

September 25, 1981

G. H. New

ROMP #134 Williston
One Floridan Aquifer Monitor Well

Site Location

This site is located on the east side of a dirt road running North and South dividing a cow pasture. It is approximately 1/4 mile south of the intersection of this dirt road and Florida State Road 335. The intersection of this dirt road with Florida S.R. 335 occurs approximately 1/2 mile east of the intersection of U.S. Highway 41 South, and S.R. 335 and is 3-1/2 miles north of Williston on U.S. 41 near Raleigh in Levy County. The site is at latitude 29° 26' 15", longitude 82° 27' 26" and in the SW quarter of the NW quarter of the NW quarter of Section 19, Township 12 South, Range 19

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Site Easement

This site includes both a perpetual easement and a temporary construction easement. The perpetual easement is 20' x 40' and is included as part of temporary construction easement which is 100' x 100'. These easements were granted by Mr. V. E. Whitehurst, Sr. for the sum of one dollar in November 1979.

Geology

This site is located at an elevation of approximately 70' above mean sea level on the Wicomico terrace. Generally speaking, the terrain in this area is flat with a few gently sloping hills or terraces. Due to the near surface proximity of limestone there has been considerable quarrying of rock for various purposes nearby. The most unusual feature of this area seems to be the lack of major "Karst" solution features.

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The lithology at this site was described from an examination of continuous wireline core samples to a depth of 519' and drill cuttings taken at 5' intervals to a total depth of 1185'. The following is a brief lithologic description:*

- 0'-4' Quartz sand, undifferentiable Plio-Pleistocene sediments
- 4'-104.5' Ocala Group Formations Limestone, biomicritic, cream-tan, pasty or chalky, weathered, foraminiferal limestone, minor traces of organic clay and pyritic mottling, moderate-high porosity throughout.
- 104.5'-330.5' Avon Park Formation Limestone, biomicritic, tan-grey or brown, partially dolomitized commonly contains some: silt, clay, or intergranular quartz, and other trace organics throughout, variable degree of hardness and lithification throughout, generally low-moderate porosity.
- 330.5'-972' Lake City Formation Limestone, Dolostone, clay and chert, predominated by limestone to 510' and predominated by dolostone below 510'; limestone-biomicritic cream-greyish tan, ranges from chalky and weathered to moldic and well preserved; dolostone-dark brown to greyish tan, hard with few fossils, contains numerous small vugs and cavities often infilled with dolomitic silt or clay, sometimes moldic. This formation contains numerous thin lenses of clay, other organic material, and intergranular quartz crystals within the pore spaces of the rock. Variable porosity throughout.
- 972'-1185' Oldsmar Formation Limestone and Dolostone, predominated by light brown-tan dolostone, microcrystalline, sucrosic, commonly contains trace organic materials, there are clay lenses and well preserved sections of limestone throughout. Predominately low porosity throughout.

* Detailed lithologic descriptions are contained in the file for ROMP #134.

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Hydrology

One of the primary objectives in drilling this monitor well to a depth of 1185' was to define the base of the Floridan aquifer system in this area. It is felt by many that the base of the Floridan is marked by one or more of the following (A) tight impermeable limestone and dolomite, (B) the presence of

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intergranular gypsum or anhydrite (evaporites) (C) deteriorating water quality with depth (D) a sharp change in potentiometric head.

During the course of drilling this well the data gathered did little to improve upon this hypothesis. Water levels remained constant from the time the potentiometric surface was encountered (near 30' total depth) until the total depth of the well at 1185' (allowing for small daily fluctuations in water level). The Floridan aquifer was found to be one continuous aquifer at this site with an unconfined upper surface allowing for recharge from rainfall by downward percolation through the highly permeable upper layers of limestone and sand. The potentiometric surface during the time of drilling was approximately 25' below land surface (or 45' above mean seal level). Although it was not tested (a process requiring the installation of inflatable packers) the lithology below 900' at this site is apparently (from examination of drill cuttings) tight and relatively impermeable however, no evidence of poor quality water, change in potentiometric head, or intergranular evaporites was found.

Special Note ** It is my opinion that the base of the Floridan aquifer was not found at this site. If further testing shows that the lower portion of this hole does not have any significant permeable zones of water production then for practical purposes a depth of around 900' should be considered the limit of significant water producing strata within the Floridan aquifer in this immediate area.*

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Several specific capacity tests were performed during the construction of the well at depths from 200' - 700' and with pumping rates up to 350 gpm. The typical amount of drawdown ranged from negligible to one-half foot (6") there-

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fore it can only be concluded that the specific capacity of this well between 200' and 700' is significant and that it probably increases with depth to some practical limit (see special note).

Water Quality Sampling

A total of more than 90 water samples were retrieved for analysis from this site at regular depth intervals. These samples were retrieved during coring, monitor well construction, and after the well had been static for a period of more than 30 days, (after drilling) with a downhole sampler. None of the water samples retrieved show any indication of less than potable water being present in any part of the borehole or of any water quality stratification throughout the well. Chlorides ranged from 7-15 mg/l, sulfates from 9-69 mg/l, specific conductivity 210-620 umho's all well within standards for public consumption.

Geophysical Logs

A suite of geophysical logs including: temperature (gradient type), fluid resistivity, caliper, electric (spontaneous potential and resistivity) and natural gamma emission were run on this well after it was drilled to total depth (interval logged from land surface-1180' below).

Geophysical log survey's of ROMP wells are used for correlative purposes and for defining various borehole characteristics.

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Well Construction

This site was cored to a depth of 520' during February thru April 1980.

The permanent monitor was constructed during April thru June 1981 and the casing was repaired between August and September 1981.

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This well was constructed by first drilling an 18" nominal diameter borehole to a depth of 35' using conventional mud rotary drilling techniques. At a depth of 35' a 14" diameter steel surface casing was seated and cemented into place. A 12" nominal diameter borehole was drilled below this to 70' and then an 8" I.D. P.V.C. casing was seated and cemented into place. After this final casing had been set the remainder of the hole was drilled using first water circulation to a depth approximately 50' below the casing and then reverse air rotary to the final depth of 1185'. An 8" nominal diameter drill bit was used to drill this open hole portion of the well (70-1185').

Drilling was stopped at 1185' due to an equipment failure which resulted in the drill stem being dropped approximately 30' fracturing the 8" P.V.C. casing and bending more than 700' of drill rods on impact.

The well was later repaired by installing a 6.2" I.D. A.B.S. liner inside of the 8" P.V.C. casing from land surface to a depth of 40'. The annular space between the P.V.C. casing and A.B.S. liner was filled with cement grout thereby bridging the fractured portion of the P.V.C. casing.

The top of the well casing was extended approximately 5' above land surface for the purpose of monitor installation and it is protected by a concrete culvert which is permanently cemented around the portion of the casing protruding above the ground.

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Type of Monitor

As stated previously this well was drilled to 1185' in an attempt to locate the base of the Floridan aquifer system. However, the primary function of

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this well is to serve as a potentiometric surface monitor reflecting the level of groundwater and its seasonal fluctuations within the Floridan aquifer as part of regional system of monitor wells.

USGS Notification

The technical support section of the District was notified during October 1981 that this well is complete and ready for monitoring by the U.S. Geological Survey.

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9-14-81 F.H.N.

ROMP #134 As Built Diagram

Fracture in 8" P.V.C. at 37'
6.2" I.D. ABS liner to 40'

All annular spaces between
casings & casing to boreholes are
filled with a cement slurry.

15" nominal borehole 0-35'

14" dia 5H. casing to 35'

12" nominal borehole dia. 35'-70'

8" Dia. P.V.C. casing to 70'

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Open hole interval from
70' to 1185'.

1185' Total Depth

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LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W- 15167

COUNTY - LEVY

TOTAL DEPTH: 01184 FT.

LOCATION: T.12S R.19E S.19 A

SAMPLES - NONE

LAT = N 29D 26M 15

LON = W 82D 27M 26

COMPLETION DATE - N/A

ELEVATION - 070 FT

OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER: SWFWMD; ROMP # 134; PROJECT #19-020-51.

WORKED BY: G.L. HENDERSON AND J.L. DECKER. CODED AND ENTERED BY RICHARD GREEN
9/90.

THIS SITE IS LOCATED ON THE EAST SIDE OF A DIRT ROAD RUNNING NORTH AND SOUTH DIVIDING A COW PASTURE. IT IS APPROX. 1/4 MILE SOUTH OF THE INTERSECTION OF THIS DIRT ROAD AND FLORIDA STATE ROAD 335. THE INTERSECTION OF THIS DIRT ROAD WITH FL. S.R. 335 OCCURS APPROX. 1/2 MILE EAST OF THE INTERSECTION OF U.S. HIGHWAY 41 SOUTH, AND S.R. 335 AND IS 3 1/2 MILES NORTH OF WILLISTON ON U.S. 41 NEAR RALEIGH IN LEVY COUNTY.

THE SITE IS LOCATED IN THE SW QUARTER OF THE NW QUARTER OF THE NW QUARTER OF SECTION 19. (SEE HEADER FOR MORE INFO.)

THIS WELL IS TOO LONG FOR THE PROGRAM, THEREFORE IT HAS BEEN SPLIT INTO SEVERAL PARTS. THIS IS PART 1 OF 4. THE REMAINING PARTS FOLLOW ONE ANOTHER ON THE DISK.

0.	-	4.	UNDIFFERENTIATED SAND AND CLAY
4.	-	104.	OCALA GROUP
24.	-	69.	WILLISTON FM. } <i>Doubt Sample</i>
69.	-	104.	INGLIS FM. }
104.	-	330.	AVON PARK FM. }
330.	-	972.	LAKE CITY LIMESTONE } <i>Avon Park</i>
972.	-	.	OLDSMAR LIMESTONE

0 - 4 SAND; WHITE TO TRANSPARENT; POSSIBLY HIGH PERMEABILITY;
RANGE: MEDIUM TO COARSE;
OTHER FEATURES: FROSTED;

4 - 8 LIMESTONE; WHITE;
-----TOP OF Ocala FORMATION (RESTRICTED?)----- BIOMICRITE, OFFWHITE, SOFT-HARD,
MASSIVE-SLIGHTLY PASTY, MILIOLOIDAL, NUMEROUS CAMERINA, OPERCS, LEPIDOCYCLINA OCALANA AND
HETEROSTEGINA OCALANA, SOME OSTREA AND OPERC. VAUGHNI, FAIRLY WEATHERED- INDURATED, TRACE
OF BRYOZOAN FRAGS, MOD-HIGH POROSITY.

- 8 - 12 LIMESTONE; WHITE; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
OTHER FEATURES: WEATHERED;
FOSSILS: BENTHIC FORAMINIFERA, MILIOLIDS, BRYOZOA;
BIOMICRITE, OFFWHITE, SOFT-HARD, MASSIVE-SLIGHTLY PASTY, ABUNDANT CAMERINA AND LEPS, SOME OPERCS. AND HETERSTEGINA, ABUNDANT BRYOZOANS, HIGHLY WEATHERED. MOD-HIGH POROSITY.
- 12 - 17 LIMESTONE; WHITE TO CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
OTHER FEATURES: WEATHERED;
FOSSILS: BENTHIC FORAMINIFERA, MILIOLIDS, BRYOZOA, MOLLUSKS;
BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-GRANULAR IN PART, NUMEROUS CAMERINA AND LEPS, SOME OPERCS AND HETEROSTEGINA, ABUNDANT BRYOZOANS AND SOME PECTEN SP., HIGHLY WEATHERED, MOD.-HIGH POROSITY.
- 17 - 24 AS ABOVE
PECTEN MORE COMMON.
- 24 - 25.3 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, MILIOLIDS;
SPARSE BIOMICRITE, SOFT, MASSIVE, POORLY PRESERVED FOSSILS, ALMOST BARREN, TRACES OF UNIDENTIFIABLE PELECYPOD MOLDS. HIGH POROSITY.
- 25.3- 30.8 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
FOSSILS: BENTHIC FORAMINIFERA;
BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-NODULAR IN PART, SPONGIFORM-LIKE CONCRETIONS, ABUNDANT OPERC. FLORIDENSIS AND OSTREA MOLDS AND CASTS, SOME LOCALLY ABUNDANT LAYERS OF NONION ADVENUM AND ROTALIA SP., SOME PECTEN, LEPS, AMPHISTEGINA, TRACES OF A CHOCOLATE BROWN, WAXY CLAY POCKETING BOTTOM OF SECTION, HIGH POROSITY.
- 30.8- 32 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
FOSSILS: MILIOLIDS, BENTHIC FORAMINIFERA;
BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-UNCONSOLIDATED IN PARTS, SMALL FORAM BIOMICRITE COMPOSED OF DETRITAL CALCITE, MILLIOLIDS, AND SOME COMATULID BRACHIAL FRAGMENTS, SOME CAMERINA AND AMPHISTEGINA, TRACE OF REGULAR ECHINOID FRAGMENTS. HIGH POROSITY.
- 32 - 35.3 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
FOSSILS: BENTHIC FORAMINIFERA;
SOFT-HARD, MASSIVE-PASTY, FORAM BIOMICRITE WITH ABUNDANT OPERCS. AND OSTREA PODAGRINA MOLDS AND CASTS, SOME LOCALLY ABUNDANT LAYERS OF NONION, ROTALIA, AND VERT ABUNDANT OPERCS. NEAR BOTTOM OF SECTION, SOME CHOCOLATE-BRN, WAXY CLAY POCKETING BOTTOM OF SECTION.

- 35.3- 40 LIMESTONE; CREAM TO LIGHT TAN;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-PASTY, CALCITIC BIOMICRITE W/ POORLY PRESERVED
FOSSILS, ALMOST BARREN, TRACES OF SOME OPERCS. NEAR TOP OF SECTION, OTHER FOSSILS
UNIDENTIFIABLE, MOD.-HIGH POROSITY.
- 40 - 44.5 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL MOLDS;
SOFT-HARD, MASSIVE-SLIGHTLY PASTY, FORAMINIFERAL BIOMICRITE WITH ABUNDANT OPERCS. AND SOME
OSTREA CASTS AND MOLDS, SOME LOCALLY ABUNDANT LAYERS OF NONION, ROTALIA, AND OTHER SMALL
FORAMS, WELL COMPACTED IN BOTTOM OF SECTION. MOD.-HIGH POROSITY.
- 44.5- 45.3 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
POOR INDURATION;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, ECHINOID;
BIOMICRITE, SOFT, MASSIVE-PASTY-UNCONSOLIDATED IN PARTS, MAINLY SMALL FORAMINIFERAL
BIOMICRITE WITH SOME DETRITAL CALCITE AND COMATULID BRACHIAL FRAGS, ABUNDANT OPERCS. AND
OSTREA SHELL CASTS, SOME AMPHISTEGINA. NONION, AND CAMERINA, ALL LOOSELY HELD IN A
CALCITIC PASTE, SOME REGULAR ECHINOID FRAGMENTS, SOME PYRITE MOTTILING THROUGHOUT SECTION.
HIGH POROSITY.
- 45.3- 49.3 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
OTHER FEATURES: CHALKY;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL MOLDS;
SOFT-HARD, MASSIVE-SLIGHTLY CHALKY, MILLIOLOIDAL, TOP OF SECTION VERY CHALKY BIOMICRITE
GRADING TO SPARSE BIOMICRITE NEAR BOTTOM OF SECTION, TRACES OF OPERCS. AND PECTEN, SOME
LOCALLY ABUNDANT LAYERS OF NONION AND ROTALIA NEAR TOP OF SECTION, SOME UNIDENTIFIABLE
MOLLUSK MOLDS AND CASTS, SOME PYRITE MOTTILING THROUGHOUT, HIGH POROSITY.
- 49.3- 53 LIMESTONE; CREAM;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-SLIGHTLY PASTY, RELATIVELY BARREN BIOMICRITE WITH
POORLY PRESERVED MACROFOSSILS, TRACES OF POSSIBLE OPERCS. AT TOP OF SECTION,
PSEUDOPHRAGMINA ZARAGOSENSIS CASTS?, SOME PYRITE MOTTILING, MOD.-HIGH POROSITY.
- 53 - 58 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
OTHER FEATURES: CHALKY;
FOSSILS: MILIOLIDS, MOLLUSKS, FOSSIL MOLDS, BENTHIC FORAMINIFERA;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-CHALKY IN PARTS, TOP OF SECTION IS CHALKY BIOMICRITE
GRADING TO A SPARSE BIOMICRITE IN MAIN PARTS OF MIDDLE-BOTTOM SECTION, TOP SECTION HAVING
ABUNDANT PECTEN MOLDS WITH LOCALLY ABUNDANT LAYERS OF AMPHISTEGINA, NONION, ROTALIA, AND
COMATULID BRACHIALS, SOME UNIDENTIFIABLE PELECYPOD MOLDS IN THE SPARSE BIOMICRITE, SOME
SLIGHT PYRITE MOTTILING, HIGH POROSITY.

- 58 - 64.3 LIMESTONE; CREAM TO LIGHT TAN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE, POORLY PRESERVED FOSSILS, TRACES OF PECTEN AND
OTHER PELECYPOD CASTS AND MOLDS IN UPPER SECTION, TRACES OF PSEUDOPHRAGMINA? CASTS, SOME
PYRITE MOTTLING, MOD-HIGH POROSITY.
- 64.3- 69.3 LIMESTONE; CREAM TO LIGHT TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
SOFT-HARD, MASSIVE-NODULAR IN PART, FORAMINIFERAL BIOMICRITE WITH SPONGIFORM CONCRETIONS,
ABUNDANT PERIARCHUS? DOLOMITIZED FRAGMENTS, SOME LOCALLY ABUNDANT LAYERS OF AMPHISTEGINA,
ROTALIA, NONION, AND COMATULID BRACHIAL PLATES, TOP OF SECTION GRADES TO SPARSE BIOMICRITE
NEAR BOTTOM OF SECTION, SOME LOCALLY ABUNDANT PECTEN CASTS AND MOLDS, MOD-HIGH POROSITY.
- 69.3- 74.2 LIMESTONE; CREAM TO LIGHT TAN; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
FOSSILS: BENTHIC FORAMINIFERA, MILIOLIDS, MOLLUSKS, FOSSIL MOLDS;
BIOMICRITE; SOFT-HARD, WELL COMPACTED, SOME TRACES OF OXIDATION INDICATING THIS SECTION
EXPOSED TO WEATHERING, MATRIX MATERIAL BEING SMALL FORAMINIFERAL BIOMICRITE W/ SOME
LOCALLY ABUNDANT LAYERS OF AMPHISTEGINA, NONION, AND MILIOLIDS AT BOTTOM OF SECTION,
ABUNDANT MOLLUSK MOLDS (ARCA, CERETHIUM?), MODERATE-HIGH POROSITY.
- 74.2- 76.5 LIMESTONE; CREAM TO LIGHT TAN; FRACTURE, MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL MOLDS, ECHINOID, WORM TRACES;
SOFT-HARD, WELL COMPACTED WITH NUMEROUS FOSSIL-FILLED WEATHERED FRACTURES, MOLLUSK MOLDS,
OR WORM BORINGS, SOME DOLOMITIZED MOLLUSK MOLDS OR CASTS; CAMERINA, NONION, AND ROTALIA
COMPRISE THE MAJOR MICROFAUNA WITH SOME DOLOMITIZED ECHINOID TEST FRAGMENTS AND
SHRIMP-CRAB CLAWS?, FILLED SECTIONS RESEMBLING A COQUINA, MOD.-HIGH POROSITY.
- 76.5- 89.5 LIMESTONE; WHITE TO CREAM; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
FOSSILS: BENTHIC FORAMINIFERA, ECHINOID, CORAL;
SOFT-HARD, MASSIVE-SLIGHTLY PASTY-UNCONSOLIDATED IN PARTS, MILLIOLOIDAL, POORLY CEMENTED,
ABUNDANT MOLLUSK MOLDS AND CASTS THAT ARE FAIRLY OXIDIZED, MAINLY NONION, ROTALIA, AND FEW
CAMERINA WITH DOLOMITIZED REGULAR ECHINOID FRAGMENTS (PERIARCHUS DALLI?), ALSO SOME CORAL
IMPRINTS, MOD.-HIGH POROSITY.
- 89.5- 93 LIMESTONE; WHITE TO CREAM; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
FOSSILS: MILIOLIDS, BENTHIC FORAMINIFERA, FOSSIL MOLDS, MOLLUSKS;
SOFT-HARD, WELL COMPACTED, SMALL FORAMINIFERAL BIOMICRITE WITH SOME LOCALLY ABUNDANT
LAYERS OF AMPHISTEGINA, NONION, ROTALIA, AND MILIOLIDS NEAR BOTTOM OF SECTION, VERY
ABUNDANT MOLLUSK MOLDS AND CASTS THAT ARE WELL OXIDIZED (CERITHIUM, TURRITELLA?),
MOD.-HIGH POROSITY.

- 93 - 104.5 LIMESTONE; CREAM TO LIGHT TAN; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
FOSSILS: MILIOLIDS, BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL MOLDS;
SOFT-HARD, MASSIVE-SLIGHTLY PASTY-UNCONSOLIDATED NEAR BOTTOM, WELL COMPACTED MILLIOLOIDAL BIOMICRITE GRADING TO A POORLY CONSOLIDATED BIOMICRITE AT BOTTOM OF SECTION, HIGHLY OXIDIZED MOLLUSK MOLDS WITH SOME AMPHISTEGINA, COSKINOLINA, NONION, AND ROTALIA, SOME TRACE OF DICTYOCONUS COOKEI?, ALSO SOME VERY LARGE DOLOMITIZED PERIARCHUS? TESTS, MODERATE-HIGH POROSITY.
- 104.5- 109.4 LIMESTONE; CREAM TO LIGHT TAN; POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
FOSSILS: BENTHIC FORAMINIFERA, MILIOLIDS, MOLLUSKS, FOSSIL MOLDS, ECHINOID;
SOFT-HARD, PASTY-SLIGHTLY FRAGMENTAL, FORAMINIFERAL COQUINA W/ ABUNDANT MOLLUSK CASTS AND MOLDS, SOME DOLOMITIZED ECHINOID (PERIARCHUS DALLI?) TESTS, SOME POSSIBLE CERITHIUM? AND PECTEN, SHRIMP CLAWS, CORALS, AND BRYOZOANS COMMON, POORLY CEMENTED UPPER SECTION GRADING TO HIGHLY OXIDIZED-WELL CEMENTED LOWER SECTION.
- 109.4- 109.8 LIMESTONE; CREAM; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-VERY CLAYEY, POSSIBLE DOLOMITE-CLAY WITH TRACES OF SOME FORAMS, ALMOST BARREN OF FOSSILS, WELL OXIDIZED, MODERATE-HIGH POROSITY.
- 109.8- 114.6 LIMESTONE; LIGHT TAN TO TAN; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: SKELETAL, CALCILUTITE, BIOGENIC;
MODERATE INDURATION;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-TUFACEOUS. SLIGHTLY DOLOMITIZED W/ POORLY PRESERVED FOSSILS, ALMOST BARREN OF IDENTIFIABLE FOSSILS, ABUNDANT MOLLUSK MOLDS AND CASTS, SOME DOLOMITIZED PERIARCHUS TESTS, WELL OXIDIZED, ALMOST ALL MOLDIC POROSITY, LOW-MODERATE POROSITY.
- 114.6- 119.5 LIMESTONE; TAN TO BROWNISH GRAY; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
MODERATE INDURATION;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-TUFACEOUS, SLIGHTLY DOLOMITIZED WITH POORLY PRESERVED FOSSILS, ABUNDANT MOLLUSK MOLDS AND CASTS, ALL MOLDIC POROSITY, LOW-MOD. POROSITY.
- 119.5- 121.3 LIMESTONE; BROWNISH GRAY; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
MODERATE INDURATION;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-TUFACEOUS, SLIGHTLY DOLOMITIZED W/ POORLY PRESERVED FOSSILS, SOME MOLLUSK MOLDS, TOP OF SECTION SLIGHTLY LAMINATED BY CARBONIZED PLANT REMAINS, BOTTOM OF SECTION HAVING WORM BORINGS FILLED IN BY UNDERLYING ROCK UNIT, MOLDIC POROSITY, LOW-MODERATE POROSITY.

- 121.3- 125.3 LIMESTONE; TAN TO BROWNISH GRAY; FRACTURE, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
BIOMICRITE, HARD-VERY HARD, MASSIVE-VERY DENSE, HIGHLY DOLOMITIZED WITH UPPER SECTION
EXHIBITING VERTICAL FRACTURING AND WORM BORINGS FILLED BY UNDERLYING ROCK UNIT, SLIGHTLY
LAMINATED WITH SILTY DOLOMITE-CLAY SEAMS (.25-.5"), ONE AT BOTTOM OF SECTION AND OTHER
MIDWAY THROUGH SECTION, SOME CARBONIZED PLANT REMAINS SCATTERED THROUGHOUT.
- 125.3- 131.5 LIMESTONE; TAN TO LIGHT GRAY; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
SOFT-HARD, MASSIVE-DENSE-POROUS, FORAMINIFERAL DOLOMITIC BIOMICRITE WITH THE UPPER SECTION
DENSER AND HAVING MANY BLUE AND WHITE SPECKS, THE WHITE SPECKS REPRESENTING FORAM MOLDS
FILLED WITH FORAM REMAINS, AND THE BLUE SPECKS BEING ORGANIC CLAY, THE MIDDLE SECTION
BEING TAN-BROWN WITH MANY EMPTY FORAM MOLDS, SLIGHT DOLOMITIZATION IN BOTTOM OF SECTION.
- 131.5- 132.5 LIMESTONE; TAN TO LIGHT GRAY; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE;
POOR INDURATION;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-DENSE-SLIGHTLY PASTY, POSSIBLE DOLOMITE-CLAY W/
TRACES OF FORAMS, LAMINATED BY CARBONIZED PLANT REMAINS, LOW-MODERATE POROSITY.
- 132.5- 134.8 LIMESTONE; TAN TO BROWNISH GRAY; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;

W/ ABUNDANT MOLLUSK AND POSSIBLE PENEROPLID? CASTS AND MOLDS, SOME WELL DOLOMITIZED
SECTIONS THROUGHOUT, UPPER SECTION HAVING SOME DOLOMITE-CLAY? AS DESCRIBED ABOVE,
LAMINATED BY CARBONIZED PLANT REMAINS NEAR BOTTOM OF SECTION, MOLDIC POROSITY, LOW-MOD.
POROSITY.
- 134.8- 139.5 LIMESTONE; LIGHT TAN TO LIGHT GRAY; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
BIOMICRITE, SOFT-HARD, MASSIVE-DENSE-SLIGHTLY PASTY- CLAYEY IN PARTS, A DENSE, MOLDIC
DOLOMITIC BIOMICRITE IN UPPER SECTION GRADING TO A MORE POROUS-MOLDIC DOLOMITIC IN MIDDLE
SECTION, THE LOWER SECTION GRADING INTO A CLAYEY CARBONATE FACIES, THAT IS SIMILAR TO THE
UNDERLYING ROCK UNIT, MOLLUSK MOLDS AND WORM BORINGS VERY COMMON, THE WORM BORINGS BEING
MORE PREVALANT IN THE MIDDLE SECTION.
- 139.5- 146.4 LIMESTONE; WHITE TO CREAM;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
SPARSE BIOMICRITE, VERY PURE, DENSE CARBONATE RESEMBLING CLAY WHEN WET, HOWEVER, CEMENTS
SOLIDLY WHEN DRY, FEW FORAM MOLDS, OTHERWISE BARREN OF FOSSILS, FEW CARBONIZED PLANT
REMAINS SCATTERED THROUGHOUT, MOD-HIGH POROSITY.

- 146.4- 149.8 LIMESTONE; CREAM TO LIGHT TAN; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
SOFT-HARD, MASSIVE-SLIGHTLY PASTY-CLAYEY IN PARTS, CLAYEY CARBONATE W/ OXIDATION LAMINATIONS GRADING TO A MOLDIC, DOLOMITIC BIOMICRITE WITH NUMEROUS WHITE SPECKS (CALCITE FILLED FORAMS MOLDS) THAT IS WELL OXIDIZED, ABUNDANT WORM BORINGS THROUGHOUT MIDDLE AND BOTTOM OF SECTION, WITH BOTTOM SHOWING SLIGHT OXIDATION. MOLDIC POROSITY, LOW-MOD. POROSITY.
- 149.8- 154.6 LIMESTONE; CREAM TO LIGHT TAN; MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
BIOMICRITE, SOFT-HARD, MASSIVE-PASTY-SLIGHTLY OXIDIZED THROUGHOUT SECTION, A DENSE DOLOMITIC BIOMICRITE IN UPPER SECTION, GRADING TO A PASTY LITHOGRAPHIC BIOMICRITE AND THEN BACK TO THE DENSE BIOMICRITE AGAIN, UPPER AND MIDDLE SECTION BEING RELATIVELY BARREN OF FOSSILS, TRACES OF FORAM CASTS, LOWER SECTION SHOWING DOLOMITIZED PERONELLA DALLI? TESTS AND SOME CORAL CASTS, SOME COSKINOLINA?, MOLLUSK CASTS COMMON.
- 154.6- 170 LIMESTONE; TAN TO LIGHT BROWN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
OTHER FEATURES: DOLOMITIC;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL MOLDS;
SOFT BUT TOUGH, TUFACEOUS- MASSIVE, ABUNDANT FORAMS, SUCH AS DICTYOCONUS COOKEI, COSKINOLINA AND LITUONELLA?, SOME MICROFAUNA DOLOMITIZED, OTHERS CALCITE-FILLED, SOME DOLOMITIZED PERONELLA TESTS AND CASTS, TRACES OF MOLLUSK CASTS AND MOLDS, LAMINATED BY VERY THIN STREAKS OF CARBONIZED PLANT REMAINS AT TOP AND BOTTOM OF SECTION.
- 170 - 174.5 LIMESTONE; LIGHT TAN TO TAN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, WORM TRACES, BENTHIC FORAMINIFERA;
BIOMICRITE, SOFT-HARD, TUFACEOUS-MASSIVE-VERY CLAYEY, BIOMICRITE WITH TRACES OF FORAMS, SOME MOLLUSK CASTS AND WITH THE CASTS AND WORM BORINGS FILLED WITH HIGH CONCENTRATIONS OF MICROFAUNA, VERY CLAYEY THROUGHOUT W/ SOME SECTIONS ALMOST FRAGMENTAL DUE TO WASHING OUT OF FOSSIL-FILLED BORINGS WHILE SECTION WAS BEING CORED, MOLDIC POROSITY, MODERATE-HIGH POROSITY.
- 174.5- 182 LIMESTONE; LIGHT TAN TO TAN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
OTHER FEATURES: DOLOMITIC;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL MOLDS, MOLLUSKS;
BIOMICRITE, SOFT-HARD, TUFACEOUS-MASSIVE-CLAYEY, ABUNDANT FORAM CASTS AND MOLDS, MANY UNIDENTIFIABLE , SOME MOLLUSK CASTS FILLED BY MICROFAUNA CASTS AND MOLDS, MOD-HIGH POROSITY.

- 182 - 184.8 LIMESTONE; LIGHT TAN TO TAN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
BIOMICRITE, TUFACEOUS-MASSIVE, ABUNDANT FORAM CASTS AND MOLDS THAT ARE UNIDENTIFIABLE,
SOME MOLLUSK CASTS NEAR BOTTOM OF SECTION, SOME CASTS SLIGHTLY DOLOMITIZED, MOLDIC
POROSITY, MOD.-HIGH POROSITY.
- 184.8- 186.1 LIMESTONE; TAN TO LIGHT BROWN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
MODERATE INDURATION;
OTHER FEATURES: DOLOMITIC;
FOSSILS: MOLLUSKS, FOSSIL MOLDS;
SPARSE BIOMICRITE, SOFT-HARD, MASSIVE-TUFACEOUS, DOLOMITIZED WITH POORLY PRESERVED
FOSSILS, ALMOST BARREN OF IDENTIFIABLE FOSSILS, ABUNDANT MOLLUSK MOLDS THAT ARE SLIGHTLY
DOLOMITIZED. MOD.-HIGH POROSITY.
- 186.1- 191 LIMESTONE; LIGHT TAN TO TAN; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
TUFACEOUS-MASSIVE, DOLOMITIZED BIOMICRITE WITH ABUNDANT FORAM CASTS AND MOLDS THAT ARE
DOLOMITIZED AND MOSTLY UNIDENTIFIABLE, SOME CERITHIUM? CASTS, A 2 INCH SEAM OF THE
OVERLYING ROCK UNIT AT 189.5- 189.7' AND ALSO AT BOTTOM OF THIS SECTION, MOD-HIGH
POROSITY.
- 191 - 196 LIMESTONE; TAN TO LIGHT GRAY; LOW PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
TUFACEOUS-MASSIVE-DENSE, FORAMINIFERAL MOLDIC DOLOMITIC BIOMICRITE WITH LAYERS OF DENSE,
MOLDIC, LIGHT GRAY, HIGHLY DOLOMITIZED BIOMICRITE RUNNING THROUGHOUT SECTION, GIVING THIS
UNIT A SEMI-LAMINATED APPEARANCE, BOTTOM OF SECTION BEING ALMOST ALL A LIGHT GRAY, DENSE,
SEMICRYSTALLINE DOLOMITE THAT IS VERY HARD, LOW-MODERATE POROSITY.
- 196 - 198.2 LIMESTONE; CREAM TO BROWN; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
MODERATE INDURATION;
OTHER FEATURES: DOLOMITIC;
SPARSE BIOMICRITE, SOFT-HARD, DENSE-BRITTLE IN PARTS, SLIGHTLY DOLOMITIC BIOMICRITE
COMPOSED OF SUCCESSIVE LAYERS OF MICRO-CRYSTALLINE DOLOMITE INTERBEDDED WITH ORGANIC,
POSSIBLY DOLOMITIC CLAYS, HIGH POROSITY.
- 198.2- 201.5 LIMESTONE; LIGHT TAN TO TAN; VUGULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
OTHER FEATURES: DOLOMITIC;
FOSSILS: ECHINOID, MOLLUSKS, FOSSIL FRAGMENTS;
BIOMICRITE, TUFACEOUS, DOLOMITIZED IN PARTS WITH SOME ECHINOID TESTS, SOME MOLLUSK SHELL
FRAGMENTS (CHALKY WHITE) THROUGHOUT SECTION, SLIGHTLY VUGGY AT BOTTOM OF UNIT, MOD.-HIGH
POROSITY.

201.5- 204.7 LIMESTONE; TAN TO LIGHT BROWN;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL;
OTHER FEATURES: DOLOMITIC;
FOSSILS: BRYOZOA, MOLLUSKS, FOSSIL MOLDS, ECHINOID;
BIOMICRITE, DOLOMITIC WITH ABUNDANT ECHINOID MOLDS- CALCITIZED IN UPPER .5' WITH THE
REMAINING MOLDS HEAVILY DOLOMITIZED, FINGERS AND FRAGMENTS OF UNDERLYING ROCK UNIT FOUND
IN BOTTOM OF THIS SECTION, MODERATE-HIGH POROSITY.

204.7 TOTAL DEPTH