October 1981 G. H. New

TR 7-1 "Bowlees Creek," Bradenton
Executive Summary

I. General Description

This site is located within the confines of a Manatee County utility yard on the north side of Bay Drive approximately 1/3 mile west of U.S. Highway 41 in Bradenton. It is approximately 200 yards from the Gulf of Mexico. The site is located in the SW 1/4 of the SE 1/4 of the SE 1/4 of Section 22, Township 35 South, Range 17 East and at latitude 27°, 25', 10"; longitude 82°, 34', 57".

The marine environment and processes which are responsible for much of the geology at this site are still prevalent today in this area. This site lies less than 10' above mean sea level on the landward side of a shallow backwater bay protected by a well developed off-shore barrier island.

An examination of the cores from this site reveal the cyclic changes from shallow to deeper water marine environments at this location.

II. Site Easement

This easement was granted by Manatee County in July 1981. The perpetual easement is 30' x 20' and is contained within the temporary construction easement of 100' x 100'.

III. Geology *

This site is located on the Pamlico terrace at an elevation of approximately 8' above mean sea level.

The following Lithologic description was obtained from an examination of 1 7/8" diameter wireline cores taken continuously from 30' - 634' below l.s.d. The interval from land surface to 30' was described from the drillers log.

0' - 15'	undifferentiated surficial deposits - quartz sand, shell, clay, generally moderate permeability.
15' - 74'	TAMIAMI FM. (Miocene) - interbedded clay, chert, limestone and dolomite, generally low - moderate permeability.
74' - 299'	HAWTHORN FM. (Miocene) - interbedded clay, siltstone, sandstone, limestone and dolomite, generally low of permeability and predominated by clay to 250', 250' - 299' contains some zones of high permeability and is predominated by limestone and dolomite.

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299' - 464' TAMPA FM. (Miocene) - predominently limestone and clay, with some dolomite and siltstone, 299' - 420' contains alternating layers of high and low permeability, 420' - 464' is generally of high permeability.

464' - 634' SUWANEE FM. (Oligocene) - predominently limestone with some thin clay lenses and dolomite, generally of moderate permeability.

* A detailed lithologic description is available in the TR 7-1 file (core description).

IV. Hydrology *

The hydrology at this location consists of a water table and a multi-zoned artesian system which has been well documented by others Sutcliffe, Peek, etc. In general water quality decreases and potentiometric head increases with increasing depth.

No data was collected on the water table at this site however, since the first clay layer occurs between 20' and 25' it can be assumed that the water table is limited to the upper 20' of stratum.

The first artesian zone is fairly continuous between the depths of 45' and 140' below land surface. This zone has a potentiometric head of approximately 4' above land surface and the water quality does not meet standards for public consumption. Conductivity ranges from 1400-1500 umho's, chlorides 150-175 mg/l, and sulfates 400-500 mg/l.

Between the first and second artesian zones a good confiner exists which is composed primarily of dolomite, siltstone, and clay typically of low permeability.

The second artesian zone exists between 240' and 380' below l.s.d. This zone is less continuous than the first artesian zone and in fact may be two separate artesian zones. This aquifer consists of several thin permeable beds 10' - 20' thick, each separated by less permeable confining beds 10' - 30' thick. This aquifer contains the only potable water encountered while coring at this site (cored to a depth of 634'). The upper portion of this zone has a potentiometric head ranging from 3' - 4 1/2' above l.s.d. The water quality ranges from: conductivity 1000 - 1450 umho's, chlorides 75-140 mg/l, and sulfate 200 - 380 mg/l. The lower portion of this aquifer has a potentiometric head between 6' - 8' above l.s.d. The water quality recorded was as follows: conductivity 1100 - 1900 umho's, chlorides 50 - 290 mg/l, and sulfates 350 - 4750 mg/l.

The third major artesian zone was encountered at a depth of 420' and is relatively continuous beyond 634'. This zone was found to have a potentiometric head of between 10' - 11' above l.s.d. Water quality ranges from: conductivity 1900 - 2200 umho's, chlorides 300 - 400 mg/l, and sulfates 500 - 550 mg/l.

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*All of the data presented in this section was gathered during drilling of the exploratory core hole between May and July 1981. The potentiometric head and water quality of any zone are subject to seasonal and cummulative long term fluctuations. For example when constructing the monitor well during October 1981 the potentiometric head at a depth of 340' was found to be over 9' above l.s.d. (instead of 8').

V. Water Quality and Level Data

Water level and water quality measurements were made continuously at 10' and 20' intervals while the exploratory core hole was being drilled. In all forty two (42) water level measurements were recorded and forty seven (47), water samples were field checked for conductivity and temperature. Thirty two (32) water samples were analyzed in the SWFWMD lab for chloride and sulfate concentrations.

VI. Well Construction

A. Coring - This site was cored by the District owned CME-75 and crew between May and July 1981. One and seven eights (1 7/8") inch diameter wireline cores were taken from 30' to a total depth of 634'.

B. Monitor Construction - A single coastal transect monitor well was constructed by the District owned Portadrill and crew between September 1981 and October 1981. The completed well has a total depth of 340' and is cased to a depth of 320' with 6.2" inside diameter abs plastic casing. It therefore monitors a zone of ground water between 320' and 340' below l.s.d. (approximately 312' - 332' below m.s.l.).

This well was constructed by first drilling a 17 1/2 nominal borehole to a depth of 50' inside of which 50' of 12" diameter steel surface casing was grouted into place. From 50' - 320' a 12 1/4" nominal borehole was drilled and 320' of 6.2" inside diameter abs well casing was grouted inside of this portion of the borehole. From the bottom of the abs casing (320') to a total depth of 340' a 5 5/8" nominal borehole was drilled for the open hole (or monitored) interval of this well. After the well had been drilled to its total depth it was blown with compressed air for approximately 30 minutes to develop the well bore and remove any cuttings or drilling mud from the well. At this time the hydrostatic head in the well was measured and found to be over 9' above l.s.d. The abs well casing was then extended upwards to approximately 11' above l.s.d. to capture the wells flow. A section of 12" diameter steel well casing was welded to the steel surface casing and placed about the abs casing to a height of approximately 10' to protect the abs casing from impacts or damage.

#2 (3/5)

VII. Type of Monitor

This well is designed to monitor movement of the fresh/saltwater interface along the coast and is one of many such wells referred to as coastal transects. In particular this well is designed to monitor a descrete zone (320' - 340') which was found to contain potable water during coring. This small zone of good water is separated by approximately 30' of confining strata from poor quality water below it. If further saltwater intrusion were to occur from the coast it is believed that this well would reflect this change either by a change in water quality or potentiometric head.

VIII. Geophysical Logs

The following geophysical logs were run on the exploratory core hole at this site: electric (single point resistivity and spontaneous potential), fluid resistivity, temperature (gradient type), gamma (natural gamma emission), caliper, and a vertical flow meter. These geophysical logs were used to provide substantiating evidence for: lithologic descriptions, formational boundaries, and identifying artesian zones.

IX. U.S.G.S. Notification

The Technical Support section of the District was notified that this well is complete and ready for monitoring during November 1981.

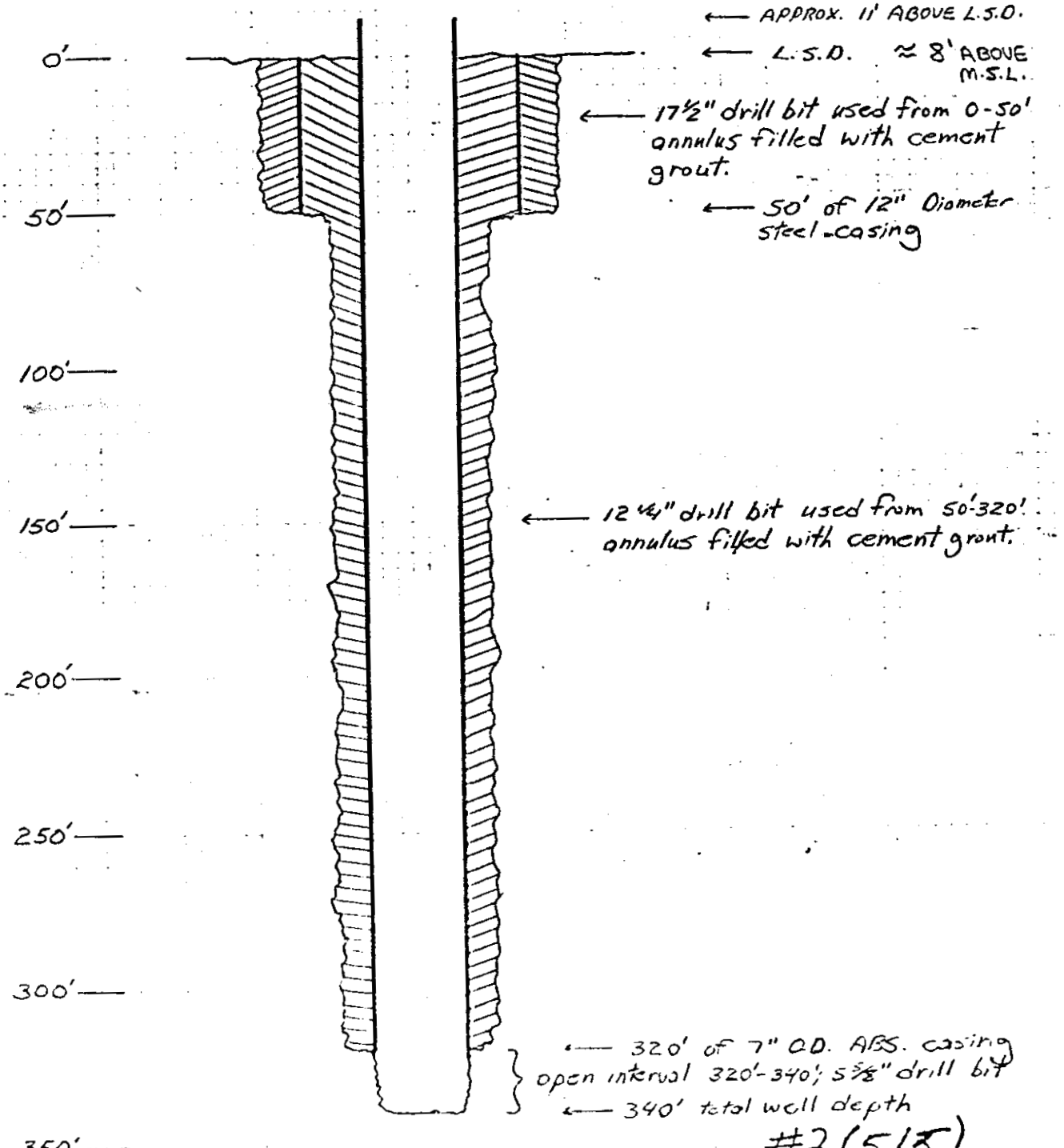
GHN:wp2

#2(4/5)

G. H. New
10/81

TR 7-1 "BRADENTON"
S22, T35, R17

AS BUILT DIAGRAM



#2 (515)

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W- 15166
TOTAL DEPTH: 00634 FT.
SAMPLES - NONE

COUNTY - MANATEE
LOCATION: T.35S R.17E S.22
LAT = N 27D 25M 00
LON = W 82D 34M 57

COMPLETION DATE - 10/19/81
ELEVATION - 008 FT
OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER: SWFWMD; TR-7-1; BOWLES CREEK ON BRADENTON QUADRANGLE

WORKED BY: SAME WELL ALSO DESCRIBED BY T.SCOTT (FLORIDA GEOLOGIC SURVEY); HIS DESCRIPTION WENT TO 451 FEET, THIS PRESENT DESCRIPTION IS BY G.H.NEW

0. -	30.	NO SAMPLES
30. -	74.	TAMIAMI FM.
74. -	464.	HAWTHORN GROUP
74. -	139.	PEACE RIVER FM.
139. -	464.	ARCADIA FM.
299. -	464.	TAMPA MEMBER OF ARCADIA FM.
464. -	.	SUWANNEE LIMESTONE

0 - 30 NO SAMPLES

30 - 34 LIMESTONE; MODERATE GRAY TO WHITE;
OTHER FEATURES: WEATHERED;
FOSSILS: MOLLUSKS;
VERY LOW RECOVERY ZONE, ONE VERNICARDIA PELECYPOD, APPROXIMATELY 6 INCH THICK CLAY SEAM, DOES NOT CONTAIN SAND OR PHOSPHATE

34 - 34.5 CHERT; REDDISH BROWN TO WHITE;
OTHER FEATURES: WEATHERED;

34.5- 36 LIMESTONE; LIGHT GRAY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MOTTLED,
OTHER FEATURES: WEATHERED, DOLOMITIC;
FOSSILS: FOSSIL MOLDS;

36 - 37 CLAY; DARK GREENISH GRAY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
WAXY CLAY WITH GOOD FISSILITY

37 - 39 CLAY; WHITE TO LIGHT GRAY; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
OTHER FEATURES: DOLOMITIC, WEATHERED;
MODERATELY HARD CALCAREOUS-DOLOMITIC CLAY, WEATHERED AT BOTTOM OF SECTION

39 - 44 AS ABOVE
THE INTERVAL OF 39-44 HAS VERY LOW RECOVERY, THE ONLY SECTION RECOVERED WAS 2 INCH THICK GRAY-WHITE CHERT LENSE AND SOME MOLDS

44 - 46 CLAY; LIGHT BLUISH GRAY; LOW PERMEABILITY; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
OTHER FEATURES: PLASTIC;

46 - 47 CHERT; BLUE TO BLACK; GOOD INDURATION;
SOME WEATHERED DOLOMITIC LIMESTONE INFILLING CAVITIES

47 - 49 SILT; LIGHT GRAY; GOOD INDURATION;
SEDIMENTARY STRUCTURES: MOTTLED,
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;
DOLOMITIC SILTSTONE, HARD IN PART, VERY CRUMBLY IN PART, MOTTLED APPEARANCE DUE TO FOSSIL MOLDS

49 - 53 SILT; LIGHT GRAY; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX, CLAY MATRIX;

53 - 54 DOLOSTONE; DARK GRAY; MOLDIC, INTERGRANULAR;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MOTTLED,
ACCESSORY MINERALS: PHOSPHATIC GRAVEL-%;

54 - 59 NO SAMPLES
VERY LOW RECOVERY ZONE, FOSSILIFEROUS LIMESTONE PRESENT, WITH MOLLUSK & ECHINOID FOSSILS, MINOR PHOSPHATIC PEBBLES PRESENT LIMESTONE IS SOFT, FRIABLE AND VERY SILTY THIS INTERVAL PICKED AS AN UNCONFORMITY SURFACE

59 - 67.5 SANDSTONE; LIGHT GRAY TO BROWNISH GRAY; INTERGRANULAR, LOW PERMEABILITY;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BANDED,
ACCESSORY MINERALS: SILT- %, DOLOMITE- %, CLAY-%;
CALCAREOUS SILTSTONE TO SANDSTONE, POSSIBLE FOSSIL MOLDS AND FRAGMENTS

67.5- 69 AS ABOVE
GREENISH-GRAY SILTY PHOSPHATIC CLAY SEAM AT 67.5-68

69 - 73.5 CALCILUTITE; LIGHT GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: SILT- %, PHOSPHATIC SAND- %;
OTHER FEATURES: WEATHERED, DOLOMITIC;
FOSSILS: FOSSIL MOLDS;

73.5- 74 AS ABOVE
SAME CALCILUTITE AS ABOVE, BUT MORE PHOSPHATE PRESENT PICKED AS THE TOP OF THE HAWTHORN GROUP

74 - 79 CLAY; LIGHT GREENISH GRAY; LOW PERMEABILITY;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: SILT- %, QUARTZ SAND- %, PHOSPHATIC SAND- %;
OTHER FEATURES: WEATHERED;

79 - 84 CLAY; LIGHT GREENISH GRAY; LOW PERMEABILITY;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: DOLOMITE- %, CHERT-%;
POOR RECOVERY IN THIS INTERVAL

84 - 85 CLAY; GREENISH GRAY; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;

85 - 86 CLAY; LIGHT GRAY; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, SILT- %, CALCILUTITE-%;

86 - 89 CALCILUTITE; LIGHT GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC GRAVEL-05%;

89 - 96 CLAY; LIGHT GRAY; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: CROSS-BEDDED,
ACCESSORY MINERALS: SILT- %, PHOSPHATIC SAND- %, DOLOMITE- %;
OTHER FEATURES: VARVED;
LIGHT GRAY CLAY GRADES FROM HARD DENSE CLAY TO A SOFTER SEQUENCE OF INTERBEDDED CLAY AND SANDY CLAY

96 - 96.5 DOLOSTONE; MODERATE GRAY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;

96.5- 98 CLAY; LIGHT GRAY TO MODERATE GRAY;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED,
ACCESSORY MINERALS: QUARTZ SAND- %, DOLOMITE-%;

98 - 104 CALCILUTITE; LIGHT GRAY TO MODERATE LIGHT GRAY; OL% POROSITY, LOW PERMEABILITY, INTERGRANULAR;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, PHOSPHATIC GRAVEL- %;
OTHER FEATURES: WEATHERED;
FOSSILS: MOLLUSKS;
MODERATE TO LOW PERMEABILITY

104 - 106.5 LIMESTONE; LIGHT GRAY TO CREAM;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, PHOSPHATIC GRAVEL-%;
VERY FEW FOSSILS; THIN CHERT LAYER AT TOP OF SECTION

106.5- 109 SANDSTONE; WHITE TO BLACK; INTERGRANULAR, POSSIBLY HIGH PERMEABILITY;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: CROSS-BEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND-%;
"SANDSTONE-CALCARENITE"; SHOWS CONSISTENT THICKENING OF THE BEACH SAND FACIES IN ONE DIRECTION AND A DEEPER WATER CALCARENITE FACIES IN THE OPPOSITE DIRECTION

109 - 114 LIMESTONE; LIGHT GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, PHOSPHATIC GRAVEL- %, QUARTZ SAND- %;
OTHER FEATURES: CHALKY, DOLOMITIC;
MORE DOLOMITIC IN LOWER HALF OF SECTION; FOSSIL VOID INFILLING BY DOLOMITIC MICRITE

114 - 119 SILT; MODERATE LIGHT GRAY; LOW PERMEABILITY, MOLDIC;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %, QUARTZ SAND- %;
FOSSILS: FOSSIL MOLDS, ORGANICS;

119 - 120 CLAY; GREENISH GRAY; LOW PERMEABILITY; GOOD INDURATION;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;

120 - 122 CLAY; LIGHT GRAY TO DARK GREEN; LOW PERMEABILITY;
CEMENT TYPE(S): CLAY MATRIX, ORGANIC MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
BLACK LIGNITIC CLAY AT 120.5, COULD BE THE RESULT OF FOSSIL DECOMPOSITION

122 - 123 LIMESTONE; LIGHT GRAY; INTERGRANULAR, MOLDIC;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED,
ACCESSORY MINERALS: CLAY- %, PHOSPHATIC GRAVEL- %;
FOSSILS: CORAL, MOLLUSKS;

123 - 124 SILT; LIGHT GRAY TO WHITE; INTERGRANULAR, MOLDIC;

124 - 124 SILT; LIGHT GRAY TO WHITE; INTERGRANULAR, PIN POINT VUGS;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, QUARTZ SAND- %;
OTHER FEATURES: DOLOMITIC;

124 - 126.5 CLAY; LIGHT GREEN TO MODERATE GREEN; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, ORGANIC MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;
AT BOTTOM OF SECTION, THERE ARE 3 INCH THICK LENSES OF HARD DOLOMITIC CLAY AND GREEN CHERT

126.5- 128 SILT; LIGHT GRAY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: QUARTZ SAND- %, PHOSPHATIC SAND-%;

SANDY SILTSTONE INTERBEDDED WITH STRINGERS OF QUARTZ AND PHOSPHATIC SAND; UPPER PART IS HARDER AND MORE SILTY, WHILE THE LOWER PART IS SOFTER WITH A CLAYEY MATRIX

128 - 131 CLAY; LIGHT GREENISH GRAY TO MODERATE GRAY; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: QUARTZ SAND- %, PHOSPHATIC SAND- %;
FOSSILS: MOLLUSKS, CRUSTACEA;
INTERBEDDED CLAY WITH PHOSPHATIC AND QUARTZ SANDS, SOME INFILLED FOSSIL MOLDS, SLIGHT DOLOMITIZATION; CLAY SOMEWHAT WAXY

131 - 133 CLAY; MODERATE GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;
UPPER PART IS BRECCIATED (BY DRILLING??); WAXY APPEARANCE

133 - 134 AS ABOVE
SOME CROSSBEDDED LENSES OF DOLOMITIC CALCARENITE AND PHOSPHATE

134 - 138 CLAY; DARK GREEN TO MODERATE GREEN; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: QUARTZ SAND- %, CALCILUTITE-%;

138 - 139 LIMESTONE; MODERATE GRAY; INTERGRANULAR, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS;

139 - 139 LIMESTONE; MODERATE GRAY; INTERGRANULAR, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: CROSS-BEDDED,
ACCESSORY MINERALS: CLAY- %, SILT- %;
FOSSILS: MOLLUSKS;
SOME INFILLED VUGS; PICKED AS TOP OF HAWTHORN (LOWER UNIT)

139 - 144.5 CLAY; DARK GREEN TO MODERATE GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: SILT- %, PHOSPHATIC SAND- %;
FOSSILS: FOSSIL MOLDS, ECHINOID;
THIN DOLOMITE LENSES FROM 139-140; FOSSIL MOLDS INFILLED WITH PHOSPHATIC SAND, MARL AND SILT

144.5- 147 LIMESTONE; LIGHT GRAY TO MODERATE GRAY; INTERGRANULAR, MOLDIC;
GOOD INDURATION;
ACCESSORY MINERALS: PHOSPHATIC SAND-10%;
FOSSILS: MOLLUSKS, CORAL;
UNCONFORMITY PICKED AT 147'

147 - 149 DOLOSTONE; LIGHT GRAY TO DARK GRAY; INTERGRANULAR, LOW PERMEABILITY;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: WEATHERED;
FOSSILS: BRYOZOA;
MANY MOLDS AND VUGS HAVE BEEN INFILLED WITH CHERT OR PHOSPHATE BRECCIATED APPEARANCE

149 - 153 DOLOSTONE; LIGHT GRAY TO BLACK; INTERGRANULAR, MOLDIC;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: DOLOMITE- %, CLAY- %;
OTHER FEATURES: WEATHERED;
FOSSILS: ORGANICS;
NEARLY ALL VUGS AND CAVITIES FILLED WITH OFFWHITE DOLOMITIC SILT OR CLAY; LARGE-SCALE BRECCIA UP TO 3" ACROSS, MANY PELECYPOD MOLDS

153 - 154 LIMESTONE; LIGHT GRAY;
GRAIN TYPE: CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
FOSSILS: BRYOZOA;
BRECCIATED APPEARANCE FOR THE INTERVAL 149-154

154 - 155 AS ABOVE
SAME AS ABOVE BUT MORE DOLOMITIC AND FOSSILIFEROUS

155 - 158.5 LIMESTONE; MODERATE GRAY;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;
DOLOMITIZED LIMESTONE GRADES INTO SILTSTONE AT BOTTOM OF SECTION

158.5- 159 SILT; LIGHT GRAY; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;

159 - 163 SILT; LIGHT GRAY TO MODERATE GRAY; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, PHOSPHATIC GRAVEL- %, CLAY- %;
OTHER FEATURES: WEATHERED;
FOSSILS: WORM TRACES;
EVIDENCE FOR GROUNDWATER SOLUTION ACTIVITY, POSSIBLY FOLLOWING OLD WORM BURROWS MATRIX IS WELL INDURATED IN LOWER PART OF SECTION

163 - 164 SILT; LIGHT GRAY; LOW PERMEABILITY; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, CLAY- %;
FOSSILS: FOSSIL MOLDS;
SOFT FRIABLE SILTSTONE

164 - 166.5 CLAY; LIGHT GREENISH GRAY TO GREENISH GRAY; MOLDIC; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: FISSILE,
ACCESSORY MINERALS: ORGANICS- %, QUARTZ SAND- %, PHOSPHATIC SAND- %;
FOSSILS: FOSSIL MOLDS;

166.5- 168 CLAY; DARK GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: FISSILE,
ACCESSORY MINERALS: ORGANICS-%;

168 - 173.5 CLAY; DARK GREEN TO LIGHT GREEN; LOW PERMEABILITY;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: SILT- %, PHOSPHATIC SAND- %;
OTHER FEATURES: CHALKY;
FOSSILS: MOLLUSKS, FOSSIL MOLDS;
GREEN CLAYS AND SILTS INTERLAYERED, SILTY CLAY INFILLED FOSSIL MOLDS AT A LATER DATE
ALMOST ENTIRELY GREEN CLAY WITH PHOSPHATE PEBBLES AT 173.5 THE LAST 5 FEET OF CORE
168-173.5 APPEARS WEATHERED

173.5- 174 SILT; LIGHT GRAY; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: DOLOMITE- %;
OTHER FEATURES: WEATHERED;
THIS SECTION APPEARS TO BE A TRANSITIONAL OR "MIXING ZONE"

174 - 179 CLAY; MODERATE GREEN; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BANDED,
ACCESSORY MINERALS: SILT- %, PHOSPHATIC GRAVEL-%;
THE LAST SIX INCHES IS A LIGHT GREEN BANDED CLAY

179 - 184 CLAY; DARK GREEN TO MODERATE GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BANDED, STREAKED,
ACCESSORY MINERALS: PHOSPHATIC GRAVEL-%;
MUCH LESS PHOSPHATE THAN ABOVE INTERVAL, STREAKS OF CALCAREOUS MATERIAL

184 - 189 SILT; LIGHT GRAY; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: CHERT- %, PHOSPHATIC GRAVEL-%;
THIN LENSE OF BLACK CHERT AT TOP OF SECTION; THIS SECTION SIMILAR TO ABOVE SECTION BUT LIGHTER IN COLOR AND LESS PHOSPHATE

189 - 194 CLAY; GRAYISH GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: STREAKED,
ACCESSORY MINERALS: SILT- %, ORGANICS- %, PHOSPHATIC GRAVEL- %, PHOSPHATIC SAND-%;
THIS CLAY APPEARS GLAUCONITIC, CALCAREOUS STRINGERS THROUGHOUT

194 - 196 SILT; MODERATE GRAY; INTERGRANULAR; GOOD INDURATION;
SEDIMENTARY STRUCTURES: CROSS-BEDDED, INTERBEDDED,
ACCESSORY MINERALS: QUARTZ SAND- %, PHOSPHATIC SAND- %, CLAY- %;
OTHER FEATURES: VARVED;

196 - 199.5 CLAY; LIGHT GRAY TO MODERATE GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: FISSILE,
ACCESSORY MINERALS: SILT-%;
THIN BRECCIATED LAYER AT TOP OF INTERVAL THEN SILTSTONE GRADES INTO A PURE GRAY CLAY WITH LOWER SILT CONTENT LOWER IN SECTION

199.5- 202.5 CLAY; MODERATE GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: CALCILUTITE- %, PHOSPHATIC SAND- %, SILT-%;
SILTY PHOSPHATIC CLAY AT TOP OF SECTION, LOWER HALF BRECCIATED SILTY CLAY WITH BLEBS OF OFFWHITE MARLY LIMESTONE, CLAY CONTENT INCREASES DOWN SECTION UNCONFORMITY PICKED AT 202.5

202.5- 203 CHERT; BLACK TO MODERATE GRAY; LOW PERMEABILITY;
SEDIMENTARY STRUCTURES: BANDED,
FOSSILS: FOSSIL MOLDS;

203 - 205 CLAY; DARK GREEN TO LIGHT GRAYISH GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: STREAKED,
ACCESSORY MINERALS: SILT-%;
CLAY HAS GLAUCONITIC APPEARANCE

205 - 209.5 NO SAMPLES
POOR RECOVERY; WEATHERED FOSSILIFEROUS MICRITE

209.5- 214 SILT; LIGHT GRAY TO MODERATE GRAY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CALCILUTITE- %, CLAY- %, PHOSPHATIC SAND-%;
GOOD POROSITY, MODERATE PERMEABILITY, CONTAINS THIN LENSES OF GRAY WAXY CLAY NEAR TOP OF SECTION; UNCONFORMITY PICKED AT 214

214 - 214.5 CHERT; LIGHT GRAY TO MODERATE GRAY; LOW PERMEABILITY; GOOD INDURATION;
SEDIMENTARY STRUCTURES: MOTTLED,
ACCESSORY MINERALS: DOLOMITE- %;
OTHER FEATURES: WEATHERED;
FOSSILS: ORGANICS;
SILICEOUS DOLOMITE

214.5- 219 LIMESTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
ACCESSORY MINERALS: CLAY- %;
OTHER FEATURES: WEATHERED, CHALKY;
FOSSILS: FOSSIL FRAGMENTS;
CLAY CONTENT INCREASES THROUGH SECTION

219 - 229 NO SAMPLES
NO RECOVERY, SAMPLE PROBABLY CONSISTS OF LIGHT GRAY CLAY

229 - 230 SANDSTONE; MODERATE GRAY; INTERGRANULAR; POOR INDURATION;
ACCESSORY MINERALS: PHOSPHATIC GRAVEL- %, LIMESTONE- %, CLAY-%;

230 - 233.5 SILT; LIGHT GRAY; INTERGRANULAR; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT, CLAY MATRIX;
ACCESSORY MINERALS: DOLOMITE- %;
FOSSILS: WORM TRACES;

MASSIVE WELL-LITHIFIED SILTSTONE WITH SOLUTION PIPES (PROBABLY FORMER WORM BORINGS THAT ARE INFILLED WITH LIMEY GRAY CLAY AND PHOSPHATIC AND QUARTZ SAND; CLAY INCREASES AND DOLOMITE DECREASES TOWARDS BOTTOM OF SECTION

233.5- 234 CLAY; GRAYISH GREEN; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;

234 - 234.5 LIMESTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
ACCESSORY MINERALS: CLAY- %, PHOSPHATIC GRAVEL- %;
OTHER FEATURES: WEATHERED;

234.5- 238 DOLOSTONE; LIGHT GRAY; MOLDIC, LOW PERMEABILITY;
GRAIN SIZE: FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MASSIVE,
ACCESSORY MINERALS: PHOSPHATIC SAND- %, CLAY- %, DOLOMITE- %;
FOSSILS: FOSSIL MOLDS;
SEVERAL LARGE PELECYPOD MOLDS INFILLED WITH MIXTURE OF DOLOMITE AND DOLOMITIC CLAY AND PHOSPHATIC SANDS

238 - 239 CLAY; LIGHT GREENISH GRAY TO LIGHT GRAY; LOW PERMEABILITY;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %, SILT- %;
OTHER FEATURES: WEATHERED;
THE ABOVE SECTION OF DOLOMITIZED SILTSTONE GRADES INTO THIS CLAY

239 - 240 AS ABOVE
INCREASE OF PHOSPHATE GRAVEL TOWARDS BOTTOM OF SECTION

240 - 243.5 LIMESTONE; LIGHT GRAY TO MODERATE GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC GRAVEL- %, LIMESTONE- %;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;
INFILLED FOSSIL MOLDS, PHOSPHATE GRAVEL INCREASES TOWARDS BOTTOM SOME GREEN CLAY BLEBS INFILLING CAVITIES AT 243.5

243.5- 244 CALCARENITE; LIGHT GRAY TO MODERATE GRAY;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SILT- %, QUARTZ SAND- %, PHOSPHATIC SAND- %, CALCILUTITE- %;
FOSSILS: FOSSIL MOLDS;

244 - 247 SANDSTONE; LIGHT GRAY; INTERGRANULAR;
GRAIN SIZE: VERY FINE; POOR INDURATION;
ACCESSORY MINERALS: CLAY-%;

247 - 249 LIMESTONE; LIGHT TAN TO LIGHT GRAY; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CRYSTALS;
CEMENT TYPE(S): SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: QUARTZ SAND- %, PHOSPHATIC SAND- %;
OTHER FEATURES: COQUINA;
FOSSILS: MOLLUSKS;

249 - 253.5 AS ABOVE
SAME AS ABOVE COQUINA LIMESTONE, WITH THICK (2-3") SAND SEAMS AT 251 AND 252.5, ALSO THIN LENSES OF LIMESTONE, THE BOTTOM OF THIS SECTION IS WEATHERED, AND CONTAINS LARGE CALCITE CRYSTALS WITHIN THE MOLDS

253.5- 254.5 SANDSTONE; LIGHT GRAY; INTERGRANULAR; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: WEATHERED;

254.5- 257 LIMESTONE; LIGHT GRAY; MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: QUARTZ SAND- %;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;

257 - 260 SANDSTONE; LIGHT GRAY TO TAN; INTERGRANULAR;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: CROSS-BEDDED, INTERBEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
FOSSILS: ORGANICS;

260 - 264 NO SAMPLES
VERY POOR RECOVERY; GRAY CALCAREOUS SILTSTONE/CLAY PROBABLY

264 - 267.5 LIMESTONE; LIGHT TAN TO LIGHT GRAY; LOW PERMEABILITY;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY- %, PHOSPHATIC SAND- %, QUARTZ SAND- %, SILT- %;
OTHER FEATURES: COQUINA;
FOSSILS: MOLLUSKS;
COQUINA INTERBEDDED WITH 2-4" THICK LAYERS OF CALC. SILTSTONE CLAY AND PHOSPHATE CONTENT INCREASES DOWNSECTION

267.5- 269 LIMESTONE; LIGHT ORANGE TO LIGHT TAN;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;

269 - 274 NO SAMPLES
VERY POOR RECOVERY, CALCAREOUS SILTSTONE AGAIN

274 - 279 SILT; LIGHT GRAY TO MODERATE GRAY; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: MASSIVE, MOTTLED,
ACCESSORY MINERALS: QUARTZ SAND- %;
OTHER FEATURES: WEATHERED;
CLAY-RICH SILTSTONE WITH A MOTTLED APPEARANCE

279 - 282 LIMESTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: CROSS-BEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %, QUARTZ SAND- %, CLAY- %;
OTHER FEATURES: WEATHERED;
CLAY CONTENT INCREASES DOWNSECTION

282 - 284 SAND; LIGHT GRAY TO LIGHT GREEN; LOW PERMEABILITY; POOR INDURATION;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %, CLAY- %;
OTHER FEATURES: WEATHERED;
FOSSILS: MOLLUSKS;
BRECCIATED MIXTURE OF CALCAREOUS SILT AND SAND WITH PELECYPOD AND OSTREA FOSSILS

284 - 293 CLAY; LIGHT GREENISH GRAY TO LIGHT GREEN; LOW PERMEABILITY;
CEMENT TYPE(S): CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
FOSSILS: MOLLUSKS;
THICK CLAY INTERVAL WITH OSTREA FOSSILS INTERSPERSED THROUGH SECTION, SLIGHTLY DOLOMITIC
AT 285.5, THIS INTERVAL PROBABLY REPRESENTS A FORMER OYSTER BED WITHIN A BAY ENVIRONMENT

293 - 294 CLAY; GREENISH GRAY; LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
ACCESSORY MINERALS: DOLOMITE- %, CALCILUTITE- %;
OTHER FEATURES: WEATHERED;
CALCILUTITE-RICH CLAY GRADES INTO A DOLOMITIC MICRITE AT BOTTOM WITH MINOR PHOSPHATE

294 - 294.5 DOLOSTONE; WHITE TO LIGHT GRAY; LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
FOSSILS: FOSSIL MOLDS;
"TRANSITIONAL ZONE" PICKED AT 294.5

294.5- 299 LIMESTONE; LIGHT ORANGE TO LIGHT TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
ACCESSORY MINERALS: PHOSPHATIC SAND- %, DOLOMITE- %, CLAY- %;
OTHER FEATURES: VARVED;
FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS;
FOSSILIFEROUS MICRITE INTERBEDDED WITH MANY THIN LAYERS OF SANDY CALCARENITE WITH PHOSPHATIC SAND; MANY REPLACED FOSSILS; VARVY AND MOTTLED APPEARANCE SUGGEST DEPOSITION IN A CYCLIC ENVIRONMENT; INFILLING OF CLAY INTO CAVITIES COMMON TOP OF TAMPA LIMESTONE MEMBER OF HAWTHORN GROUP PICKED AT 299

299 - 303 LIMESTONE; LIGHT TAN;
GRAIN TYPE: BIOGENIC;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
ACCESSORY MINERALS: CLAY- %;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;
MANY FOSSIL MOLDS INFILLED WITH FINE MICRITIC SAND AT 302, THERE IS A 3" THICK POCKET OF CALCAREOUS CLAY THAT APPEARS TO BE A WEATHERED FRAGMENT OF COQUINA THAT WAS REDEPOSITED

303 - 309 LIMESTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS;
FOSSILIFEROUS MICRITE WITH NUMEROUS FOSSIL MOLDS PRESENT

309 - 311 AS ABOVE
SAME AS ABOVE BUT BETTER INDURATION AT 311' INTERVAL

311 - 313 CALCILUTITE; LIGHT TAN TO TAN; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: FOSSILIFEROUS;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA;
THIN CLAYEY LENSE AT 312

313 - 319 AS ABOVE
AT 313-314, LIGHT GRAY MICRITE AS ABOVE BUT VERY WEATHERED PARTIALLY DOLOMITIC IN THIS INTERVAL; VERY POOR RECOVERY FROM 314-319 INTERVAL; MATERIAL APPEARS SIMILAR TO 313-314 INTERVAL, BUT MORE DOLOMITIC; GASTROPODS ALSO RECOGNIZED, SOME CALCITE REPLACEMENT AND ORGANICS

319 - 323 CALCILUTITE; LIGHT TAN; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: FOSSILIFEROUS;
FOSSILS: BENTHIC FORAMINIFERA;

323 - 326 CALCILUTITE; LIGHT TAN TO WHITE;
GRAIN TYPE: CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: WEATHERED;

326 - 329.5 CALCILUTITE; LIGHT TAN TO TAN;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: DOLOMITIC;
FOSSILS: FOSSIL MOLDS, MOLLUSKS;
PARTIALLY DOLOMITIZED IN ZONES, VERY WEATHERED APPEARANCE SECONDARY POROSITY DESTROYED BY WEATHERING

329.5- 332.5 LIMESTONE; LIGHT GRAY TO TAN; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;

GOOD SECONDARY POROSITY IN SOME ZONES, CALCITE REPLACEMENT ALSO

332.5- 335.5 LIMESTONE; LIGHT TAN TO LIGHT GRAY; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
OTHER FEATURES: CHALKY, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL MOLDS;
FROM 332.5 - 334, CYCLIC BANDING OF MICRITIC AND SILTY GRAINS SOME EVIDENCE OF POST-DEPOSITIONAL INFILLING BY MICRITE AFTER WEATHERING AND PARTIAL DOLOMITIZATION

335.5- 339 LIMESTONE; LIGHT GRAY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: CHALKY, WEATHERED;
NOT AS FOSSILIFEROUS AS ABOVE INTERVAL

339 - 344.5 LIMESTONE; LIGHT TAN TO MODERATE GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
OTHER FEATURES: DOLOMITIC, CHALKY;
VERY POOR RECOVERY IN THIS INTERVAL; GRAY DOLOMITIZED CLAY BRECCIA

344.5- 345.5 LIMESTONE; DARK GRAY TO BROWN; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: FOSSILIFEROUS, WEATHERED;

345.5- 348 DOLOSTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;
MANY INFILLED FOSSIL MOLDS

348 - 351 LIMESTONE; TAN TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
ACCESSORY MINERALS: PYRITE- %;
OTHER FEATURES: WEATHERED, CHALKY;
FOSSILS: FOSSIL MOLDS, ORGANICS;
SOME LARGE CALCITIZED GASTROPODS (TURRETELLA)

351 - 352.5 DOLOSTONE; LIGHT GRAY;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: LIMESTONE-%;
THIS SECTION HAS A LATTICE-LIKE STRUCTURE CONSISTING OF TAN LIMESTONE INFILLED WITH GRAY DOLOMITE

352.5- 359 CALCILUTITE; TAN TO MODERATE GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: DOLOMITIC, WEATHERED, CHALKY;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, FOSSIL MOLDS;
LARGE PELECYPOD AND GASTROPOD FOSSILS REPLACED BY CALCITE; ZONE OF SECONDARY POROSITY AT 356; SOME ZONES ARE MORE POROUS AND SOME ZONES ARE MORE CHALKY

359 - 364 AS ABOVE
VERY POOR RECOVERY IN THIS INTERVAL, BUT APPEARS SIMILAR (EXCEPT BETTER INDURATED) TO ABOVE INTERVAL

364 - 365 CALCILUTITE; TAN TO WHITE;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: CHALKY, WEATHERED, FOSSILIFEROUS;

365 - 369 LIMESTONE; LIGHT TAN TO CREAM;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: WEATHERED, CHALKY, FOSSILIFEROUS;
FOSSILS: MOLLUSKS, FOSSIL MOLDS;
ZONE OF HIGH PERMEABILITY AT 365-367.5 FORMED BY A HIGH DEGREE OF SECONDARY POROSITY DEVELOPMENT

369 - 374 CALCILUTITE; LIGHT TAN TO CREAM; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
OTHER FEATURES: CHALKY, DOLOMITIC;
FOSSILS: FOSSIL MOLDS;

374 - 379 CALCILUTITE; LIGHT TAN TO CREAM; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: DOLOMITIC, WEATHERED, CHALKY;
FOSSILS: FOSSIL MOLDS;
GOOD SECONDARY POROSITY IN TOP 6" OF SECTION BOTTOM 2 FEET OF SECTION IS MOTTLED MICRITE WITH INFILLING OF FOSSIL MOLDS

379 - 389 CALCILUTITE; LIGHT TAN TO CREAM; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: DOLOMITIC, FOSSILIFEROUS;
NUMEROUS VERTICAL SOLUTION FRACTURES (MAY BE WORM BORINGS) WHICH ARE INFILLED WITH A GREY-GREEN WAXY CLAY

389 - 399 CALCILUTITE; TAN TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED, DOLOMITIC, FOSSILIFEROUS;
FOSSILS: FOSSIL MOLDS;
UNCONFORMITY PICKED AT 399

399 - 400.5 CALCILUTITE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
ACCESSORY MINERALS: PHOSPHATIC GRAVEL- %;
OTHER FEATURES: WEATHERED, CHALKY, DOLOMITIC;

400.5- 409 CALCILUTITE; MODERATE GRAY TO LIGHT TAN;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
MODERATE INDURATION;
OTHER FEATURES: DOLOMITIC;
FOSSILS: FOSSIL MOLDS;

409 - 414 CALCILUTITE; WHITE TO LIGHT GRAY; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
OTHER FEATURES: WEATHERED, CHALKY, DOLOMITIC;
FOSSILS: FOSSIL MOLDS;

414 - 418 CALCILUTITE; WHITE TO LIGHT GRAY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR- %;
OTHER FEATURES: WEATHERED, CHALKY;
FOSSILS: FOSSIL MOLDS;
SEVERAL FOSSIL MOLDS INFILLED WITH SPARRY CALCITE THIS INTERVAL PICKED AS UNCONFORMABLE TRANSITION ZONE

418 - 424 CALCILUTITE; LIGHT GRAY TO LIGHT TAN; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED,
ACCESSORY MINERALS: CLAY- %;
OTHER FEATURES: DOLOMITIC, CHALKY, WEATHERED;
FOSSILS: ORGANICS;
DOLOMITIZED MICRITE BRECCIATED WITH SMALL BLEBS OF BLUE-GREEN CLAY; BRECCIATION INCREASE DOWNSECTION

424 - 430.5 DOLOSTONE; LIGHT TAN TO BROWN; LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
ACCESSORY MINERALS: CHERT- %, CLAY-%;
BLUE GRAY CHERT LENSES AT 425,426 AND 428.5; LOWER 12" OF SECTION IS CHALKY AND LESS DOLOMITIC, AT 427' IS A 3" LENSE OF HARD, WAXY BLUE GREEN CLAY

430.5- 431.5 AS ABOVE

431.5- 439 LIMESTONE; MODERATE GRAY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: SPAR- %, DOLOMITE- %;
FOSSILS: FOSSIL MOLDS;
THE INTERVAL 431.5-434 IS INTERBEDDED DOLOMITIZED LIMESTONE AND GRAY WAXY CLAY, FROM 434-439, FOSSILIFEROUS MICRITE WITH CLAY LENSE AT 435

439 - 443.5 AS ABOVE
BUT MORE DOLOMITIZATION AND LESS CALCITE SPAR, MINOR PHOSPHATE IN THIS INTERVAL

443.5- 444.5 CLAY; MODERATE GRAY; LOW PERMEABILITY;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;

444.5- 454 DOLOSTONE; WHITE TO MODERATE GRAY;
MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: CLAY- %;
FOSSILS: FOSSIL MOLDS;
SMALL QUARTZ CRYSTALS FILLING MANY FOSSIL MOLDS IN 444.5-449 INTERVAL, FROM 449-451 NUMEROUS VERTICAL SOLUTION PIPES (WORM BORINGS) WHICH WERE ONCED FILLED WITH CLAY THAT HAS BEEN REMOVED MINOR BLUE-GREEN CLAY BLEBS IN 451-454 INTERVAL

454 - 462 AS ABOVE
MUCH MORE POROUS IN THIS INTERVAL, THIS SECTION HAS UNDERGONE A HIGH DEGREE OF DOLOMITIZATION AND HAS MUCH MORE QUARTZ REPLACEMENT

462 - 464 AS ABOVE
LESS EVIDENCE FOR DOLOMITIZATION, FOSSILS NOW REPLACED WITH CALCITE AND THERE IS NO QUARTZ PRESENT

464 - 469 LIMESTONE; LIGHT YELLOW; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: MOLLUSKS, CORAL;
ACRAPA CERIVICORNIUS? PRESENT

469 - 476 LIMESTONE; CREAM; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;
INTERVAL FROM 469-474 HAS EVIDENCE FOR CONSIDERABLE GROUNDWATER MOVEMENT, INTERVAL FROM 474-476 IS MORE COMPACTED, WITH LOWER PERMEABILITY

476 - 482 LIMESTONE; CREAM;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CLAY- %;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS;
VARIABLE POROSITY IN THIS INTERVAL OF MICRITIC LIMERSTONE, FOSSIL MOLDS COMMON, EVIDENCE FOR GROUNDWATER MOVEMENT, THIN LENSES OF GRAY CALCAREOUS CLAY AT 478

482 - 488 LIMESTONE; CREAM; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, FOSSIL FRAGMENTS;

HIGHER PERMEABILITY AT 486-488

488 - 494 LIMESTONE; CREAM TO TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, MOLLUSKS, CORAL;

494 - 499 LIMESTONE; CREAM TO TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED, COQUINA;
FOSSILS: CRUSTACEA, BRYOZOA, MOLLUSKS, BENTHIC FORAMINIFERA;

499 - 504 CALCARENITE; CREAM TO TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR- %, PHOSPHATIC SAND- %;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, BRYOZOA, CORAL, MOLLUSKS;
INCREASING DEGREE OF LITHIFICATION TOWARDS BOTTOM OF SECTION

504 - 507 CALCARENITE; TAN TO CREAM;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, WORM TRACES, FOSSIL FRAGMENTS;

507 - 515 LIMESTONE; WHITE TO LIGHT TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: DOLOMITE- %;
OTHER FEATURES: WEATHERED;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL FRAGMENTS;
DOLOMITIC ZONE AT 509-512.5

515 - 519 LIMESTONE; CREAM TO WHITE;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: SPAR- %;
FOSSILS: BENTHIC FORAMINIFERA;

519 - 522.5 AS ABOVE

522.5- 532.5 CALCARENITE; TAN TO LIGHT TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY- %, DOLOMITE- %;
FOSSILS: MOLLUSKS;
LOWER PART OF SECTION HAS INTERBEDDED LENSES OF MICRITIC CLAY AND SILT, LOWER PART OF SECTION IS MORE CEMENTED TRANSITION ZONE PICKED AT 532.5

532.5- 534.5 LIMESTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: CHERT- %;
OTHER FEATURES: WEATHERED, CHALKY;
FOSSILS: FOSSIL FRAGMENTS;

534.5- 539.5 LIMESTONE; LIGHT GRAY TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
ACCESSORY MINERALS: SPAR- %;
OTHER FEATURES: WEATHERED, CHALKY;
FOSSILS: BRYOZOA, FOSSIL MOLDS, MOLLUSKS;
ZONE OF MODERATE TO HIGH POROSITY AT 534.5-536.5

539.5- 544 DOLOSTONE; WHITE TO LIGHT GRAY; PIN POINT VUGS, LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;

544 - 553 LIMESTONE; LIGHT GRAY TO TAN; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
OTHER FEATURES: CHALKY, WEATHERED;
DOLOMITIC INTERVAL AT 550-551, THIS SECTION APPEARS TO HAVE BEEN FAULTED WITH SMALL MOVEMENT AMOUNTS. SOME SAMPLES RECOVERED HAVE SLICKENSLIDES, STRIATIONS, AND SHOW EVIDENCE OF PYRITIZATION AND CALCITE RECRYSTALLIZATION

553 - 554 CLAY; TAN TO WHITE; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
OTHER FEATURES: DOLOMITIC;

554 - 559 CALCARENITE; WHITE TO LIGHT GRAY; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: COQUINA;
FOSSILS: BENTHIC FORAMINIFERA;
UPPER AND LOWER PART OF THIS SECTION ARE WEATHERED AND LEACHED

559 - 564 DOLOSTONE; LIGHT GRAY TO WHITE; MOLDIC, PIN POINT VUGS, LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
POOR RECOVERY IN THIS DOLOMITE INTERVAL

564 - 574 CALCARENITE; LIGHT GRAY TO MODERATE GRAY; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: COQUINA, WEATHERED;

574 - 579 LIMESTONE; TAN;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: STREAKED,
ACCESSORY MINERALS: CALCILUTITE- %;
OTHER FEATURES: WEATHERED;
SMALL POCKETS AND STREAKS OF CALCAREOUS CLAY THROUGHOUT INTERVAL MICROFOSSILS WEATHERED BEYOND RECOGNITION, POROSITY VARIABLE

579 - 585 LIMESTONE; TAN; MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
OTHER FEATURES: CHALKY;
FOSSILS: FOSSIL MOLDS;
AT 583, FAULTED AND MINERALIZED MATERIAL SIMILAR TO 551-553

585 - 596 LIMESTONE; CREAM TO WHITE; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: DOLOMITIC, WEATHERED, COQUINA;
FOSSILS: ORGANICS, FOSSIL MOLDS;

596 - 604 LIMESTONE; TAN TO LIGHT TAN; POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: CROSS-BEDDED,
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, CORAL, MOLLUSKS;

604 - 606.5 CALCARENITE; LIGHT TAN; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GOOD INDURATION;
OTHER FEATURES: COQUINA;
FOSSILS: FOSSIL MOLDS;
THIN LENSES OF MICRITE SILT AND CLAY WITH MINOR ORGANIC STREAKS

606.5- 608 CLAY; LIGHT TAN; LOW PERMEABILITY; POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: DOLOMITIC;
FOSSILS: ORGANICS, PLANT REMAINS;

608 - 614 LIMESTONE; TAN TO LIGHT TAN; LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
OTHER FEATURES: WEATHERED, CHALKY, DOLOMITIC;
FOSSILS: ECHINOID, FOSSIL FRAGMENTS;

614 - 619 AS ABOVE
SLIGHTLY LESS WEATHERING AND BETTER FOSSIL PRESERVATION

619 - 623 CALCARENITE; WHITE TO LIGHT TAN; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;

623 - 623 LIMESTONE; WHITE TO LIGHT TAN; LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
OTHER FEATURES: WEATHERED, DOLOMITIC;

623 - 624 AS ABOVE
MINOR ORGANICS PRESENT

624 - 629.5 SILT; LIGHT TAN TO WHITE; LOW PERMEABILITY; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: CROSS-BEDDED, INTERBEDDED,
OTHER FEATURES: WEATHERED, CHALKY;
FOSSILS: NO FOSSILS;
DOLOMITIZED CALCAREOUS SILTSTONE INTERBEDDED WITH THIN LENSES OF GRAY-BROWN ORGANIC CLAYS

629.5- 634 DOLOSTONE; DARK TAN TO LIGHT TAN; LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MASSIVE,
OTHER FEATURES: WEATHERED;
FOSSILS: FOSSIL MOLDS, ORGANICS;

634 TOTAL DEPTH