2975 - 2995 Sandstone as above, glauconitic. Shale as above
2995 - 3000 Sandstone, light-brown, gray, and grayish-brown, very fine-grained, glauconitic. Shale as above, trace
3000 - 3025 Sandstone as above. Shale, dark-greenish-gray. Dolomite, light-brown and gray, coarse-grained, glauconitic; trace
3025 - 3030 Shale, dark-greenish-gray, micaceous, silty. Sandstone, very light-brown to medium-brown, very fine-grained, micaceous, slightly glauconitic. Dolomite, light-gray and brownish-gray, microcrystalline (dolosiltite), silty; heavy trace
3030 - 3035 Sandstone, light-pinkish-yellow, fine-grained, dolomitic; few medium and coarse grains. Shale, light-greenish-gray, micaceous; minor. ROME FORMATION at 3028 feet (GRN)
3035 - 3040 Sandstone, light-pinkish-yellow to light-brown, fine-grained, dolomitic; few medium grains
3040 - 3080 No samples (cored)
3080 - 3095 Sandstone, light- and medium-brown, very fine- and fine-grained, dolomitic; few fine-grained dark-brown oolites; grading in small part into very fine- and fine-grained(?) dolomite
3095 - 3100 As above, few chips of sandstone and dolomite with irregularly shaped interclasts of very light-gray dolomicrite. Shale, dark-brownish-gray; trace
3100 - 3105 As above, some coarse-grained sand in dolomicrite-bearing sandstone or dolomite
3105 - 3110 Sandstone, light-pinkish-yellow, light-brownish-gray and light- and medium-brown, very fine- and fine-grained; some medium- and coarse-grained sand; very dolomitic in part. Dolomite, very light-grayish-brown, microcrystalline (dolomicrite), sandy, oolitic (dark-brown, fine- and medium-grained, grain-supported); heavy trace
3110 - 3115 Sandstone as above, in part grading into medium-brown dolomite
3115 - 3120 Sandstone as above. Dolomite, light-gray and brown, microcrystalline (dolomicrite), conglomeratic(?); showing contact with sandstone
3120 - 3130 Sandstone as in sample from 3110 to 3120 feet. Dolomite, light-brown, microcrystalline (dolosiltite), sandy, oolitic (light-brown, fine-grained, sand-centered, grain-supported); trace
3130 - 3140 Sandstone, light-brownish-gray, poorly sorted, fine- to coarse-grained (predominantly fine), dolomitic; few pink and purple grains (garnet?)
3140 - 3155 Sandstone, light-brownish-gray, fine- and medium-grained, dolomitic
3155 - 3160 Sandstone, light-pinkish-gray, light-brown, and grayish-brown, fine- and medium-grained; few coarse grains
3160 - 3180 Sandstone, light-pinkish-gray, fine- and medium grained (predominantly fine)
3180 - 3190 Sandstone, light-pinkish-gray, light- and medium-brownish-gray, very fine- and fine-grained; dolomitic in part. Siltstone, light- and medium-grayish-brown and dark-brown, dolomitic, sandy (very fine-grained sand), argillaceous, slightly glauconitic; minor
3190 - 3195 As above. Dolomite, medium-brown, medium-crystalline (dolosiltite), oolitic (fine- and medium-grained, grain-supported); trace
3195 - 3200 Dolomite, medium-grayish-brown and brownish-gray, medium- and dark-gray, microcrystalline (dolosiltite), oolitic and pelletal (mud- and grain-supported), very silty, sandy (very fine- and fine-grained sand), brecciated, laminated; porosity due to dissolved pellets and/or oolites. Sandstone, light-grayish-brown to pinkish-gray, fine-grained
3200 - 3205 Dolomite, light- to medium-brown, slightly grayish, fine- to coarse-grained, silty. Dolomite, light- to medium-brown, sandy, oolitic (medium-grained, grain-supported); trace
3205 - 3210 Dolomite, light-brown, microcrystalline (dolosiltite), sandy. Sandstone, light-brown, fine- and medium-grained, some medium-grained oolites; dolosiltite occurring as breccia in sandstone
3210 - 3215 Dolomite, medium-gray, fine-grained, sandy (very fine- and fine-grained sand). Sandstone, pinkish-gray and light-gray, fine- to coarse-grained, poorly sorted; dark-gray shale laminations
3215 - 3220 Dolomite, light- to dark-brown, light- to dark-gray, microcrystalline, silty, argillaceous, sandy (very fine-grained sand); fine-grained in part; oolitic and pelletal in part. Sandstone, pinkish-gray, very fine-grained; heavy trace
3220 - 3235 Dolomite as above, sandy (very fine- to coarse-grained sand); minor. Sandstone, pinkish-gray, very light-grayish-brown, fine- to coarse-grained. MT. SIMON SANDSTONE at 3220 feet
3235 - 3240 Sandstone, light-pinkish-brown, pinkish-gray, and light-gray, predominantly very fine- and fine-grained. Dolomite, light- and medium-gray and light-brown, microcrystalline (dolosiltite), oolitic, argillaceous, very sandy (very fine- and fine-grained sand); minor
3240 - 3245 Sandstone, pinkish-gray and light-greenish-gray, predominantly fine- and medium-grained, poorly sorted
3245 - 3250 Sandstone, fine- to coarse-grained
3250 - 3260 Sandstone as above, fine and medium grained
3260 - 3265 Sandstone, very light-pinkish-brown, very fine- and fine-grained
3265 - 3270 Sandstone as above, few medium-sized grains
3270 - 3275 Sandstone as above, slightly glauconitic; dark-gray silty shale laminations
3275 - 3280 Sandstone, light- and medium-gray, very fine- and fine-grained, silty, very glauconitic; shale laminations as above
3280 - 3290 Sandstone, light-gray and very light-brown, fine- to coarse-grained, poorly sorted, very glauconitic; shale laminations as above
3290 - 3310 Sandstone, light-pinkish-gray, light-greenish-gray, predominantly fine- and medium-grained
3310 - 3315 Sandstone, light-pinkish-brown, very fine- and fine-grained
3315 - 3320 Sandstone, light-pinkish-brown and very light-grayish-brown, fine- and medium-grained
3320 - 3330 Sandstone, very light-grayish-brown, fine- and medium-grained; black spiny material
3330 - 3335 Sandstone, light-green, fine- and medium-grained, clayey. Sandstone, light-pinkish-gray, fine- and medium-grained, arkosic; black spines and platy material; trace
3335 - 3340 Sand, fine- to coarse-grained, arkosic, chloritic
3340 - 3345 Amphibolite; see McCormick, 1961
3345 - 3490 Samples not described
TD samples 3490 feet

Fayette County
Jasper Township
VMSL 5351

Kewanee Oil Co. #1 Barnes
Permit No. 4
Sample No. 767
Elevation (CM) 1043 feet

Depth (ft)
1700 - 1710 Limestone, light-gray and light- and medium-

SAMPLE # 751 Log by Bass

Esther Wilson well no. 1
Fayette County, Ohio
Concord Twp.
SUMMARY

P# 2
KEWANEE OIL CO.
WMSL 1002
API = 3404720002

3300-3325: buff, fine to coarse, rounded to angular, poorly sorted arkose and quartzose sandstone; slightly dolomitic, siliceous cement; abundant dark fossil fragments, apparently trilobites.

3325-3330: interlayered buff sandstone and gray siltstone; intergrade as well as interlayered and interlaminated.

3330--3335: grayish green, medium-grained quartzose sandstone; chloritic and probably siliceous cement; trace pyrite and scattered coarse sand grains of red weathered feldspar (1 percent of rock).

a few fine and medium grained crystalline fragments composed largely of red feldspar with green or greenish black matrix; one such cutting embedded in grayish green sandstone.

one medium- to coarse-grained cutting of quarts, feldspar, pyrite and biotite.

3335-3340: largely fine-grained, weathered crystalline fragments;composed of red feldspar in green or gray matrix, often with interspersed dark grains (very-fine-grained), probably magnetite or biotite or both. No quartz; apparently syenite (weathered gabbro??). Not embedded in sandstone, though many sandstone cuttings present (Cavings?) - may be weathered syenite in place, into joints of which sand has fallen, or perhaps syenite-rich basal breccia at base of sandstone.

3340-3494TD: Fresh basement rock. Depending on identity of "syenite" above, basement top at 3340 or 3335.

Basement rock is fine-grained ǵ gabbro (?) with lighter mottlings. Dark gray to medium gray in gross aspect depending on abundance of lighter mottlings. Dark rock composed of amphibole or pyroxene plus light mineral, probably plagioclase, but no twinning seen except in one grain. Lighter mottlings largely white to colorless minerals, and mafics tend to be medium green rather than black as in dark rock. Medium-grained patches up to 1/2 inch across composed of white to colorless to light green, rarely pink, feldspar and possibly quartz; plus minor mafics and rarely a red-brown mineral; apparently occurs as patches or streaks with moderately sharp to gradational boundary against host fine-grained rock. Irregularly disposed throughout the well, commonly in very minor amounts where present; but in 3445-3460 medium-grained material perhaps 10-35 percent of rock.

Trace of biotite; may be more common near medium-grained patches.

Numerous dark green to black "aphanitic" grains. Many of these are mere coatings of chlor or serpentine on joints. Others are apparently truly aphanitic to very-fine-grained rock (finer than normal rock), either equigranular or rarely with fine-grained phenocrysts. Darkness may be due to fine grain size in some cases, but in most cases apparently due to concentration of mafics (lamprophyric). Shape of such dark masses not known; may be patches, lenses or veinlets. Only one contact versus normal fine-grained gabbro(?) seen; it was sharp. Generally the dark cuttings are rare, scattered in trace amounts through cuttings of normal rock. But form about 20 percent of rock in 3485-3490; and in 3490-3494TD almost the whole rock is black to very dark gray and very-fine-grained, apparently due in part to mafic-rich grains, but also to "chilling" so that rock of the same composition as the dominant rock above appears [illegible] manifestations.

Structure of rock appears to be massive. Many, perhaps most, cuttings tend to be flattened, but fracture is crudely to clearly conchoidal, like spalls obtained in breaking massive fine-grained gabbro or diabase. In addition a considerable portion of the cuttings are irregular or equant. Joints identified by peculiar coatings; one may have had a white coating (did not effervesce in acid); but mostly coated by dense, dark green to black chlorite or serpentine. The lighter mottlings are irregular in shape and distribution, only in one case showing even a slight suggestion of banded distribution with respect to the host dark rock. Almost all cuttings show no internal structure; the components are equant to stubby prismatic, equigranular, interlocking; might be texture either of gabbro or possibly granoblastic texture of amphibolite. The very rare cuttings with internal structure showed it only vaguely except where cuttings relatively biotite rich; or in one cutting that had light and dark bands on order of thickness of grain diameter. These may be local flow or fracture or shear features. In general though, the structure is massive.

The massive structure, fresh appearance, composition, light irregular mottlings, dark green joint coverings, and perhaps even the red syenite(?) at the top (is it weathered gabbro?) are all suggestive of gabbro. But no diabasic texture was seen, as might be expected in such a fine-grained basic magmatic rock. Another possibility is massive metamorphic amphibolite. The absence of recognizable twinning in plagioclase supports this idea. Also, traces of a red-brown mineral were seen in some intervals which might be garnet, and the texture could be granoblastic rather than gabbroic so far as binocular examination revealed. However, many of the features mentioned above as suggestive of gabbro are unusual for amphibolite, and wherever metamorphic rocks were drilled in Ohio and Michigan, a 160-foot section almost invariably showed recognizable variations in rock type.

The resolution of the problem may come with petrographic study - is the dominant mafic pyroxene or amphibole; is the texture igneous or metamorphic? is garnet present? zeolites?

I may get enough biotite for an age determination. All of the metamorphic rocks of Ohio are probably of the same concordant (Presumably Grenville) age since the regional geology is best interpreted in terms of only one metamorphic event there. If the Esther basement rock is the same age, it presumably belongs to the same province. The exposed Grenville continas both amphibolite and unaltered gabbro, so rock type alone is not definitive of correlation. The Hopkins basement rock is Grenville-type, but both the Esther well and the presumed Grenville boundary lie somewhat west of the Hopkins well, so position alone is not a basis for correlation as yet. The Barnes and Adams wells may shed light on this matter. I have found some evidence from regional studies that large gabbroic masses, often differentiated, tend to lie in or near a major tectonic boundary. If the Esther well is on or near the Grenville boundary, it is possible that the gabbro(?) was intruded after the boundary was created. In that case the age of the Esther basement will be post-Grenville, i.e., ≦ 900 million years or less.