauconitic in part, light greenish gray 5G8/1 to greenish gray 5G6/1 and yellowish gray 5Y8/1 to light olive gray 5Y6/1.
6050-6060  Shale and sandstone as above, and few pieces of yellowish gray 5Y8/1 micaceous bentonite.
6060-6100  Shale, dark gray to black and olive gray 5Y4/1 fissile, compact.
6100-6160  Shale, as above, and some very fine grained sandstone, moderately well cemented, calcareous, slightly glauconitic in part, very light gray.
6160-6180  Shale, greenish gray 5GY6/1 and medium gray to grayish black, fissile, compact.
6180-6240  Shale, as above and little sandstone as above (6100-6160).
6240-6290  Shale as above, few pieces of limestone, chalky, soft, very pale orange 10YR8/2, some shaly limestone and limy shale, olive gray and medium gray to grayish black.
6290-6330  Shale, limy shale and shaly limestone, as above.
6330-6350  Shale, medium dark gray to black, light olive gray 5Y6/1 to olive gray 5Y4/1, and light brownish gray, fissile, compact.
6350-6380  Shale, as above, grading to very light shale.
6380-6430  Shale, and limy shale as above and some shaly limestone, dense, dark gray and, greenish gray 5GY6/1.
6430-6460  Shale and shaly limestone as above and little fine crystalline, to very fine granular limestone, dense, very pale orange to pale yellowish brown.
6460-6510 Limestone, very fine granular, argillaceous, very pale orange to
moderate orange pink 5YR8/4 and moderate pink 5R7/4 to dusky red
5R3/4, and much shale, dark gray to black, and greenish gray
5GY6/1, very limy in part, fissile, compact to brittle.

6510-6550 Limestone, as above to very fine crystalline, dense, and much
shale, greenish gray 5GY6/1, light olive gray 5Y6/1 and dark gray
to grayish black, fissile, compact.

6550-6610 Limestone, very fine crystalline, and very fine granular, dense,
pale red 5R6/2 to grayish red 5R4/2, light red to moderate red
5R4/6, and moderate orange pink 5YR8/4, and much shale as above.

6610-6680 Limestone and shale as above, little very fine grained sandstone
and silty sandstone, friable, moderate reddish orange 10R6/6 to
moderate reddish brown 10R4/6.

6680-6800 Sandstone as above, with some shale and limestone as above.

6800-6830 Sandstone as above to dark reddish brown 10R3/4, and little shale
as above; probably cavings since radioactivity and electrical logs
indicate salt.

6830-6860 Sandstone and much shale, mostly cavings as above, probably salt
with shale stringers.

6860-6950 Shale, vitreous, colorless to grayish orange pink 10R8/2.

6950-7140 Shale, medium dark gray to grayish black and greenish gray 5GY6/1,
and little sandstone, very fine grained, friable, moderate reddish
orange to moderate reddish brown 10R4/6.

7140-7160 Missing.

7160-7180 Salt, vitreous, and anhydrite, crystalline, grayish orange pink to
moderate orange pink, and some shale cavings.

7180-7190 Limestone, very fine granular, interstitial porosity, grayish
orange pink, moderate orange pink and moderate reddish orange,
some shale, grayish black and greenish gray, fissile, compact.

7190-7210 Shale, as above.

7210-7270 Limestone, very fine granular, anhydritic in part, moderate orange
pink to pale reddish brown, little crystalline anhydrite, white to
grayish orange pink 10R8/2 and some shale as above.

7270-7300 Anhydrite, very fine granular, moderate orange pink 10R7/4, some
salt, vitreous, colorless, and shale cavings.

7300-7330 Missing.

7330-7350 Anhydrite, snowy, soft, white, moderate pink and grayish orange
pink to moderate orange pink, with some shale and sandstone
cavings.

7350-7390 Salt, vitreous, colorless and tinted moderate orange pink 10R7/4,
with much caved shale and sandstone.

7390-7410 Anhydrite, mostly snowy to earthy, little very fine granular,
white and moderate orange pink 10R7/4, with much caved shale and
sandstone.

7410-7510 Anhydrite as above; very poor samples, almost entirely caved
material.

7510-7520 Sandstone, fine grained, friable, grayish orange pink to moderate
reddish orange; poor samples, mostly caved material.

7520-7530 Sandstone as above, some greenish gray and grayish black shale
and much caved material.

7530-7550 Sandstone, as above to yellowish gray; very poor sample mostly
anhydrite cavings.

7550-7560 No sample.
7560-7620 Sandstone, fine grained, friable to moderately well cemented, anhydritic, slightly calcareous, white, grayish orange pink and light red 5R6/6, with anhydrite and shale cavings.
7620-7720 Sandstone, very fine to fine grained, friable to well cemented, slightly calcareous, white, grayish pink 5R8/2, moderate pink, and light red 5R6/6, some dolomite, calcitic, fine crystalline, dense, grayish orange pink 10R8/2, moderate orange pink and pale red 10R6/2, and little shale, greenish gray 5GY6/1 and dark gray, fissile, compact.
7720-7760 Dolomite, fine crystalline, some fine granular, dense, moderate pink 5R7/4 to dusky red 5R3/4 and little sandstone as above.
7760-7810 Dolomite and sandstone as above, and some shale, greenish gray and dark gray, lumpy to fissile, compact.
7810-7850 Dolomite, very fine crystalline, to very fine granular, dense, grayish orange pink 10R8/2 and light red to moderate red 5R4/6, little shale, greenish gray and dark gray, fissile, compact.
7850-7940 Dolomite, very fine granular, some fine crystalline, dense, very pale orange to dusky yellowish brown, moderate pink and light red to moderate red 5R4/6, and little shale as above.
7940-7950 Limestone, fine crystalline, dense, light brownish gray 5YR4/1 to brownish black 5YR2/1, and some shale, black, fissile, compact.
7950-7990 Limestone and shale as above and little sandstone, fine grained, subangular to subrounded, friable, pale yellowish brown 10YR6/2.
7990-8000 Circulation sample: As above.
7992-7993 Shale, grayish red 5R4/2, waxy, brittle.
7993-7994 Shale, very dusky red 10R2/2 waxy, brittle.
7994-7995 Shale, pale olive 10Y6/2, brittle, slightly arenaceous in part, and sandstone, very fine grained, well cemented, dusky red 5R3/4.
7995-7996 Sandstone, as above.
7996-7997 Sandstone, very fine grained, well cemented, yellowish gray 5Y8/1 to light greenish gray 5GY8/1.
7997-7998 Sandstone, as above with scattered dusky red staining.
7998-8000 Shale, greenish gray 5GY6/1 and dark reddish brown 10R3/4, brittle, with little included sandstone as above.
8000-8001 Sandstone, very fine grained, well cemented, greenish gray 5GY6/1, and dark reddish brown 10R3/4.
8001-8002 Sandstone, medium grained, rounded, well cemented, white and dark reddish brown 10R3/4, and dolomite, shaly, fine crystalline, dense, grayish green 5G5/2 and dark reddish brown.
8002-8003 Limestone, dolomitic, fine crystalline, dense, olive gray 5Y4/1.
8003-8004 Shale, grayish red 10R4/2, slightly calcareous, waxy, brittle, abundant ostracodes.
8004-8005 Shale, dark greenish gray 5G4/1, calcareous, waxy, compact with numerous ostracodes and few pelecypod fragments.
8005-8006 Limestone, fine crystalline, dense, fossiliferous, greenish gray 5GY6/1.
8006-8007 Shale, olive gray 5Y4/1, calcareous, brittle.
8007-8009 Shale black, limy, brittle.
8009-8010 Shale, black, siliceous, brittle.

Core #1 (7992-8026) Recovered 27 feet.
<table>
<thead>
<tr>
<th>Sample Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8010-8011</td>
<td>Shale, black, calcareous, fossiliferous, pyritic, brittle.</td>
</tr>
<tr>
<td>8011-8019</td>
<td>Shale, grayish black, compact.</td>
</tr>
</tbody>
</table>

**Samples**

<table>
<thead>
<tr>
<th>Sample Range</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>8015-8020</td>
<td>Shale as above, poor sample, mostly cavings.</td>
</tr>
<tr>
<td>8020-8025</td>
<td>Missing.</td>
</tr>
<tr>
<td>8025-8030</td>
<td>Lost circulation material.</td>
</tr>
<tr>
<td>8030-8050</td>
<td>Shale as above and cavings.</td>
</tr>
<tr>
<td>8050-8080</td>
<td>Shale as above, some limestone, fine crystalline, dense, brownish gray to brownish black and some limy shale, grayish black, brittle.</td>
</tr>
<tr>
<td>8080-8180</td>
<td>Limestone as above to light brownish gray, some yellowish gray 5Y8/1, and much shale and limy shale as above.</td>
</tr>
<tr>
<td>8180-8190</td>
<td>Shale and limestone as above, and little sandstone, very fine to fine grained, friable, calcareous, white, yellowish gray 5Y8/1 and moderate pink 5R7/4 to moderate orange pink 10R7/4.</td>
</tr>
<tr>
<td>8190-8220</td>
<td>Sandstone as above, and shale, dark gray to grayish black, compact.</td>
</tr>
<tr>
<td>8222</td>
<td>Circulation sample: As above.</td>
</tr>
<tr>
<td>8220-8270</td>
<td>Sandstone and some shale as above.</td>
</tr>
<tr>
<td>8270-8340</td>
<td>Sandstone, very fine to medium grained, subangular to rounded, mostly vitreous, some frosted, friable, slightly calcareous, white, moderate orange pink to pale reddish brown 10R5/4 and grayish orange pink to moderate pink 5R7/4, some shale medium gray grayish black and greenish gray 5GY6/1, compact.</td>
</tr>
<tr>
<td>8340-8350</td>
<td>Lost circulation material.</td>
</tr>
<tr>
<td>8350-8360</td>
<td>Missing.</td>
</tr>
<tr>
<td>8360-8390</td>
<td>Limestone, very fine crystalline, dense, light brownish gray to brownish gray 5YR4/1 and little anhydrite, snowy to earthy, white.</td>
</tr>
<tr>
<td>8390-8410</td>
<td>Shale, dark gray and greenish gray 5GY6/1, compact with some limestone and anhydrite as above.</td>
</tr>
<tr>
<td>8410-8450</td>
<td>Shale, as above, some sandstone, very fine to medium grained, friable, calcareous, moderate orange pink to dark reddish brown 10R3/4 and grayish orange pink to moderate pink 5R7/4 and little limestone as above.</td>
</tr>
<tr>
<td>8450-8470</td>
<td>Shale, sandstone and limestone, as above and little earthy to snowy, white to grayish orange pink anhydrite.</td>
</tr>
<tr>
<td>8470-8480</td>
<td>Salt, and salt coated shale and sandstone cavings.</td>
</tr>
<tr>
<td>8480-8490</td>
<td>Shale, medium dark gray to black and olive gray 5Y4/1, fissile, compact, and little silty shale, moderate reddish orange, compact.</td>
</tr>
<tr>
<td>8490-8500</td>
<td>Shale, as above to greenish gray 5GY6/1, and more silty shale as above.</td>
</tr>
<tr>
<td>8500-8520</td>
<td>Shale as above, and little earthy to snowy, white anhydrite.</td>
</tr>
<tr>
<td>8520-8530</td>
<td>Missing.</td>
</tr>
<tr>
<td>8530-8540</td>
<td>Shale and anhydrite, as above.</td>
</tr>
<tr>
<td>8540-8560</td>
<td>Missing.</td>
</tr>
<tr>
<td>8560-8590</td>
<td>Shale, dark gray to black, and olive gray 5Y4/1, some silty sandstone, slightly calcareous, friable, light brown 5YR6/4 and some snowy to earthy, white anhydrite.</td>
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<tr>
<td>8590-8630</td>
<td>Anhydrite, earthy, white, and much caved material, some coated with salt.</td>
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<tr>
<td>8630-8370</td>
<td>Salt.</td>
</tr>
<tr>
<td>8370-8710</td>
<td>Limestone, fine crystalline, dense, pale yellowish brown to dark yellowish brown.</td>
</tr>
</tbody>
</table>
8710-8720 Limestone as above, some shale, grayish black, and olive gray 5Y4/1, and little anhydrite, earthy, white.
8720-8730 Limestone and shale, as above.
8730-8750 Limestone and shale as above, and some earthy, white anhydrite.
8750-8770 Poor samples; limestone, shale and anhydrite, as above and much lost circulation material.
8770-8790 Limestone, fine crystalline, dense, pale yellowish brown to dusky yellowish brown 10YR2/2 and little shale, greenish gray 5GY6/1 and dark gray.
8790-8800 Limestone, fine crystalline, scattered pinpoint porosity, dark yellowish brown to dusky yellowish brown, and little shale as above.
8800-8830 Limestone and shale as above and little earthy to snowy white anhydrite.
8830-8840 Anhydrite, earthy to crystalline, white, and some limestone and shale as above.
8840-8860 Shale, light olive gray 5Y6/1 to olive gray 5Y4/1 and medium dark gray to black, mostly lumpy, spongy, little fissile, compact.
8860-8885 Anhydrite, earthy, white, much shale, olive gray, greenish gray and medium dark gray to black, compact and some limestone, fine crystalline, dense, dark yellowish brown to dusky yellowish brown.
8885-8900 Limestone, very fine granular, scattered pinpoint porosity, very pale orange to pale yellowish brown, and little anhydrite as above.
8900-8905 Poor sample, mostly lost circulation material.
8905-8915 Anhydrite as above, much shale, brownish gray and dark gray to black, and little fine crystalline, dense, dusky yellowish brown limestone.
8915-8920 Anhydrite, earthy, lumpy, spongy, with shale and limestone inclusions, white to light gray and yellowish gray 5Y8/1, and little shale and limestone as above.
8925-8960 Limestone, very fine granular, scattered pinpoint porosity, very pale orange to pale yellowish brown, and some fine crystalline to fine fragmental, dense limestone, dark yellowish brown to dusky yellowish brown.
8960-9000 Limestone, very fine granular, chalky in part, pale yellowish brown 10YR6/2, little fragmental limestone as above and little shale, olive gray 5Y4/1, compact.
9205-9215 Limestone, fine granular, scattered pinpoint porosity, very pale orange to dusky yellowish brown, some brown staining, slight fluorescence, no cut.

9218- Circulation sample; 1 1/2 hours: Limestone, as above.

9218-9230 Limestone as above with several pieces showing and fair fluorescence and excellent cut.

9230-9235 Limestone as above, scattered stain, no fluorescence, or cut.

9236- Circulation sample; 1 hour: Limestone, fine granular, scattered pinpoint porosity, pale yellowish brown to dark yellowish brown, fair to good stain, fair spotty fluorescence and good cut.

9235-9270 Limestone, as above, with very poor fluorescence and slight cut.

9270-9305 Limestone, fine granular, little scattered pinpoint porosity, pale yellowish brown to dark yellowish brown.

9305-9310 Limestone, mostly fine granular, some fine to dense medium fragmental, very pale orange to dusky yellowish brown.

9310-9320 Limestone as above, and little earthy to snowy, white anhydrite.

9320-9390 Limestone as above.

9390-9415 Limestone as above, and little fine to medium very oolitic limestone, very pale orange to dusky yellowish brown.

9415-9445 Limestone, mostly fine granular, same fine to little medium oolitic and fine fragmental, very pale orange to dusky yellowish brown.

9445-9460 Limestone, dolomitic, microsucrosic, interstitial porosity, pale yellowish brown to dark yellowish brown, some scattered staining, fair fluorescence and slight cut.

9460-9470 Limestone, very fine to fine granular, chalky in part, very pale orange to dark yellowish brown and some microsucrosic limestone as above.

9470- Circulation sample; 1/2 hour: Limestone, as above.

9470-9476 Missing.

9476 Total depth.