EXECUTIVE SUMMARY
TR3-3 "LEMON BAY"
Charlotte County
Basin 20, S8, T41S, R20E

10-1-86

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I. SITE LOCATION

The TR3-3 wellsite is located approximately 2 miles south of Englewood in Charlotte County, Florida. This wellsite can be found by proceeding south 2 miles on SR 775 from Englewood then turning east onto the Lemon Bay High School grounds. The monitor wellsite can be found southeast of the school's football field. The site encompasses a 72'x80' temporary construction easement. The wellsite is located in the SE 1/4 of the SE 1/4 of the NW 1/4 of Section 8, Township 41 South, Range 20 East; at latitude 26°55'31" North, longitude 82°19'48" West.

II. TYPE AND PURPOSE OF MONITORS

Four monitor wells were constructed on the TR3-3 wellsite: a Deep Dual Zoned RO Injection Monitor, Upper Floridan Monitor, Dual Zone Intermediate Monitor and a Water Table Monitor.

The primary objectives of constructing these four monitor wells are: to monitor the Englewood Water District's brine disposal injection well, to define the physical characteristics of the hydrologic system at the TR3-3 wellsite by water level monitoring and aquifer testing.

The TR3-3 wellsite is located about 2.1 miles southeast of the Englewood Water District's disposal site for reject water (brine) from their reverse osmosis plant. It is hoped the monitor wells will detect changes in water quality due to any leakage from confining units within the Floridan Aquifer and subsequently into the Upper and Lower Hawthorn Aquifers. The Deep Dual Zone RO Injection Monitor should provide a detection point for lateral or horizontal migration of brine injection waters. The Dual Zone Intermediate Monitor will be a detection point for upward migration of effluent from the brine disposal injection well. It is expected the Tampa Confiner which lies below this intermediate monitor will provide the most protection against effluent in excess of 10,000 mg/l T.D.S. It is also hoped the overlying production interval of supply wells will be hydraulically separated so that contamination from the brine disposal injection well will be minimal.

The Upper Floridan Monitor will be primarily used for aquifer testing to determine hydraulic characteristics of the entire ground water system at the TR 3-3 wellsite.

The Water Table Monitor, as well as the other monitor wells, will also be constructed for the purpose of monitoring the hydrostatic level differential between the Surficial, Upper and Lower Hawthorn and Floridan Aquifers.

The open and screened intervals in the completed monitor wells should provide a profile of water quality changes that occur between the aquifers from land surface to approximately 1700' below LSD. A deterioration of aquifer waters and a decrease in hydrostatic head pressure within aquifer zones at this wellsite should provide a warning for municipal, domestic, agriculture and industrial users of water supplies in the northeast coastal area of Charlotte County.

III. GEOLOGY

The TR3-3 wellsite is located on the Silver Bluff Terrace (of Pleistocene age) at an elevation of about 5.8' above MSL. The site lies in the Terraced Coastal Lowlands, a subdivision of the Gulf Coastal Lowlands topographic land feature of peninsular Florida. The land surface at the TR3-3 wellsite consists chiefly of a thin mantle of quartz sand about 15' thick. Beneath these sand deposits lie many layers of sedimentary rocks which were described to a depth of 1700' below LSD. The geology at the TR3-3 wellsite was interpreted from 924' of core samples and 800' of drill cuttings from 900' to 1700' below LSD. These samples were correlated with geophysical logs during and following drilling operations. The geological units described at the TR3-3 wellsite are: the Undifferentiated Surficial Deposits, Caloosahatchee Marl, the Tamiami, Hawthorn, Tampa and Suwannee Formations, the Ocala Group and Avon Park Formation. The interpretated stratigraphic sequence for this site is as follows:

DEPTH (Ft. below LSD)	STRATIGRAPHIC UNIT/AGE	LITHOLOGIC DESCRIPTION
LSD-15'	**Undifferentiated Surficial Deposits** (Holocene-Pleistocene)	Sand; quartz, clear-gray, unconsolidated, fine-medium grained, organics, good porosity and permeability.
15'-35'	**Caloosahatchee Marl** (Pleistocene)	Sand; quartz, clear-gray unconsolidated, fine-medium grained, some organics and phosphate, shells, good porosity and permeability.
35'-56'	**Tamiami Fm.** (Pliocene)	Sandstone; quartz, gray, fine-medium grained, moderately indurated and consolidated, calcareous cement, abundant phosphate, shell fragments, fair-good porosity and permeability.
56'-456'	**Hawthorn Fm.** (Middle Miocene)	Sandstone; quartz, buff-gray, very fine-medium grained, phosphate, moderate induration, subrounded, clayey, fair-good porosity and

		permeability— Limestone; gray-buff, moderate-good induration, microcrystalline-fine crystalline, calcilutite-calcarenite, dolomitic in part, phosphatic, clayey, poor-good porosity and permeability—Dolomite; gray-yellow gray-light brown, microcrystalline-fine crystalline, phosphatic, moderate-good induration, poor-fair porosity and permeability—Clay; gray-green-buff, calcareous-dolomitic, no visible porosity, phosphatic.
456'-686'	**Tampa Fm.** (Early Miocene)	Limstone; light gray-buff, microcrystalline-fine crystalline, moderate-good induration, calcilutite-calcarenite, sandy in part, phosphatic, often clayey and silty, generally poor porosity and permeability, many pelecypod and gastropod molds—Clay; buff-gray, gray green, no-poor porosity and permeability, calcareous.
686'-955'	**Suwannee Fm.** (Oligocene)	Limestone; buff-light gray, microcrystalline-fine crystalline, moderate induration, calcilutite-predominantly calcarenite, abundant foraminifera: Dictyoconus cookei, echinoids, millioloidal, pelecypod and gastropod molds and casts, generally fair-good porosity and permeability—Dolomite; 905'-945', yellowish brown, cryptocrystalline-very fine crystalline, dense, some fractures, poor porosity and permeability.

955'-1255'	**Ocala Group** (Late Eocene)	Limestone; cream-buff-light gray green, predominantly very fine-fine grained calcarenite, moderate-good induration, clayey and silty in part, poor-good porosity, poor-fair permeability, in part dolomitic, pelecypod and gastropod fragments and molds, foraminifera: Lepidocyclina—Dolomite; near bottom of section, gray brown-yellow brown, cryptocrystalline-very fine crystalline, dense, some fractures, poor intercrystalline porosity, fair fracture porosity and permeability.
1255'-1700' TD	**Avon Park Fm.** (Middle Eocene)	Dolomite; yellow brown-dark brown, microcrystalline-sucrosic, often highly fractured, carbonaceous and clayey zones, good induration, tight-fair intercrystalline porosity, good fracture porosity and permeability—Limestone; cream-tan, microcrystalline-fine grained, micrite-calcarenite, often chalky, highly fossiliferous, poor-good induration, fair porosity and permeability.

The unconsolidated and moderately consolidated quartz sands, sandstone, shell and phosphatic materials of Holocene, Pleistocene, Pliocene and Middle Miocene age extend to a depth of 64' LSD. These materials include the Undifferentiated Surficial Deposits, Caloosahatchee Marl, Tamiami Formation, and about 8' of the Upper Hawthorn Formation. The Undifferentiated Surficial Deposits are underlain unconformably by the Caloosahatchee Marl which in turn is underlain by the Tamiami Formation (Fig. 1).

The Hawthorn Formation of Middle Miocene age unconformably underlies the Tamiami Formation. The upper part of the formation consists principally of beds of sandy, phosphatic limestone, dolomite, and chalky to granular phosphatic marl and clay. The lower part of the Hawthorn Formation is a more dolomitic and crystalline limestone. The contact between the Hawthorn Formation and the Tampa Formation is an erosional unconformity. The Tampa Formation, encountered at 465'

below LSD, consists of white, pale orange, light gray, silicified, calcarentic, and calcilutitic limestone with intermittent clay layers and phosphatic sand. Vertical and horizontal fractures were described in the clay and calcarenite core samples between 575' and 609' below LSD. Brecciated calcarenite (with calcite granules) was also noted near the bottom of the Tampa Formation. The Suwannee Formation, Oligocene in age, lies unconformably below the Tampa Formation and was encountered at 686' below LSD. The formation is composed of a white, very light to yellowish gray, pale orange calcarenitic limestone. Intermittent layers and seams of calcarenite and often fractured dolomite were described between 905' and 946' below LSD. A layer of calcareous clay, interbedded with calcite and dolomite appears to be the uncomformable contact between the bottom of the Suwannee Formation and the top of the Crystal River Formation (Ocala Group). The top of the Ocala Group was encountered about 955' below LSD. The Ocala Group consists of three formations (Crystal River, Williston and Inglis). These formations are conformable and will not be differentiated in this report. The Ocala Group is composed of a chalky, soft, calcilutitic and fossiliferous calcarenite. Light brown, grayish brown, moderate yellowish brown dolomite and calcareous clay layers and seams were described near the base of the Ocala Group. The unconformity at the bottom of the Ocala Group and the top of the Avon Park was determined to be about 1255' below LSD. The Avon Park Formation varies between soft to hard calcarenite and light brown to dark brown crystalline dolomite. Between 1420' and 1700' below LSD the calcarenite and dolomite are often cavernous and fractured, providing an injection zone for brackish water from the reverse osmosis water treatment plant in Englewood (Fig. 1).

The Lake City Formation of Middle Eocene Age, consisting primarily of limestone, dolomite and varying amounts of evaporites, was not encountered at the TR3-3 wellsite.

IV. HYDROGEOLOGY AND WATER QUALITY

The hydrogeologic framework underlying the TR3-3 wellsite consists of the following units: Surficial Aquifer, two intermediate aquifers (Upper Hawthorn and Lower Hawthorn Aquifers) and confining beds, Floridan Aquifer and the lower confining bed or base of the Floridan Aquifer. The aquifers and confining beds consist of sedimentary and surficial deposits whose lithology and structure control the occurrence and movement of groundwater (Fig. 1).

The sequence of ground-water levels from shallowest to deepest includes the water table in the Surficial Aquifer and the potentiometric surfaces of the Upper Hawthorn, Lower Hawthorn, and Floridan Aquifers.

The Surficial Aquifer lies between land surface and 35' below LSD (29.2' below MSL). This includes all material above the Tamiami Formation, which consists of Undifferentiated Surficial Deposits and the Caloosahatchee Marl (Fig. 1). The Surficial Aquifer, composed primarily of unconsolidated quartz and phosphatic sand, appears to be unconfined. These deposits demonstrate fair to good porosity and permeability. Permeable units near the top of the Tamiami Formation are probably hydraulically connected to the Surficial Aquifer. They are comprised mainly of quartz sand, sandstone, phosphatic sand and shell fragments which are unconsolidated to poorly consolidated.

The water level in the Surficial Aquifer was 3.95' below LSD (1.85' above MSL) as recorded in the Water Table Monitor. Fluid conductivity, following well construction, was 6,050 Umhos. Chloride and sulfate values were 2000 mg/l and 187 mg/l respectively. The poor water quality is apparently due to the wellsite's close proximity to a salt/brackish water inlet and its low elevation of 5.8' above MSL.

The confining bed (Fig. 1) between the Surficial Aquifer and the Upper Hawthorn, the Tamiami-Upper Hawthorn Confining Unit, is composed of gray to green gumbo, sandy and slightly calcareous clay. Interbedded with this clay are beds of clayey sandstone and calcarenite, none of which produce significant amounts of water. The Tamiami-Upper Hawthorn Confining Unit retards vertical movement of water between the Surficial Aquifer and the Upper Hawthorn Aquifer. This confining unit is about 116.5' thick at the TR 3-3 wellsite and extends from 35' to 151.5' below LSD (29.2'-145.7' below LSD). The water level averaged about 3.2' below LSD while coring the lower 56.5' of this confining unit (95'-151.5' below LSD). Footage above 95' was mud rotary drilled and no water levels were taken. The conductivity of the water during coring of this confining unit ranged from 1530-2300 Umhos. At 109' below LSD chlorides were 347 mg/l while sulfates were 113 mg/l. At 139' below LSD the chlorides had doubled while sulfates did not significantly change.

The uppermost Intermediate Aquifer is referred to as the "Tamiami-Upper Hawthorn Aquifer" by Wolansky (1983) in the USGS Water-Resources Investigations Report 82-4089, while H. Sutcliffe, Jr. (1975) breaks the Tamiami and Upper Hawthorn into two (2) separate aquifers in the FBG Report of Investigations #78-Appraisal of the Water Resources of Charlotte County, Florida. At the TR 3-3 wellsite there does appear to be a minor, but not a clearly defined aquifer within the Tamiami Formation. Most of the Tamiami and the top of the Upper Hawthorn Formation can be considered a confining unit at this wellsite. In this memorandum the first Intermediate Aquifer will be referred to as the Upper Hawthorn Aquifer.

The Upper Hawthorn Aquifer is predominantly composed of dolomite with lesser amounts of limestone. Both contain significant amounts of phosphate and clay. These deposits demonstrated generally poor to occasionally good porosity and permeability, although there were some solutional channels up to 3/8" in diameter in the lower 20 feet of this aquifer. This Upper Hawthorn Aquifer extends from approximately 151.5' to 255' below LSD (145.7'-249.2' below MSL). The water level throughout this aquifer averaged about 7.5' above LSD (13.3' above MSL). While coring this aquifer the conductivity of the water ranged from 1050 Umhos at 154' below LSD to 1250 Umhos at 244' below LSD. Upon penetrating the Upper Hawthorn Aquifer from the above confining unit, the water's conductivity dropped from 2300 Umhos at 149' to 1050 Umhos at 154' below LSD. The chlorides at 234' below LSD were 303 mg/l. Sulfates were 4.8 mg/l at 154' below LSD and remained very low throughout the Upper Hawthorn Aquifer. Total dissolved solids (TDS) were 677 mg/l at 154' below LSD.

Following the completion of the Dual Zone Intermediate Monitor, water level and water quality measurements were recorded. A screened interval (155'-175' below LSD) monitors the Upper Hawthorn Aquifer. A water level 7.7' above LSD (13.5 above LSD) was recorded for this interval. Fluid conductivity was 8500 Umhos. The chloride and sulfate values were 2875 mg/l and 163 mg/l respectively. These values greatly exceed the results of water samples retrieved during coring operations. Contamination resulting from drilling operations may explain these high values.

The confining bed between the two intermediate aquifers (Upper and Lower Hawthorn Aquifers) will be referred to as the Middle Hawthorn Confining Unit (Fig. 1). This confining unit is composed of gray to grayish-green clay with dolomite and limestone, both of which are clayey and phosphatic. These deposits demonstrated poor to no visible porosity and very poor permeability. This confining unit extends from 255' to 306' below LSD (249.2'-300.2' below MSL). The water level during the coring of this bed remained steady at 8.6' above LSD (14.4' above MSL). The conductivity of the water in this confining unit ranged from 1720 Umhos at 254' to 2280 Umhos at 294' below LSD. Chlorides ranged from 440 mg/l to 600 mg/l while sulfates ranged from 49 to 110 mg/l through the same interval.

The second Intermediate Aquifer is referred to as the Lower Hawthorn-Upper Tampa Aquifer by Wolansky (1983). This author could find no significant zones of permeability within the entire Tampa Formation, therefore the second Intermediate Aquifer will be referred to as the Lower Hawthorn Aquifer in this memorandum.

The Lower Hawthorn Aquifer is composed of limestone and dolomite, both of which contain significant amounts of phosphatic sand and clay. The limestone exhibited an abundance of moldic porosity, as high as 25%, while the dolomite (lower third of the aquifer) exhibited fracture as well as moldic porosity up to 20%. This aquifer extends from about 306' to 449' below LSD (300.2'-443.2' below MSL). At 309' below LSD the water level had risen to 10.9' above LSD. At the base of the aquifer (449' below LSD) the water level was measured at 13.3' above LSD, while the highest level of 14.75' above LSD was recorded at 404' below LSD. The conductivity of the water within this aquifer ranged from 3280 Umhos at 309' to 3800 Umhos at 449' below LSD while chlorides ranged from 800-1040 mg/l and sulfates ranged from 210-300 mg/l through the same interval.

The screened interval (370'-410' below LSD) in the Dual Zone Intermediate Monitor is located in the Lower Hawthorn Aquifer. A water level of 14.7' above LSD (19.5' above MSL) was recorded. Specific conductivity of a water sample retrieved from the 370'-410' interval was 3325 Umhos. The chloride and sulfate values were 940 mg/l and 70 mg/l respectively. These values were comparable to water samples retrieved during coring operations.

The confining bed between the Lower Hawthorn Aquifer and the Floridan Aquifer is referred to as the Tampa Confining Unit (Fig. 1). The confining unit is 237' thick (449'-686' below LSD) at the TR3-3 wellsite. The Tampa Confining Unit includes the entire Tampa Formation and the lower 6' of the Hawthorn Formation. The Tampa Confining Unit is composed of clayey, shaley, silty, calcarenitic and calcilutitic material which is semi-permeable to permeable. Upward migration of water, poor in quality, is impeded by the composition of the rock material and the thickness of this confiner.

Water levels remained fairly steady between 449' and 686' below LSD (443.2'-681.2 MSL), but averaged two to three feet less than in the Lower Hawthorn Aquifer. Water levels with a high of 12.60' above LSD and a low of 10.50' above LSD were recorded within the Tampa Confining Unit. Conductivity of water usually ranged between 3250 Umhos and 3850 Umhos, with two exceptions of 4450 Umhos and 4100 Umhos at 509' and 519' below LSD respectively. Chlorides ranged from slightly less than 750 mg/l to less than 900 mg/l according to field tests of water samples (449'-686' below LSD).

The Floridan Aquifer contact is located at the top of the Suwannee Formation (686' below LSD). The Floridan Aquifer extends from 686' to 1700' below LSD (depth of Deep Dual Zoned RO Injection Monitor) at the TR3-3 wellsite.

The Suwannee, Crystal River, Williston, Inglis and Avon Park Formations compose the Floridan Aquifer at TR3-3. This aquifer is composed of varying thicknesses of limestone (calcarenite, calcilutite) and brown to black crystalline dolomite. The dolomite is probably vertically and horizontally fractured. From a depth of 720'-900' below LSD the rock material as described from core descriptions and caliper interpretations is usually poor to moderately indurated. The calcarenite in this section is average in porosity, but usually poor in permeability. The RO Injection Well in Englewood confirmed this fact when packer tests indicated little production between 450' and 1050' below LSD and low permeability between 630'-930' below LSD. Average permeabilities were 5.42×10^{-2} ft/d. Most of the Lower Suwannee Formation and the Ocala Group exhibit confining characteristics. Vertical and horizontal permeabilities were determined from cores and straddle packer tests. Vertical permeabilities of cores ranged from .00567 to 1.13386 ft/d. Horizontal permeabilities are the result of lenses of permeable fossiliferous limestone interbedded with the dense, soft, chalkey limestone (calcarenite) confining units.

Water quality changes during coring operations were fairly rapid in the Upper Floridan Aquifer. Fluid conductivity (689'-924' below LSD) ranged between 3800 Umhos and 43,500 Umhos. The range for chlorides was from 1040 mg/l to 17,000 mg/l while sulfates increased from 300 mg/l to 2570' mg/l within this interval. Water quality changed from 28,000 Umhos at 680' below LSD to 39,500 Umhos at 720' below LSD as recorded from thief samples during flowing conditions. Fluid conductivity and temperature increases were also noted on the geophysical logs completed within the 40 ft. interval (680'-720' below LSD). The above data does indicate a thin production zone at the top of the Suwannee Permeable Zone (Fig. 1).

Following the completion of the Upper Floridan Monitor (open hole interval from 680'-910' below LSD), fluid conductivity ranged from 17,250 Umhos at 680' below LSD to 43,200 Umhos at 900' below LSD. Chlorides ranged from 6375 mg/l to 19000 mg/l for these respective depths. Sulfates ranged from 723 mg/l to 2589 mg/l for the 680' and 900' depths.

During coring operations in the Suwannee Formation (prior to the construction of the Upper Floridan Monitor), water levels declined with depth. Increasing water density due to higher salinity and a general lack of productivity probably explains the steady decline in water levels throughout most of the Suwannee Formation.

Higher water levels recorded near the top of the Floridan Aquifer at TR3-3 do indicate some increased productivity in the interval 680'-720' below LSD. Water levels increased from +12.95' at 689' to +17.7' above LSD at 694' below LSD and dropped to a level of 12.8' above LSD at 749' below LSD. The lowest water level of +1.90' was recorded at 909' below LSD. The increase in water level appears to correlate with lithologic change from calcarenite to dolomite, some of which is fractured (909'-924' below LSD).

Following the completion of the Upper Floridan Monitor (open interval 680-910' below LSD), the water level was 12.1' above LSD.

The interval between 905' and 946' below LSD, as described in the drill cuttings and correlated with geophysical logs, indicate mostly dolomite ranging from low to high (fractured) permeability. Geophysical logs indicated a zone of high porosity and low density between 909'-913' below LSD. Between 913'-918' below LSD, alternating seams of dolomite and calcarenite were described. Some fractured dolomite appears to continue to a depth of 946' below LSD. A production zone interval (905'-946' below LSD) lies at the bottom of the Suwannee Permeable Zone (Fig. 1).

The calcarenite, calcilutite and calcareous clay interval (946'-1051' below LSD) appears to be a semi-confining unit with low productivity. This is the upper part of the Ocala Confining Unit (Fig. 1).

A screened interval (1080'-1120' below LSD) monitors the Ocala Confining Unit in the Deep Dual Zoned RO Injection Monitor. Water level within this interval was measured at 4.2' above LSD (10.0' above MSL). Fluid conductivity for a water sample collected from the 1080'-1120' interval was 47,000 Umhos. A pH value of 7.5 was recorded for this sample.

Alternating layers of limestone, calcarenite and calcareous silty clay comprise the Ocala Group between 1120'-1245' below LSD. The lower Ocala Group and the top of the Avon Park Formation (1245'-1265' below LSD) is massive and dolomitic. Except for some minor dolomite layers, much of the upper Avon Park Formation (1265'-1425' below LSD) is calcarenite. The above interval (1120'-1425' below LSD) does not appear to be very productive. As a unit, it appears to be semi-confining and is in the lower part of the Ocala Confining Unit (Fig. 1). The transmissive interval (1425'-1700' below LSD) is composed of calcarenite and hard brown, crystalline dolomite which is often cavernous and fractured. This is called the Avon Park Highly Permeable Zone (Fig. 1). A flow log indicated a substantial increase in the flow rate between 1425'-1500' below LSD. Flow rates below this interval (1500'-1700' below LSD) appear to decrease due to large diameter cavities and the fractured nature of the dolomite.

Water is probably moving vertically as well as horizontally through this interval in the Avon Park Formation (1500'-1700' below LSD).

The Deep Dual Zoned RO Injection Monitor includes a lower screened interval (1602'-1652' below LSD). A water level of 0.15' below LSD (5.65' above MSL) was recorded for this interval. High density waters due to the high TDS and horizontal movement of water through this interval in the Avon Park Formation are reasons for the low water levels. Fluid conductivity for a water sample collected from this interval was 53,000 Umhos. A pH value of 7.46 was recorded for this sample.

V. WELL DESIGN AND CONSTRUCTION

Four monitor wells were constructed at the TR3-3 wellsite. The Deep Dual Zoned RO Injection Monitor was completed into the Ocala Group and Avon Park Formation. Two intervals (1602'-1652' and 1080'-1120' below LSD) will be monitored in this well. The second well is called the Upper Floridan Monitor and was completed into the Suwannee Formation. An open hole interval exists between 680'-900' below LSD. A Dual Zone Intermediate Monitor was completed into the Hawthorn Formation. This well monitors two intervals (155'-175' and 370'-410' below LSD). A Water Table Monitor was completed into the Undifferentiated Sand Deposits and monitors an interval from 10'-30' below LSD.

The construction of the Deep Dual Zoned RO Injection Monitor commenced by mud rotary drilling a 22" nominal borehole to 115' below LSD. A 16" steel casing was set and cement grouted to the surface (LSD-115' below LSD). The driller converted to reverse air drilling techniques and drilled a 14" nominal borehole (115'-1070' below LSD). An 8" PVC casing was set between LSD and 1050' below LSD. This 8" PVC casing ruptured during the cement grouting phase of construction. The driller was able to retrieve the 8" PVC casing between LSD and 580' below LSD. The 8" PVC casing which remained in the borehole was cement grouted between 580' and 1070' below LSD. Upon completion of cement grouting, 6" PVC casing was set (40'-900' below LSD). It was then necessary to couple 40' of 8" PVC between land surface and 40' below LSD for recorder box requirements. The 6" and 8" PVC casings were cement grouted to land surface from a depth of 1070' below LSD. A 6" nominal borehole was drilled through cement grout (900'-1070' below LSD) and then through limestone and dolomite to a depth of 1700' below LSD using reverse air techniques. A 4" PVC monitor tube (LSD-38') and 2" PVC monitor tube (38'-1602' below LSD) was coupled to 50' (1602'-1652' below LSD) of 2" PVC wellscreen (.030" slot). A sediment trap, using 1 foot of 2" PVC casing (1652'-1653' below LSD), was attached to the bottom of the screened interval. The borehole and screened interval was gravel packed (1573'-1700' below LSD) with 1/4" diameter silica gravel. The top twenty-eight feet (1545'-1573' below LSD) was packed with 6-20 type silica sand. The borehole (1121'-1545' below LSD) was then grouted with cement. It was determined that 40' of 1 1/4" PVC wellscreen (.030" slot), extending from (1080'-1120' below LSD), would be appropriate for the 6" borehole diameter and 6" PVC casing. An one (1') sediment trap of 1 1/4" PVC casing, 40' of 1 1/4" PVC wellscreen was coupled onto 1080' of 1 1/4" PVC tube which extends from land surface to 1080' below LSD. The screened interval was gravel packed with 1/4" diameter silica gravel from (1080'-1121' below LSD). The top thirty-five feet (1045'-1080' below LSD) was packed with 6-20 type silica sand. The borehole (1030'-1045' below LSD) was then cement grouted. The 6" PVC casing was filled with 'builders' silica sand for monitor tube stability from (1030' to 42' below LSD). A cement grout cap extends from (42'-40' below LSD). The 8" PVC casing from 40' below LSD to land surface was filled with 'builders' silica sand. Due to high potentiometric surface levels, it was decided the 8" PVC casing, the 4" and 1 1/4" PVC monitor tubes would require 8' extensions. The water level recorder box will be set about 8' above LSD. (See Well Design).

The Upper Floridan Monitor was constructed primarily for aquifer testing and as a monitor for the Upper Floridan Aquifer. A 22" nominal borehole was drilled to a depth of 120' below LSD, using mud rotary drilling techniques. A 14" steel casing was then set and cement grouted to the surface (LSD-120'). A 12" nominal borehole was then drilled (120'-680' below LSD) using mud rotary drilling techniques. A 6" PVC casing was then set and cement grouted to the surface (LSD-680'). This will effectively isolate the Upper and Lower Hawthorn Aquifers. A 6" nominal borehole was then drilled, using reverse air drilling techniques (680'-900' below LSD). This interval will be pumped or allowed to flow for a period of about one week for aquifer testing. (See Well Design). Final construction specifications will be added to the well design following aquifer testing.

The construction of the Dual Zone Intermediate Monitor commenced by drilling a 22" nominal borehole, using mud rotary drilling techniques, to a depth of 120' below LSD. Next, a 16" steel casing was set and cement grouted to land surface (LSD-120'). This effectively isolated the Surficial Aquifer. From a depth of 120' below LSD a 13" nominal borehole was drilled to 411' below LSD, using reverse air drilling techniques. Forty (40') of 4" PVC wellscreen (.030" slot), extending from a

depth of 410' to 370' below LSD, was coupled to a 4" PVC monitor tube (LSD-370'). A sediment trap, using 1 foot of 4" PVC casing (410-411' below LSD), was attached to the bottom of the screened interval. The well's annulus and screened interval were sand packed with 6-20 type silica sand (355'-411' below LSD). The borehole was then cement grouted from (355'-176' below LSD). Twenty (20') of 4" PVC wellscreen (0.10" slot), extending from a depth of 175' to 155' below LSD, was coupled to 155' of 4" PVC monitor tube (LSD-155'). A sediment trap, using 1 foot of 4" PVC casing (175-176' below LSD), was attached to the bottom of the screened interval. The well's annulus and screened interval was then sand packed (150'-176' below LSD) with 6-20 type silica sand. The remainder of a well's annulus (LSD-150') was cement grouted. Due to high potentiometric levels in the Lower and Upper Hawthorn Aquifer, the 16" steel casing and the two 4" PVC monitor tubes were extended to about 22.4' above LSD. The water level recorder box will be set at about 22.4' above LSD. Two (2") diameter lengths of PVC with 2" PVC valves tap the 4" monitor tubes through the 16" steel casing for water sampling. (See Well Design).

The construction of the Water Table Monitor was initiated by drilling a 12" nominal borehole, using mud rotary drilling techniques, to a depth near the base of the Caloosahatchee Marl (LSD-31'). A 6" PVC wellscreen (0.10" slot), extending from (10'-30' below LSD), was coupled to a 6" PVC casing (+3.5'-10' below LSD). A sediment trap using 1 foot of 6" PVC casing (30'-31' below LSD) was attached to the bottom of screened interval. The well's annulus and screened interval (5'-31' below LSD) was sand packed with 6-20 type silica sand. The remainder of the well's annulus (LSD-5') was cement grouted. Ten (10") PVC casing was then set in the cement grout 3' below ground level and extends to 3.5' above LSD (See Well Design).

Upon completion of these four monitor wells, the intervals to be monitored were developed to insure proper operation.

VI. AQUIFER CHARACTERISTICS AND TESTS

Presently, no aquifer tests have been completed at the TR3-3 wellsite. The USGS will conduct them at a future date. Prior to drilling the TR3-3 monitor wells, aquifer tests were conducted at the Englewood Wellfield on the Surficial and Floridan Aquifers to determine aquifer characteristics which were important in the designing of the Englewood RO Injection Well.

Yields of wells tapping the Surficial Aquifer average about 30 gpm and range from 10 gpm to 750 gpm according to Richard M. Wolansky (1983) in the USGS Water Resources Investigations Report 82-4089. The same publication lists the following Surficial Aquifer characteristics:

Surficial Aquifer	Average	Range
Specific Capacity (gpm/ft.)	10	3-60
Vertical Hydraulic Conductivity (ft/d)	2	1.5-15
Horizontal Hydraulic Conductivty (ft/d)	17	7-133
Transmissivity (ft^2/d)	1300	500-10,000
Storage Coefficient (unitless)	0.2	0.05-0.25
Yield of Wells (gpm)	30	10-750

Aquifer testing at the Englewood wellfield indicated transmissivity to be 7800 ft^2/d, storage coefficient $5x10^{-5}$, and specific capacity to be 22 gpm/ft in the Surficial Aquifer.

Two test wells drilled into the Tamiami-Upper Hawthorn Confining Unit at the Englewood wellfield indicated transmissivity to be 3800 ft^2/d, storage coefficient $1.7x10^{-4}$ and the leakage coefficient to be $2.4x10^{-4}$ $\frac{ft/d}{ft.}$ (Wolansky (1985) Water Resources Investigations Report 84-4044).

Wolansky, in the USGS Report 82-4089, gives the following aquifer characteristics for the Upper and Lower Hawthorn Aquifers and the Floridan Aquifer:

Upper Hawthorn Aquifer	**Average**	**Range**
Specific Capacity (gpm/ft)	10	3-15
Vertical Hydraulic Conductivity (ft/d)	1	.5-1.5
Horizontal Hydraulic Conductivity (ft/d)	23	4-30
Transmissivity (ft^2/d)	2600	500-3500
Storage Coefficient (unitless)	$1x10^{4}$	($.5-1.5x10^{-4}$)
Leakage Coefficient (ft/d/ft)	$1.3x10^{-5}$	($1x10^{-6}$-$1x10^{-4}$)
Yields of Wells (gpm)	75	20-250

Lower Hawthorn Aquifer	**Average**	**Range**
Specific Capacity (gpm/ft)	10	3-30
Horizontal Hydraulic Conductivity (ft/d)	10	2-40
Transmissivity (ft^2/d)	2600	5,000-10,000
Storage Coefficient (unitless)	$2x10^{-4}$	($.5-3x10^{-4}$)
Leakage Coefficient (ft/d/ft.)	$5x10^{-6}$	($.5-5x10^{-6}$)
Yields of Wells (gpm)	150	20-500

Floridan Aquifer	**Average**	**Range**
Specific Capacity (gpm/ft)	350	250-1000
Vertical Hydraulic Conductivity (ft/d)	1	0.1-10
Horizontal Hydraulic Conductivity (ft/d)	75	60-300
Transmissivity (ft^2/d)	$1.3x10^{5}$	($1x10^{5}$-$5x10^{5}$)
Storage Coefficient (unitless)	$1.3x10^{-3}$	($1.1-1.7x10^{-3}$)
Leakage Coefficient (ft/d/ft)	$5x10^{-6}$	($1-10x10^{-6}$)
Yields of Wells (gpm)	2000	500-5000

Results of aquifer testing completed on the RO Injection Well in Englewood are summarized below:

Interval Tested (ft)	Transmissivity (gpd/ft)	Storage Coefficient
450 - 700	7,600	6.2×10^{-3}
450 - 850	34,265	6.96×10^{-5}
450 - 1600	310,000	3.6×10^{-6}
1040 - 1800	588,000	7.0×10^{7}

From the above figures the lower injection zone (1040'-1800' below LSD) should accept and yield brine water readily.

Aquifer testing has not been initiated at TR3-3. A separate report will be written upon completion of aquifer tests by the USGS.

There will be at least one (1) and possibly two (2) aquifer tests conducted at the TR3-3 wellsite. Initially, the Upper Floridan Monitor will be allowed to flow freely for a period of approximately one (1) week. A pressure transducer will be placed on the Deep RO Injection Monitor Well to determine how the confining and semi-confining units in the Ocala Group and Avon Park Formation react in response to the flowing conditions exhibited in the Upper Floridan Monitor (open hole 686' - 900' below LSD). A pressure transducer will also be placed on the Dual Zone Intermediate Monitor to measure hydrostatic head in the Upper and Lower Hawthorn Aquifers. It is expected that hydrological parameters for the Intermediate and Floridan confining units and production zones can be retrieved by allowing the Upper Floridan Monitor to flow. Also, these techniques will permit estimation of the vertical hydraulic conductivity of the Ocala Group semi-confining bed that separates the Suwannee from the Avon Park injection zone.

If the data retrieved in this manner is not sufficient or is inconclusive, a pump test will be initiated. At this time it is expected that the duration of pumping will be at least ten (10) hours and the discharge from the Upper Floridan Monitor's open hole interval (686' - 910' below LSD) will be at a rate of about 1000 gal/min. Drawdown and recovery will be measured during the aquifer test in the Upper Floridan Monitor well, the RO Injection Monitor, the Dual Zone Intermediate Monitor, and the Water Table Monitor.

It is hoped that aquifer, confining, semi-confining, and well hydrological characteristics in the form of transmissivity, storage and leakage coefficients, specific capacity, horizontal and vertical hydraulic conductivities and yield can be retrieved either by natural flowing conditions or the pump test. The USGS or District's wireline flowmeter will be used during the aquifer tests to determine flow characteristics in the Upper Floridan Monitor. (Note: pumping limits may be imposed if Oyster Creek is silted by aquifer testing).

VII. GEOPHYSICAL LOGGING

Suites of geophysical logs were completed in the (LSD-1070') and (1065'-1700' below LSD) intervals during and following the construction of the Deep Dual Zone RO Injection Well. A partial suite (caliper, flowmeter) was completed following the construction of the Deep Floridan Monitor. These logs were utilized in correlating subsurface conditions with core samples and drill cuttings. Formation contacts and geologic units, location and hydraulic characteristics of the transmissive and confining zones were also identified by correlating core samples and drill cuttings with geophysical logs. Water quality and temperatures at selected depths were determined from thief samples, fluid conductivity, and temperature logs. Design and construction specifications for the four monitor wells at the TR3-3 wellsite were determined after evaluation and interpretation of the composite logs.

The caliper log identified the lithologic character of soft, poorly consolidated zones in the Hawthorn Formation (308'-392' below LSD) and the Suwannee Formation (776'-890' below LSD). The caliper log also identified harder, fractured dolomite units in the Upper Hawthorn Formation (158'-304' below LSD), the Lower Suwannee Formation (910'-946' below LSD) and from (1440'-1700' below LSD) in the Avon Park Formation.

The gamma ray, and electric logs (spontaneous potential, single point resistivity, 16" short normal, 64" long normal, and focused resistivity) were utilized in collecting lithologic and stratigraphic information and to identify permeable zones associated with secondary or fracture porosity. Formation contacts, correlated with core samples and drill cuttings, were selected at a 35' depth for the Tamiami Formation, a 56' depth for the top of the Hawthorn Formation, a 456' depth for the top of the Tampa Formation, 686' for the Suwannee Formation contact, and a contact between 1255' and 1266' for the top of the Avon Park Formation. The Neutron and gamma gamma logs were useful in identifying zones of high and low porosity and densities within the confining units and aquifers encountered at the TR3-3 wellsite. The temperature and flow results helped identify water producing zones by temperature and flow increases indicated on the logs. Fluid conductivity, in correlation with the temperature log, indicated changes in water quality in the (80'-100') (300'-340'), (680'-820') and (1340'-1420') depth intervals. The flow log indicated a zone of flow within the 1400'-1500' below LSD interval.

A composite of geophysical logs was assembled and correlated with the lithology described at the TR3-3 wellsite. Qualitative and quantitative data was retrieved from these logs.

Outside Sources Used

H. Sutcliffe, 1975; Appraisal of the Water Resources of Charlotte County, Florida, F.B.G. Report of Investigations No. 78, Tallahassee, Florida.

Richard M. Wolansky, 1983; Hydrogeology of Sarasota - Port Charlotte Area, Florida, U.S. Geological Survey, Water-Resources Investigations Report 82-4089, Tallahassee, Florida.

Post, Buckley, Schuh & Jernigan, 1982; Engineering Report, Test of Floridan Aquifer, the Plantation, Sarasota County, Florida; Miami, Florida.

CH2M Hill, DER, USGS, Schlumberger, Southwest Florida Water Management District, 1985-86, Hydrogeological, geophysical data collected during and following the drilling of the Englewood RO Injection Well, Sarasota County, Florida.

Wolansky, R. M., and Corral, M. A., Jr., 1985; Aquifer Tests in West-Central Florida, 1952-76, U.S Geological Survey, Water-Resources Investigation Report 84-4044, Tallahassee, Florida.

CH2M Hill, June, 1986; Results of the Reverse Osmosis Injection Well Investigation for the Englewood Water District, Tampa, Florida.

HYDROGEOLOGY - TR 3-3

12/18/86 "LEMON BAY" John Decker

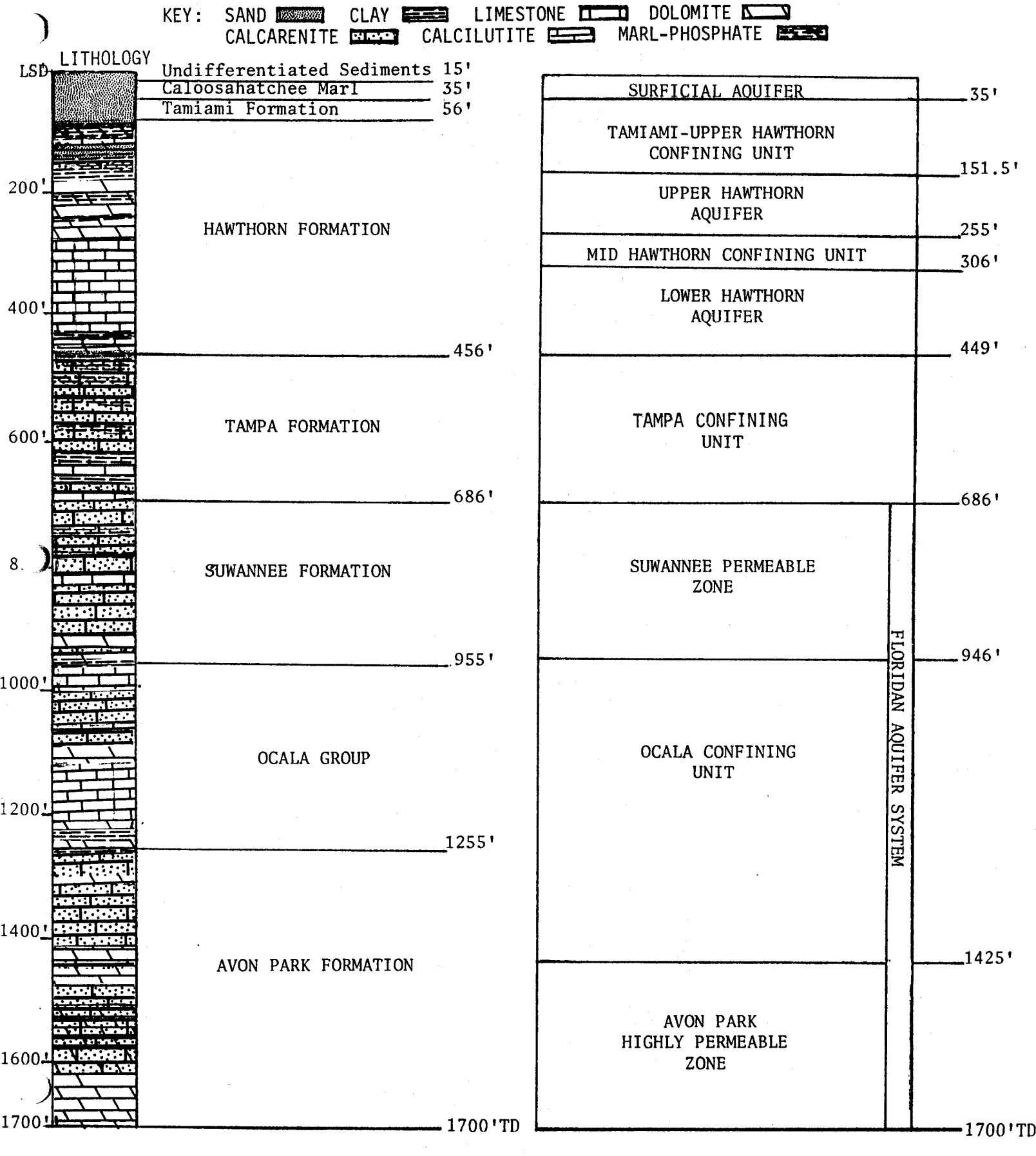


FIGURE 1: HYDROSTRATIGRAPHY AND GEOLOGY AT TR 3-3

File

WP JOB REQUEST FORM

DATE & TIME SUBMITTED 11-12-86 10:00 Rcvd

FROM John L. Ducker EXT. 6637

(Check if you wish to be called to explain your job.)---

MEMO --- LETTER --- REPORT -✓- STATS ---

NO. CARBONS: WHITE -- CANARY --

FILE CODE: ----------

TIME & DATE NEEDED

1ST DRAFT 8:00AM 11/14/86

2ND DRAFT 8:00AM 11/26/86

3RD DRAFT 8:00AM 12/8/86

4TH DRAFT 8:00AM 12/16/86 except errors on P. 3 & P. 19

FINAL 8:00AM 12/30/86 OK

---FINAL - NOT PROOFED DUE TO REQUESTED TURNAROUND TIME.

-✓-FINAL - PROOFED

(Proofed - Standard form, typos, spelling and punctuation)

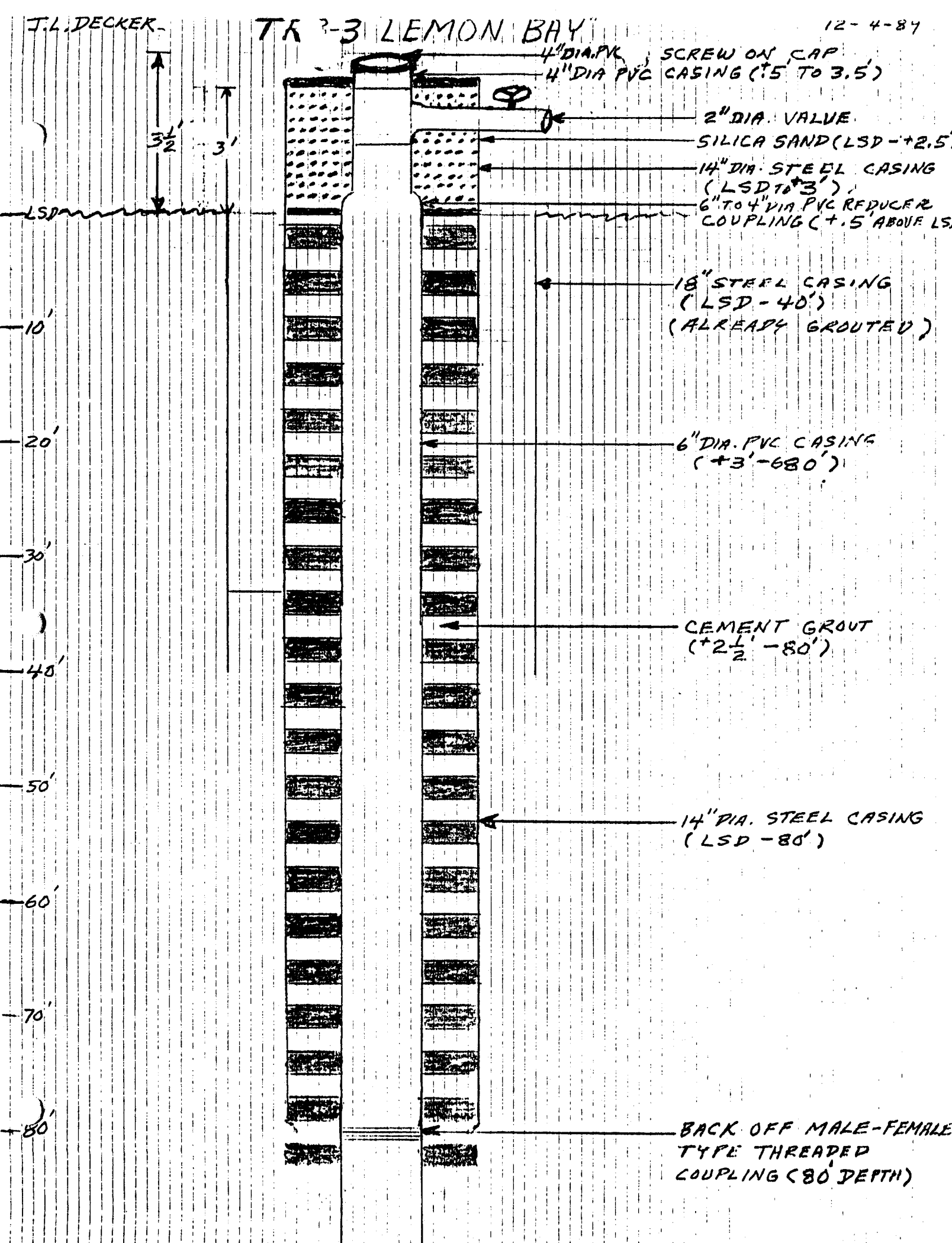
DOCUMENT REF: NAME ES-TR3-3

DISK R+D2 MAG CARD---

PLEASE KEEP THIS FORM WITH YOUR DOCUMENT. RETURN TO WP FOR EACH REVISION/FINAL AND/OR SIGN, DATE AND RETURN TO ADVISE WP THAT DOCUMENT MAY BE ERASED FROM DISK.

SIGNATURE ---------- DATE ------

J.L. DECKER — TR ?-3 LEMON BAY — 12-4-87



7-1-86

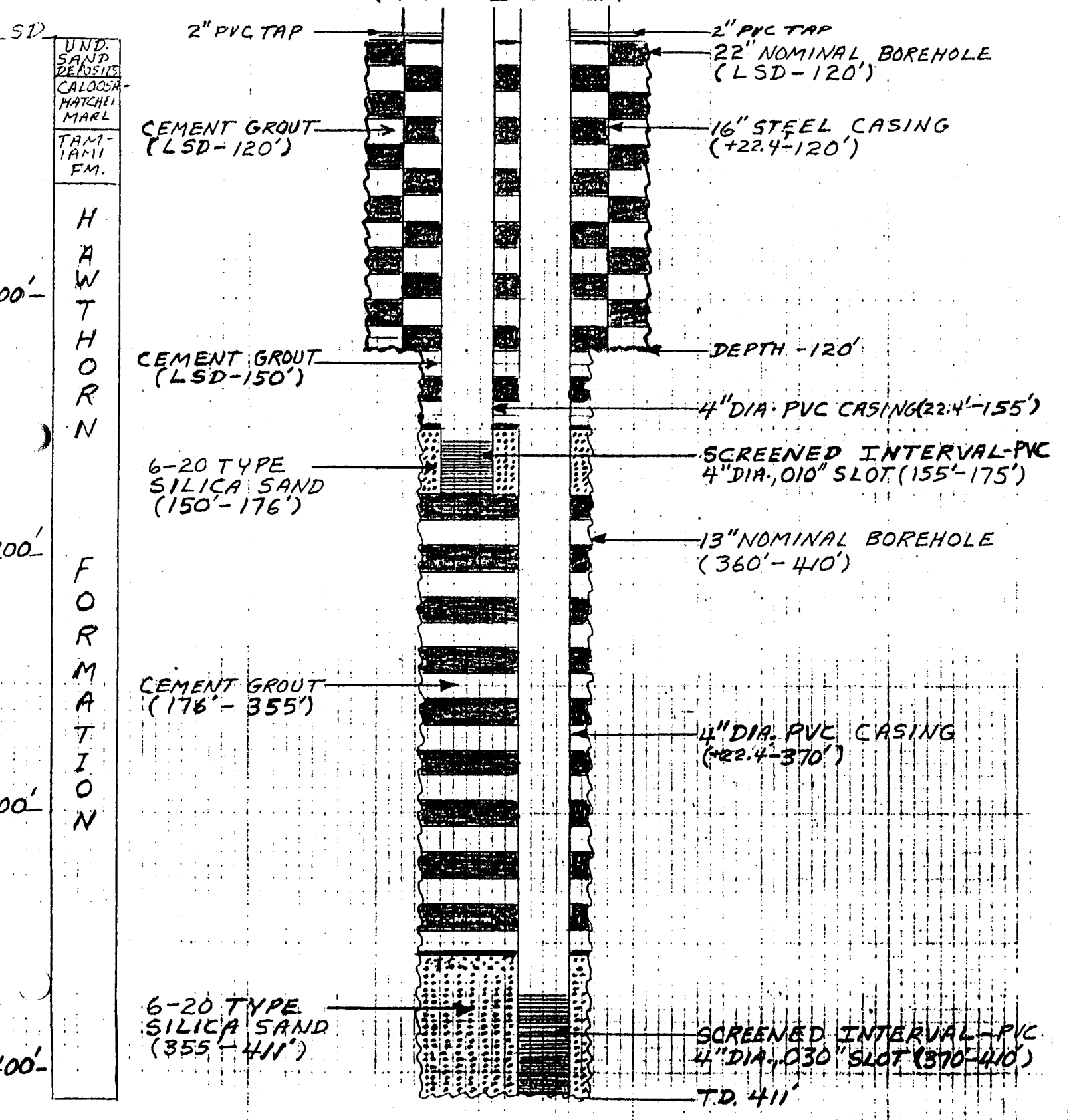
TR3-3 "LEMON BAY"

J.L. DECKER

DUAL ZONE INTERMEDIATE MONITOR

S.8, T.41S, R20E

AS BUILT



9-8-86

TR-P-3 LEMON BAY

DEEP DUAL ONED RO INJECTION WELL

AS BUILT

H.L. DACKER

STRATIGRAPHY

UND. SAND — 15'
CAL. MARL — 35'
TAMIAMI FM. — 56'

HAWTHORN FORMATION — 456'

TAMPA FORMATION — 686'

SAWANNEE FORMATION — 955'

OCALA GROUP — 1255'

AVON PARK FORMATION

TD

8" DIA PVC CASING (+8'-+40')
4" PVC MONITOR TUBE (+8' TO 38')
22" NOMINAL BOREHOLE (LSD-115')
16" DIA. STEEL CASING (+1.5' TO 115')

2" DIA. PVC MONITOR TUBE (38'-1602')

6" DIA PVC CASING (+40'-900')

CEMENT GROUT (LSD-1070')

14" NOMINAL BOREHOLE (LSD-1070')

4" PVC MONITOR TUBE (+8' TO 1080')

8" DIA. PVC CASING (580'-1070')

4" PVC MONITOR TUBE (+8' TO 1060')

CEMENT GROUT (1030'-1045')
6-20 SILICA SAND (1045'-1080')
4" DIA. SILICA GRAVEL (1080'-1121')

4" PVC SCREENED INTERVAL (0.030" SLOT) (1080'-1120')
4" PVC SEDIMENT TRAP (1120'-1121')

6" NOMINAL BOREHOLE (900'-1700')

CEMENT GROUT (1112'-1545')

2" DIA. MONITOR TUBE (38'-1602')

6-20 SILICA SAND (1545'-1578')

4" DIA. SILICA GRAVEL (1578'-1700')

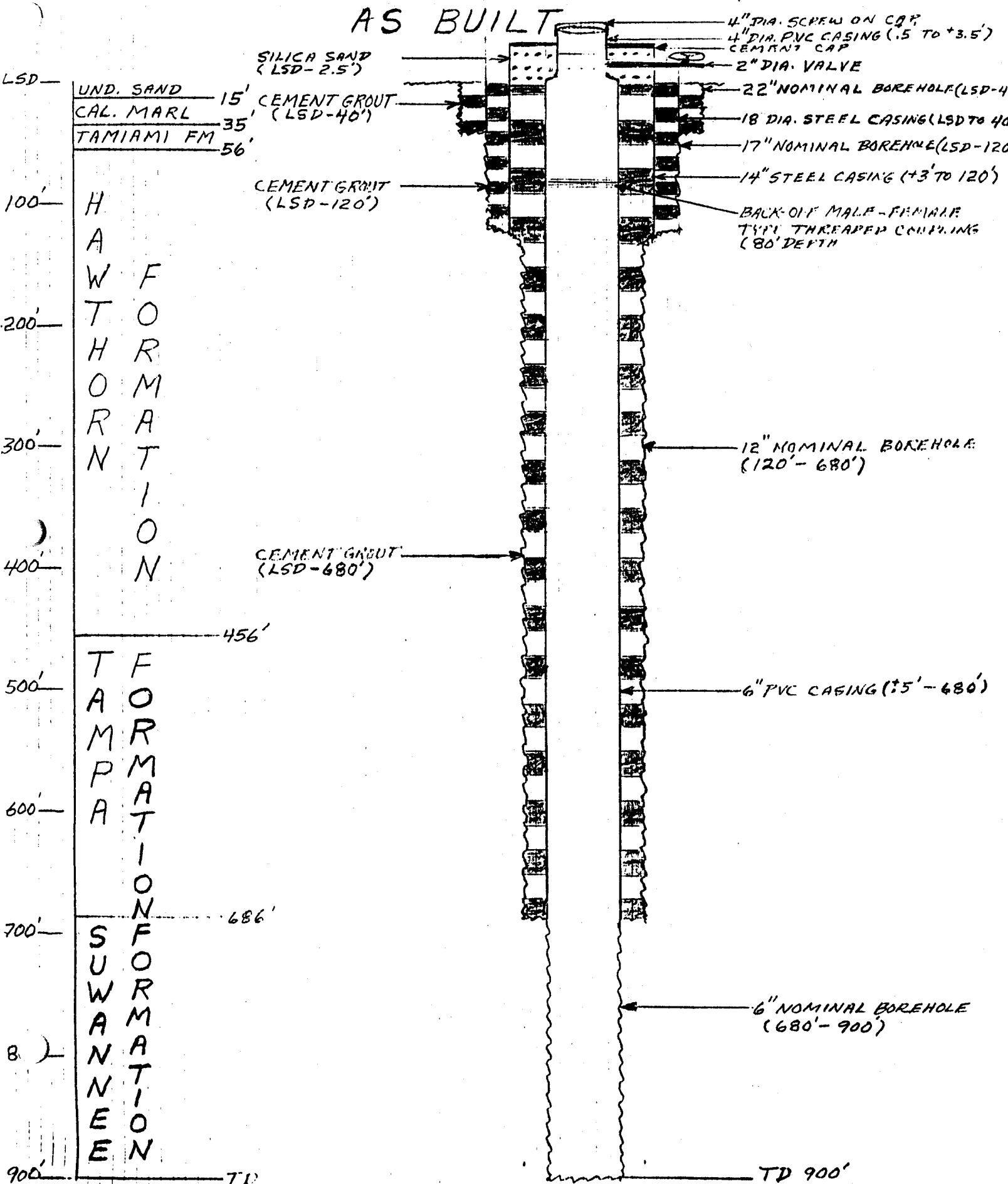
2" PVC SCREENED INTERVAL (0.030" SLOT) (1602'-1652')
2" PVC SEDIMENT TRAP (1652'-1653')

TD 1700'

1-4-90

TR 3-3 "LEMON BAY
UPPER FLORIDAN MONITOR
AS BUILT

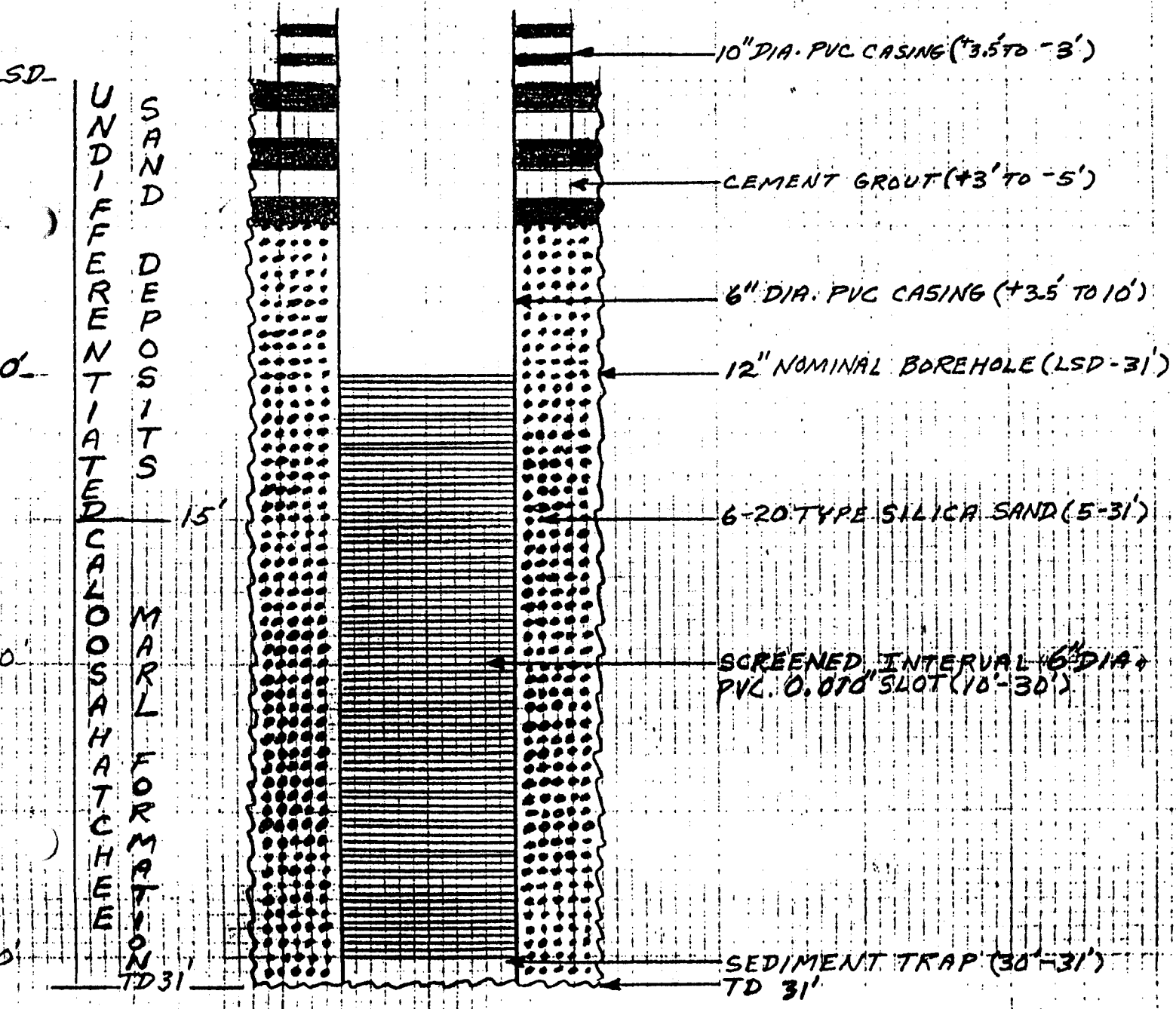
J. L. DECKER



J. L DECKER

7-28-86

TR 3-3 "LEMON BAY"
WATER TABLE MONITOR
S. 8, T41S., R20E
AS BUILT



TR 3-3 (LEMON BAY) 4-11-86

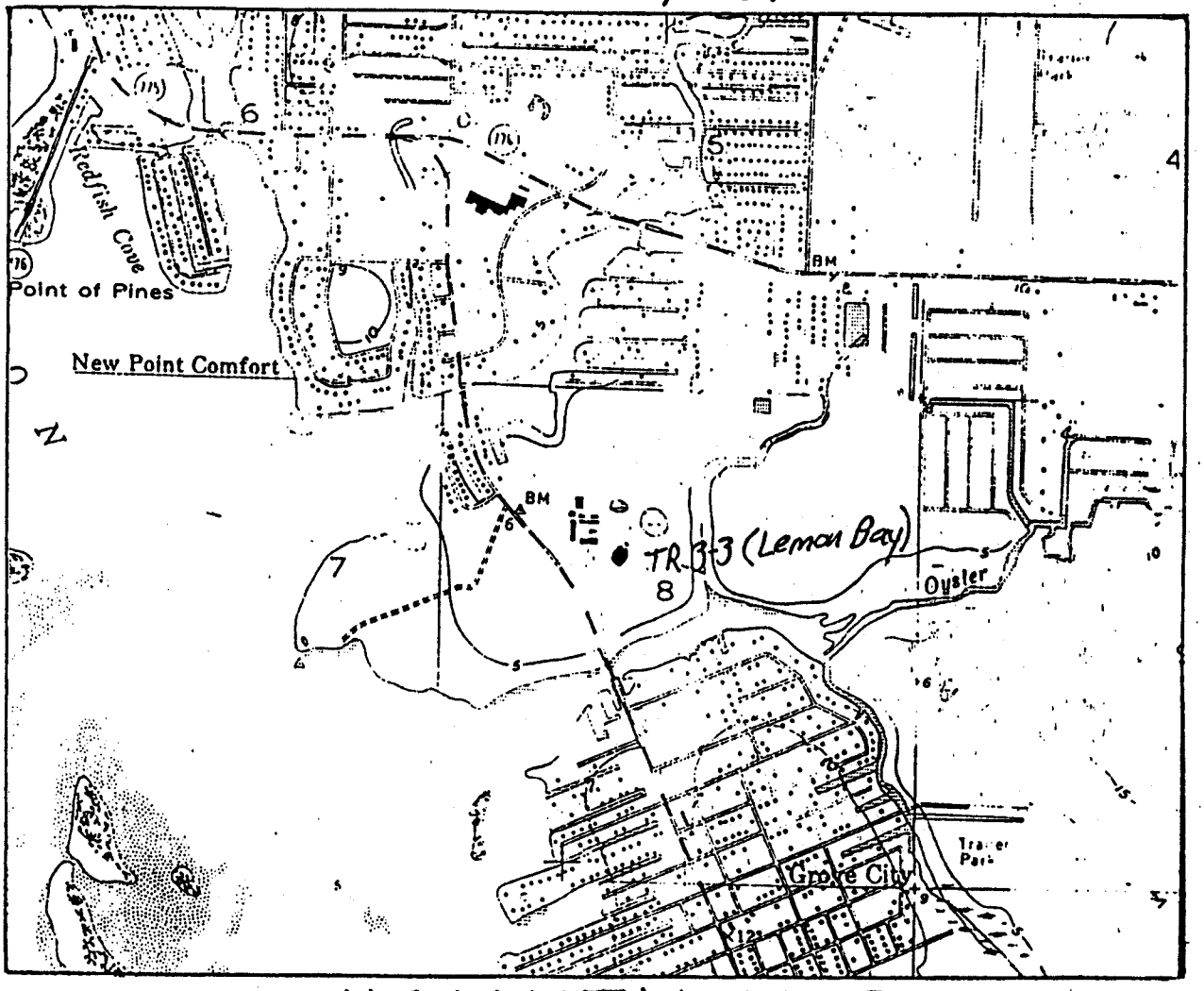
SITE LOCATION MAP

J. L. DECKER

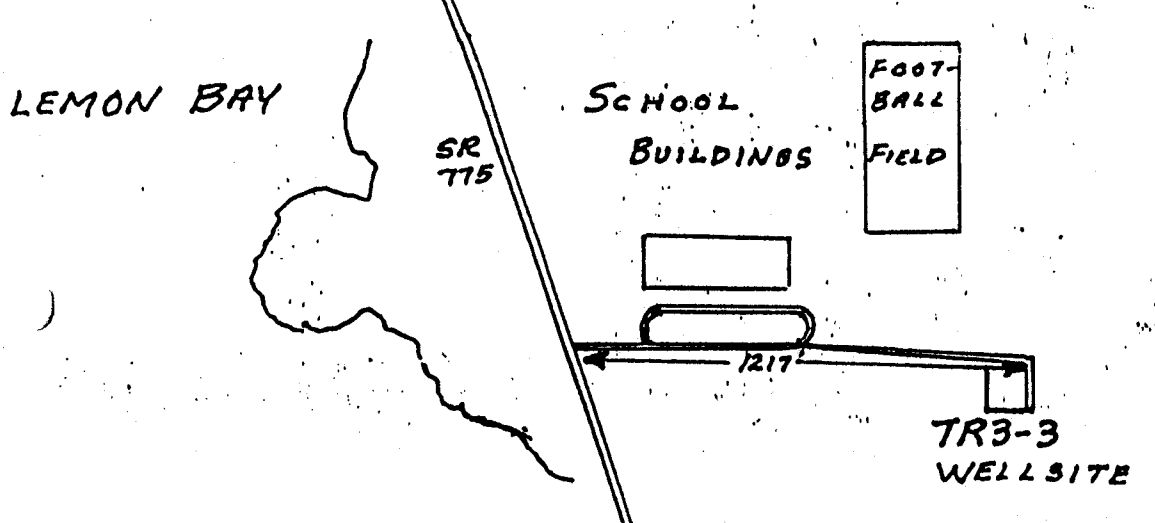
SECTION 8, TOWNSHIP 41S, RANGE 20E

LAT. 26° 55' 31" LONG. 82° 19' 48" (SCALED

ENGLEWOOD QUAD.



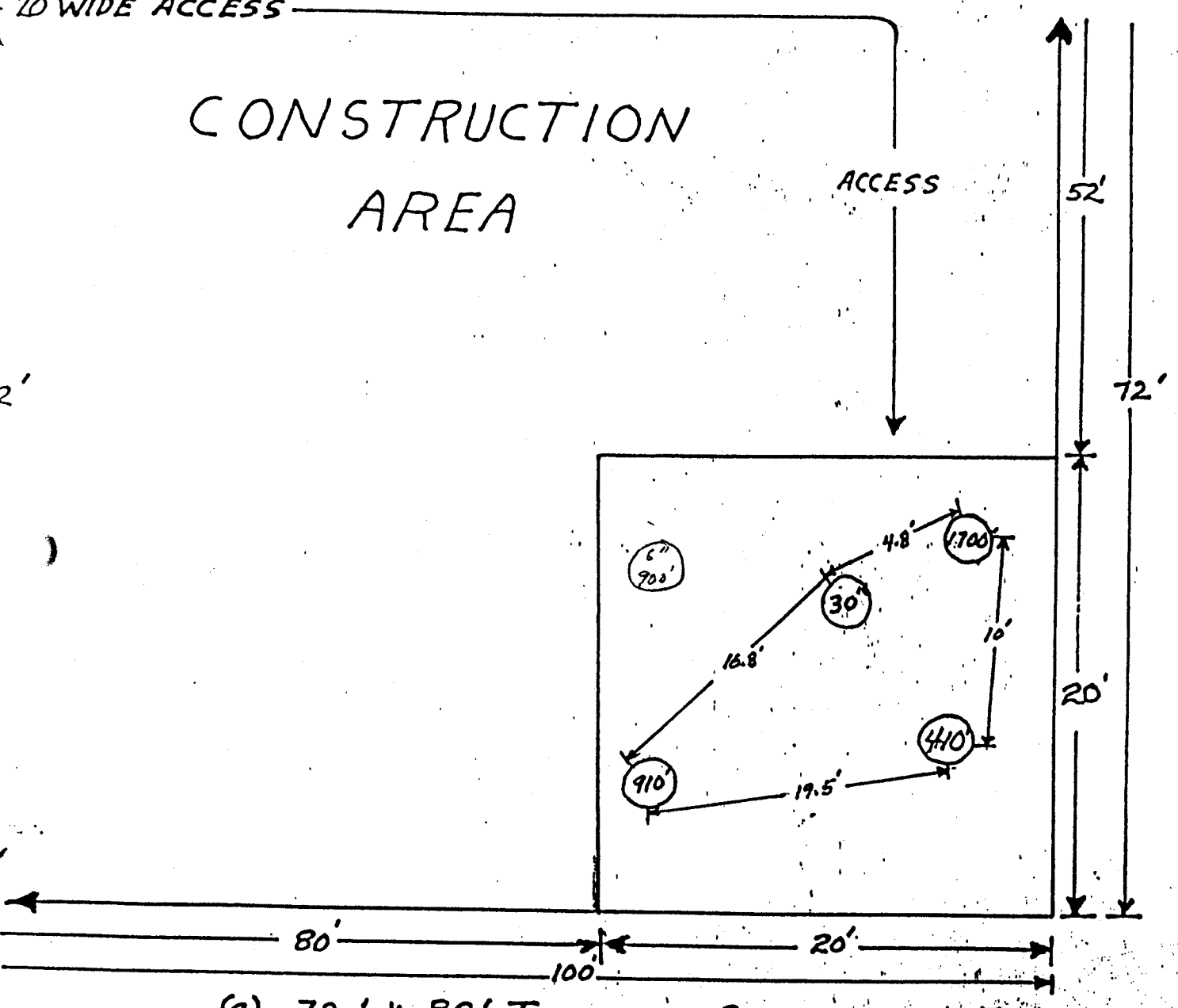
VICINITY MAP



TR 3-3 (LEMON BAY)

WELL PLACEMENT DIAGRAM

4-15-86
10-24-86
J.L. DECKER



(a) 72' X 80' TEMPORARY CONSTRUCTION EASEMENT

(b) 20' X 20' PERPETUAL EASEMENT

(C) 20' WIDE ACCESS

(d) 1700' DEEP ROR INJECTION WELL - DUAL ZONE

(e) 900' UPPER FLORIDAN WELL

(f) 410' DUAL ZONE INTERMEDIATE MONITOR WELL

(g) 30' WATER TABLE MONITOR

LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W- 15683
TOTAL DEPTH: 01700 FT.
167 SAMPLES FROM 96 TO 924 FT.

COUNTY - CHARLOTT
LOCATION: T.41S R.20E S.08DA
LAT = N 26D 55M 31
LON = W 82D 19M 48

COMPLETION DATE - 04/23/84
OTHER TYPES OF LOGS AVAILABLE - NONE

ELEVATION - 006 FT

OWNER/DRILLER: SWFWMD, ROMP CORE TR-3-3 (LEMON BAY), DRILLER: LLOYD JOHNSON WITH CME-75

WORKED BY: WORKED BY JIM CLAYTON, CORED 2-6-84 TO 4-23-84, GOOD QUALITY CORE SAMPLES
AVERAGE CORE RECOVERY 90%
ENTERED BY TOM SEAL (FGS) 1-11-91
CUTTINGS WERE KEPT TO DETERMINE FORMATION TOPS ABOVE CORE
CUTTINGS ARE NOT DESCRIBED IN DETAIL IN THIS CORE DESCRIPTION

0.	15.	TERRACE SANDS
15.	35.	CALOOSAHATCHEE FM.
35.	56.	TAMIAMI FM.
56.	686.	HAWTHORN GROUP
56.	144.	PEACE RIVER FM.
144.	686.	ARCADIA FM.
456.	686.	TAMPA MEMBER OF ARCADIA FM.
686.	955.	SUWANNEE LIMESTONE
955.	1255.	OCALA GROUP
1255.	.	AVON PARK FM.

0 - 4.5 SAND; MODERATE GRAY; UNCONSOLIDATED;
ACCESSORY MINERALS: PHOSPHATIC SAND- %;
FOSSILS: ORGANICS;

4.5- 13.5 SAND; TAN; UNCONSOLIDATED;
ACCESSORY MINERALS: PHOSPHATIC SAND-%;

13.5- 19 SAND; TAN; UNCONSOLIDATED;
FOSSILS: FOSSIL FRAGMENTS;

19 - 26.5 SAND; ; UNCONSOLIDATED;
ACCESSORY MINERALS: PHOSPHATIC SAND-02%;

26.5- 31.5 SAND; ; UNCONSOLIDATED;
ACCESSORY MINERALS: PHOSPHATIC SAND-02%;
FOSSILS: ORGANICS;

31.5- 36.5 SAND; ; UNCONSOLIDATED;
ACCESSORY MINERALS: PHOSPHATIC SAND-02%;
FOSSILS: FOSSIL FRAGMENTS;

36.5- 46.5 SAND; ; MODERATE INDURATION;
CEMENT TYPE(S): SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND-03%;
FOSSILS: FOSSIL FRAGMENTS;

46.5- 51.5 SAND; ; POOR INDURATION;
CEMENT TYPE(S): SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND-40%;
FOSSILS: FOSSIL FRAGMENTS;

51.5- 56.5 AS ABOVE
40% SANDSTONE AS ABOVE; 40% PHOSPHATIC SAND; 20% SHELL FRAGMENTS, TOP OF PEACE RIVER FORMATION AT 56'

56.5- 61.5 SANDSTONE; ; MODERATE INDURATION;
CEMENT TYPE(S): SPARRY CALCITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND-02%;
FOSSILS: FOSSIL FRAGMENTS;

61.5- 66.5 AS ABOVE
ABOVE INTERVAL IS A SILT-RICH MARL IN PART MARL IS VERY CALCAREOUS; CALOOSAHATCHEE MARL AT 64'

66.5- 81.5 AS ABOVE

81.5- 86.5 AS ABOVE
TRACE OF DOLOMITIC LIMESTONE

86.5- 91.5 LIMESTONE; ;
MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: PHOSPHATIC SAND- %, DOLOMITE- %, QUARTZ SAND-%;
NO COLOR DESCRIPTION GIVEN FOR 4.5 - 91.5 INTERVAL

91.5- 95 AS ABOVE
DOLOMITE AND LIMESTONE, 4 INCH CASING SET AT 95 FEET

95 - 99 SANDSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY; 20% POROSITY, VUGULAR, MOLDIC;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE;
ROUNDNESS:SUB-ANGULAR; LOW SPHERICITY; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: LAMINATED, BIOTURBATED, CROSS-BEDDED, MASSIVE,
ACCESSORY MINERALS: CLAY-05%, SILT-05%, PHOSPHATIC SAND-09%;
OTHER FEATURES: CALCAREOUS, GRANULAR, VARVED, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, FOSSIL FRAGMENTS;

99 - 99.5 UNCONSOLIDATED SAND AT 99.5; SAME ACCESSORY ASSEMBLAGE

99.5- 104 SANDSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY; 10% POROSITY, VUGULAR, MOLDIC, INTERGRANULAR;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE;
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: BIOTURBATED, MASSIVE, CROSS-BEDDED, INTERBEDDED,
ACCESSORY MINERALS: CLAY-05%, SILT-05%, PHOSPHATIC SAND-10%;
OTHER FEATURES: GRANULAR, VARVED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

104 - 111 SANDSTONE; LIGHT OLIVE GRAY TO LIGHT GRAY; 10% POROSITY, INTERGRANULAR, VUGULAR;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE;
ROUNDNESS:SUB-ANGULAR; MEDIUM SPHERICITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: BIOTURBATED, STREAKED, BEDDED, INTERBEDDED, LAMINATED,
ACCESSORY MINERALS: CLAY-07%, SILT-10%, PHOSPHATIC SAND-12%;
OTHER FEATURES: GRANULAR, SPECKLED, VARVED, SUCROSIC;
FOSSILS: NO FOSSILS;

111 - 114 SILT; LIGHT OLIVE TO LIGHT OLIVE GRAY; 15% POROSITY, VUGULAR, MOLDIC; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: MASSIVE,
ACCESSORY MINERALS: CLAY-20%, SILT-80%;
OTHER FEATURES: MUDDY;
FOSSILS: NO FOSSILS;
93% RECOVERY 111-114

114 - 117.5 AS ABOVE

117.5- 119 CALCARENITE; YELLOWISH GRAY TO MODERATE LIGHT GRAY; 07% POROSITY, VUGULAR;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED, STREAKED,
ACCESSORY MINERALS: CLAY-20%, PHOSPHATIC SAND-10%, SILT-10%;
OTHER FEATURES: CALCAREOUS, CHALKY, VARVED;
FOSSILS: NO FOSSILS;

119 - 124 CALCARENITE; YELLOWISH GRAY TO VERY LIGHT GRAY; 15% POROSITY, VUGULAR, MOLDIC, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, BIOTURBATED, INTERBEDDED, STREAKED,
ACCESSORY MINERALS: CLAY-15%, PHOSPHATIC SAND-10%, SILT-10%;
OTHER FEATURES: CALCAREOUS, GRANULAR, SPECKLED, REEFAL, VARVED;
FOSSILS: CORAL, BRYOZOA, MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

124 - 126 CALCARENITE; LIGHT OLIVE TO LIGHT OLIVE GRAY; 07% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BIOTURBATED, BRECCIATED, INTERBEDDED,
ACCESSORY MINERALS: CLAY-30%, SILT-10%, PHOSPHATIC SAND-05%;
OTHER FEATURES: CALCAREOUS, CHALKY, MUDDY, VARVED, WEATHERED;
FOSSILS: MOLLUSKS;

126 - 127 LIMESTONE; VERY LIGHT GRAY TO YELLOWISH GRAY; NOT OBSERVED;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BIOTURBATED, BRECCIATED, INTERBEDDED,
ACCESSORY MINERALS: CLAY-05%, SILT-03%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC;
FOSSILS: MOLLUSKS;

127 - 129.5 SILT; LIGHT OLIVE GRAY TO MODERATE OLIVE BROWN; 03% POROSITY, VUGULAR; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BIOTURBATED, BEDDED,
ACCESSORY MINERALS: CLAY-20%, PHOSPHATIC SAND-05%;

129.5- 131 DOLOSTONE; LIGHT GRAY TO GRAYISH BROWN; 06% POROSITY, VUGULAR;
0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-50%, SILT-10%;
OTHER FEATURES: CALCAREOUS, MUDDY, VARVED, LOW RECRYSTALLIZATION;
FOSSILS: ALGAE, WORM TRACES, FOSSIL MOLDS, ORGANICS;

131 - 134 CLAY; LIGHT GRAY TO LIGHT GRAYISH GREEN; 02% POROSITY, FRACTURE; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, INTERBEDDED, MASSIVE, LAMINATED, MOTTLED,
OTHER FEATURES: CALCAREOUS, MUDDY, VARVED;
FOSSILS: NO FOSSILS;
80% RECOVERY 129-134

134 - 144 CLAY; DARK GREEN TO LIGHT OLIVE; NOT OBSERVED; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED, MASSIVE, LAMINATED,
OTHER FEATURES: PLASTIC, PLATY;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS;
TOP OF ARCADIA FORMATION AT 143.5'

144 - 148 CLAY; LIGHT OLIVE GRAY TO MODERATE GRAYISH GREEN; NOT OBSERVED; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, LAMINATED, MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: SILT-10%;
OTHER FEATURES: PLASTIC;
FOSSILS: NO FOSSILS;

148 - 149 SILT; LIGHT OLIVE GRAY TO GREENISH GRAY; 05% POROSITY, VUGULAR, PIN POINT VUGS;
GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, MOTTLED, INTERBEDDED,
ACCESSORY MINERALS: CLAY-50%, PHOSPHATIC SAND-03%, PHOSPHATIC GRAVEL-01%;
OTHER FEATURES: CALCAREOUS, VARVED;
FOSSILS: BRYOZOA;

149 - 151.5 SANDSTONE; YELLOWISH GRAY TO YELLOWISH GRAY; 10% POROSITY, INTERGRANULAR, VUGULAR,
PIN POINT VUGS;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE;
ROUNDNESS:SUB-ANGULAR; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, STREAKED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-10%, SILT-15%, PHOSPHATIC SAND-08%, PHOSPHATIC GRAVEL-05%;
OTHER FEATURES: WEATHERED, VARVED;
FOSSILS: FOSSIL FRAGMENTS;

151.5- 154 DOLOSTONE; YELLOWISH GRAY TO YELLOWISH GRAY; 20% POROSITY, VUGULAR, PIN POINT VUGS, MOLDIC;
10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BIOTURBATED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-07%;
OTHER FEATURES: WEATHERED, VARVED, LOW RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
80% RECOVERY

154 - 159 DOLOSTONE; YELLOWISH GRAY TO YELLOWISH GRAY; 12% POROSITY, VUGULAR, PIN POINT VUGS, MOLDIC;
10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BIOTURBATED, INTERBEDDED,
ACCESSORY MINERALS: CLAY-04%, LIMESTONE-06%, PHOSPHATIC SAND-05%;
OTHER FEATURES: CALCAREOUS, VARVED, MEDIUM RECRYSTALLIZATION;
FOSSILS: BRYOZOA, MOLLUSKS, BRACHIOPOD;
DOLOMITE INTERBEDDED WITH MODERATELY INDURATED PLASTIC CLAY

159 - 169 DOLOSTONE; YELLOWISH GRAY TO YELLOWISH GRAY; 10% POROSITY, VUGULAR, MOLDIC, INTERCRYSTALLINE; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-10%;
OTHER FEATURES: CALCAREOUS, VARVED, LOW RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
VERY HARD DOLOMITE, 95% RECOVERY

169 - 174 DOLOSTONE; LIGHT GRAY; 05% POROSITY, FRACTURE, VUGULAR, LOW PERMEABILITY; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MASSIVE, BEDDED,
ACCESSORY MINERALS: CLAY-05%, PHOSPHATIC SAND-10%;
OTHER FEATURES: CALCAREOUS, VARVED, LOW RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;

174 - 179 AS ABOVE
10% RECOVERY 169-179; ALTERNATING HARD AND CRUMBLY DOLOMITE

179 - 181 DOLOSTONE; LIGHT GRAY TO YELLOWISH GRAY; 20% POROSITY, VUGULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; POOR INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED, BIOTURBATED, BANDED, GRADED BEDDING,
ACCESSORY MINERALS: CLAY-10%, LIMESTONE-04%, PHOSPHATIC SAND-04%;
OTHER FEATURES: CALCAREOUS, WEATHERED, VARVED, MEDIUM RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, BRYOZOA, FOSSIL MOLDS, ORGANICS;

181 - 189 DOLOSTONE; LIGHT GRAY; 03% POROSITY, VUGULAR, PIN POINT VUGS, LOW PERMEABILITY; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING,
ACCESSORY MINERALS: CLAY-06%, LIMESTONE-04%, PHOSPHATIC SAND-05%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL MOLDS;

189 - 194 DOLOSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY; 15% POROSITY, VUGULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; SUBHEDRAL; GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; POOR INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX; SEDIMENTARY STRUCTURES: GRADED BEDDING, INTERBEDDED, STREAKED, BIOTURBATED, BANDED, ACCESSORY MINERALS: CLAY-07%, PHOSPHATIC SAND-08%; OTHER FEATURES: CALCAREOUS, CHALKY, VARVED, LOW RECRYSTALLIZATION, SPECKLED; FOSSILS: MOLLUSKS, FOSSIL MOLDS, WORM TRACES, ORGANICS, ALGAE; 65% RECVOERY 189 65% RECOVERY 189-194, SEVERAL PHOSPHATE-RICH CLAY SEAMS

194 - 209 DOLOSTONE; MODERATE LIGHT GRAY TO YELLOWISH GRAY; 08% POROSITY, VUGULAR, PIN POINT VUGS, LOW PERMEABILITY; 0-10% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION; CEMENT TYPE(S): PHOSPHATE CEMENT, DOLOMITE CEMENT, CLAY MATRIX; SEDIMENTARY STRUCTURES: BEDDED, MASSIVE, ACCESSORY MINERALS: PHOSPHATIC SAND-30%, CLAY-10%, SILT-04%; OTHER FEATURES: CALCAREOUS, SPECKLED, LOW RECRYSTALLIZATION, VARVED; FOSSILS: NO FOSSILS; UNIFORM DOLOMITE INTERVAL 194-209

209 - 214 DOLOSTONE; MODERATE LIGHT GRAY TO YELLOWISH GRAY; 08% POROSITY, PIN POINT VUGS, INTERGRANULAR, LOW PERMEABILITY; 0-10% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): PHOSPHATE CEMENT, DOLOMITE CEMENT, CLAY MATRIX; SEDIMENTARY STRUCTURES: BEDDED, ACCESSORY MINERALS: PHOSPHATIC SAND-25%, CLAY-10%, SILT-04%; OTHER FEATURES: CALCAREOUS, SPECKLED, LOW RECRYSTALLIZATION; FOSSILS: NO FOSSILS;

214 - 218 LIMESTONE; MODERATE LIGHT GRAY TO YELLOWISH GRAY; 20% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY; GRAIN TYPE: BIOGENIC, SKELETAL CAST, CALCILUTITE; GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION; CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX; SEDIMENTARY STRUCTURES: BRECCIATED, ACCESSORY MINERALS: CLAY-15%, PHOSPHATIC SAND-04%; OTHER FEATURES: CALCAREOUS, WEATHERED, VARVED; FOSSILS: MOLLUSKS, BRYOZOA, BARNACLES, FOSSIL MOLDS;

218 - 225.2 DOLOSTONE; VERY LIGHT GRAY TO MODERATE GRAY; 08% POROSITY, VUGULAR, MOLDIC, LOW PERMEABILITY; 0-10% ALTERED; ANHEDRAL; GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION; CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX, PHOSPHATE CEMENT; SEDIMENTARY STRUCTURES: GRADED BEDDING, STREAKED, BIOTURBATED, ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-10%, PHOSPHATIC GRAVEL-04%; OTHER FEATURES: CALCAREOUS, SPECKLED, WEATHERED, VARVED, LOW RECRYSTALLIZATION; FOSSILS: MOLLUSKS, FOSSIL MOLDS, BRYOZOA, CRUSTACEA;

225.2- 227 CLAY; YELLOWISH GRAY TO DARK GRAY; 04% POROSITY, VUGULAR, LOW PERMEABILITY, INTERGRANULAR; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, MOTTLED,
ACCESSORY MINERALS: PHOSPHATIC SAND-40%, PHOSPHATIC GRAVEL-10%;
OTHER FEATURES: CHALKY;
FOSSILS: NO FOSSILS;

227 - 232.6 DOLOSTONE; YELLOWISH GRAY TO MODERATE GRAY; 15% POROSITY, VUGULAR, FRACTURE, POSSIBLY HIGH PERMEABILITY; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-12%, PHOSPHATIC SAND-04%;
OTHER FEATURES: CALCAREOUS, SPECKLED, WEATHERED, LOW RECRYSTALLIZATION;
FOSSILS: ECHINOID, MOLLUSKS, FOSSIL MOLDS;
SOME SMALL SOLUTION CAVITIES; CLAY INTERVAL AT 225-227'

232.6- 234 CLAY; VERY LIGHT GRAY TO LIGHT GRAY; NOT OBSERVED; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: LIMESTONE-10%;
OTHER FEATURES: CALCAREOUS;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS;

234 - 234 CLAY; DARK GREENISH YELLOW TO NO COLOR GIVEN; EC% POROSITY, , VUGULAR, ;

234 - 239 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY; 20% POROSITY, INTERGRANULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BIOTURBATED, BEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, SPAR-08%, DOLOMITE-03%, CLAY-05%;
OTHER FEATURES: CALCAREOUS, COQUINA, LOW RECRYSTALLIZATION;
FOSSILS: BRYOZOA, MOLLUSKS, ECHINOID, FOSSIL FRAGMENTS, FOSSIL MOLDS;

239 - 244 DOLOSTONE; LIGHT GRAY TO YELLOWISH GRAY; 10% POROSITY, PIN POINT VUGS, INTERGRANULAR, LOW PERMEABILITY; 0-10% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-12%, CLAY-10%;
OTHER FEATURES: CALCAREOUS, VARVED, SPECKLED, GRANULAR, LOW RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;

244 - 246.5 DOLOSTONE; LIGHT GRAY TO LIGHT GREENISH GRAY; 07% POROSITY, VUGULAR, PIN POINT VUGS,
LOW PERMEABILITY; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED, MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-12%;
OTHER FEATURES: CALCAREOUS, GRANULAR, SPECKLED, LOW RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;
SEVERAL PHOSPHATE-RICH CLAY SEAMS

246.5- 249 CLAY; LIGHT GRAY TO GREENISH GRAY; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED,
ACCESSORY MINERALS: DOLOMITE-10%, PHOSPHATIC SAND-10%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY, SPECKLED;
FOSSILS: NO FOSSILS;

249 - 251.5 DOLOSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY; 10% POROSITY, VUGULAR, PIN POINT VUGS,
LOW PERMEABILITY; 0-10% ALTERED; SUBHEDRAL;
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED, MOTTLED, STREAKED,
ACCESSORY MINERALS: CLAY-20%, PHOSPHATIC SAND-15%;
OTHER FEATURES: CALCAREOUS, GRANULAR, SPECKLED, VARVED, LOW RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;

251.5- 253.3 DOLOSTONE; VERY LIGHT GRAY TO YELLOWISH GRAY; 20% POROSITY, FRACTURE, MOLDIC,
POSSIBLY HIGH PERMEABILITY; 0-10% ALTERED; SUBHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: BRECCIATED, LAMINATED, MOTTLED, BIOTURBATED,
OTHER FEATURES: CALCAREOUS, WEATHERED, VARVED;
FOSSILS: MOLLUSKS;
SOLUTION CAVITIES FOLLOWING FRACTURES, GASTROPODS & PELECYPODS

253.3- 253.7 CLAY; MODERATE LIGHT GRAY TO GREENISH BLACK; NOT OBSERVED; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED,
OTHER FEATURES: PLASTIC, VARVED, GREASY, STROMATAL;
FOSSILS: NO FOSSILS;

253.7- 254 DOLOSTONE; MODERATE LIGHT GRAY; 10% POROSITY, VUGULAR, FRACTURE,
POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CHERT-04%, CLAY-05%;
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;

254 - 255.4 DOLOSTONE; LIGHT GRAY; 10% POROSITY, FRACTURE, POSSIBLY HIGH PERMEABILITY;
10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-10%;
OTHER FEATURES: COQUINA, MEDIUM RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;

255.4- 255.7 CLAY; LIGHT OLIVE GRAY TO LIGHT OLIVE; NOT OBSERVED; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE-05%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, PLASTIC, GREASY;
FOSSILS: NO FOSSILS;

255.7- 259 CLAY; LIGHT OLIVE GRAY TO DARK GRAYISH YELLOW; NOT OBSERVED; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: MOTTLED,
OTHER FEATURES: PLASTIC, GREASY;
FOSSILS: NO FOSSILS;
DOLOMITE LAYER AT 256.3, 75% RECOVERY 254-259

259 - 264 DOLOSTONE; LIGHT GRAY; 04% POROSITY, FRACTURE, INTERCRYSTALLINE,
LOW PERMEABILITY; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-20%;
OTHER FEATURES: CALCAREOUS;
FOSSILS: NO FOSSILS;
PLASTIC GREASY DOLOMITIC CLAY SEAMS AT 261.3 & 262.6, 75% RECOVERY 259-264

264 - 279 DOLOSTONE; LIGHT OLIVE GRAY TO MODERATE LIGHT GRAY; 08% POROSITY, VUGULAR, MOLDIC,
LOW PERMEABILITY; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-05%, PHOSPHATIC SAND-05%, PHOSPHATIC GRAVEL-01%;
OTHER FEATURES: CALCAREOUS, SPECKLED, WEATHERED, VARVED, MEDIUM RECRYSTALLIZATION;
FOSSILS: FOSSIL MOLDS, ORGANICS;
CLAY LAYERS REPORTED AT 267.3, 273.5, 274 & 277

279 - 286 DOLOSTONE; LIGHT GRAY; 05% POROSITY, VUGULAR, INTERCRYSTALLINE,
LOW PERMEABILITY; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING,
ACCESSORY MINERALS: CLAY-20%, PHOSPHATIC SAND-05%, PHOSPHATIC GRAVEL-01%;
OTHER FEATURES: CALCAREOUS, VARVED, LOW RECRYSTALLIZATION;
FOSSILS: NO FOSSILS;
CLAY LAYER REPORTED AT 282.7

286 - 289.3 DOLOSTONE; YELLOWISH GRAY TO MODERATE GRAY; 15% POROSITY, MOLDIC, VUGULAR,
POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; POOR INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, LAMINATED, STREAKED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-07%, PHOSPHATIC SAND-03%, PHOSPHATIC GRAVEL-01%;
OTHER FEATURES: CALCAREOUS, WEATHERED, LOW RECRYSTALLIZATION, STROMATAL,
LOW RECRYSTALLIZATION;
FOSSILS: BRYOZOA, MOLLUSKS, FOSSIL MOLDS, FOSSIL FRAGMENTS, ORGANICS;
85% RECOVERY 284-289

289.3- 299 LIMESTONE; VERY LIGHT GRAY TO YELLOWISH GRAY; 12% POROSITY, VUGULAR, MOLDIC,
LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, MASSIVE,
ACCESSORY MINERALS: CLAY-05%, DOLOMITE-02%, CALCITE-02%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, WEATHERED, VARVED, REEFAL;
FOSSILS: MOLLUSKS, CORAL, WORM TRACES, FOSSIL FRAGMENTS, FOSSIL MOLDS;
LIMESTONE INTERVAL WITH DECREASING CLAY TOWARDS TOP OF INTERVAL

299 - 315 LIMESTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY; 20% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED, BEDDED, MOTTLED, MASSIVE,
ACCESSORY MINERALS: CLAY-10%, CALCITE-08%, DOLOMITE-02%;
OTHER FEATURES: CALCAREOUS, CHALKY, WEATHERED, REEFAL, VARVED;
FOSSILS: ECHINOID, MOLLUSKS, FOSSIL MOLDS, FOSSIL FRAGMENTS, BRYOZOA;

315 - 329 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 15% POROSITY, MOLDIC, INTERCRYSTALLINE, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, MASSIVE, MOTTLED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-05%;
OTHER FEATURES: CALCAREOUS, SPECKLED, WEATHERED, SPECKLED, VARVED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
95% RECOVERY 315-329 VARIABLE POROSITY ESTIMATES FROM 315-329 RANGING FROM 8-25%

329 - 339 LIMESTONE; MODERATE LIGHT GRAY TO VERY LIGHT ORANGE; 10% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, SKELETAL CAST, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, MASSIVE, MOTTLED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-05%, CALCITE-04%;
OTHER FEATURES: CALCAREOUS, CHALKY, REEFAL, SPECKLED;
FOSSILS: MOLLUSKS, BRYOZOA, CORAL, FOSSIL FRAGMENTS, FOSSIL MOLDS;
A FEW CLAY-FILLED VOIDS PRESENT, SPARRY CALCITE CEMENT AT 335

339 - 345.7 CLAY; LIGHT GRAY TO YELLOWISH GRAY; 02% POROSITY, MOLDIC, LOW PERMEABILITY;
POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED, BIOTURBATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-18%, LIMESTONE-06%;
OTHER FEATURES: CALCAREOUS, CHALKY, SPECKLED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

345.7- 354 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 17% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, BIOTURBATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, CLAY-10%, DOLOMITE-01%;
OTHER FEATURES: CALCAREOUS, CHALKY, REEFAL, VARVED, DOLOMITIC;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, BRYOZOA, CRUSTACEA;
98% RECOVERY 339-354

354 - 369 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 15% POROSITY, MOLDIC, INTERCRYSTALLINE, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, MASSIVE, GRADED BEDDING,
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, CLAY-10%, DOLOMITE-05%, ANHYDRITE-00%;
OTHER FEATURES: WEATHERED, VARVED, CALCAREOUS, SPECKLED, CHALKY;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, BRYOZOA, WORM TRACES;

369 - 384 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 20% POROSITY, MOLDIC, INTERCRYSTALLINE, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, INTERBEDDED, LAMINATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, CLAY-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, REEFAL, VARVED, BROWN ANHYDRITE CRYSTALS;
FOSSILS: MOLLUSKS, ECHINOID, WORM TRACES, FOSSIL FRAGMENTS, FOSSIL MOLDS;

384 - 393 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 15% POROSITY, MOLDIC, INTERCRYSTALLINE, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX, PHOSPHATE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, STREAKED,
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, CLAY-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, CHALKY, COQUINA, REEFAL;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, WORM TRACES, FOSSIL MOLDS, CRUSTACEA;

393 - 394 DOLOSTONE; MODERATE LIGHT GRAY TO LIGHT OLIVE GRAY; 15% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-04%, CLAY-05%, LIMESTONE-04%;
OTHER FEATURES: CALCAREOUS, WEATHERED, MEDIUM RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

394 - 394.5 DOLOSTONE; MODERATE LIGHT GRAY TO LIGHT OLIVE GRAY; 10% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-04%, CLAY-05%, LIMESTONE-04%;
OTHER FEATURES: CALCAREOUS, WEATHERED, MEDIUM RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

394.5- 395.6 DOLOSTONE; LIGHT GRAY TO MODERATE LIGHT GRAY; 05% POROSITY, PIN POINT VUGS, INTERCRYSTALLINE, LOW PERMEABILITY; 0-10% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, MASSIVE,
ACCESSORY MINERALS: CLAY-04%, CALCITE-02%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: BRYOZOA, MOLLUSKS, MILIOLIDS;

395.6- 396.5 LIMESTONE; MODERATE LIGHT GRAY TO VERY LIGHT ORANGE; 05% POROSITY, PIN POINT VUGS, INTERCRYSTALLINE, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, PHOSPHATE CEMENT, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-12%, PHOSPHATIC SAND-10%, DOLOMITE-07%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS, BRYOZOA, MOLLUSKS, FOSSIL MOLDS;

396.5- 399 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 08% POROSITY, PIN POINT VUGS, INTERCRYSTALLINE, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, PHOSPHATE CEMENT, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-12%, PHOSPHATIC SAND-10%, DOLOMITE-07%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS, BRYOZOA, MOLLUSKS, FOSSIL MOLDS;
92% RECOVERY 394-399, ACCESSORY DOLOMITE IS COMMON

399 - 409 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 15% POROSITY, MOLDIC, INTERCRYSTALLINE, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO MEDIUM; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED, MOTTLED,
ACCESSORY MINERALS: CLAY-10%, DOLOMITE-05%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, VARIEGATED, WEATHERED, CHALKY;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, CRUSTACEA;

409 - 414.4 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 05% POROSITY, INTERCRYSTALLINE, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, BIOTURBATED,
ACCESSORY MINERALS: CLAY-15%, DOLOMITE-10%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

414.4- 419 DOLOSTONE; LIGHT OLIVE GRAY TO GRAYISH RED; 0c% POROSITY, VUGULAR, LOW PERMEABILITY; 0-10% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, LAMINATED, STREAKED, MASSIVE, BRECCIATED,
ACCESSORY MINERALS: CLAY-05%, LIMESTONE-15%, ANHYDRITE-0c%, HEAVY MINERALS-0c%;
OTHER FEATURES: VARVED, CALCAREOUS, HIGH RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
95% RECOVERY 414-419

419 - 424 LIMESTONE; VERY LIGHT ORANGE TO VERY LIGHT GRAY; 10% POROSITY, PIN POINT VUGS, INTERCRYSTALLINE, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: GRADED BEDDING, BIOTURBATED, LAMINATED,
ACCESSORY MINERALS: DOLOMITE-05%, CLAY-05%, PHOSPHATIC SAND-05%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, GRANULAR, VARVED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, WORM TRACES;
1" CLAY LAYER AT 419.2' & DOLOMITE LAYER AT 419.1'

424 - 426.7 LIMESTONE; LIGHT GRAY TO VERY LIGHT ORANGE; 04% POROSITY, PIN POINT VUGS, INTERCRYSTALLINE, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED, MOTTLED,
ACCESSORY MINERALS: CLAY-12%, DOLOMITE-05%, PHOSPHATIC SAND-06%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY, WEATHERED, GRANULAR;
FOSSILS: MOLLUSKS, ECHINOID, FOSSIL FRAGMENTS, ORGANICS;

426.7- 430 DOLOSTONE; LIGHT OLIVE GRAY; 02% POROSITY, PIN POINT VUGS, INTERCRYSTALLINE, LOW PERMEABILITY; 0-10% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, LAMINATED, STREAKED, BIOTURBATED,
ACCESSORY MINERALS: LIMESTONE-04%;
OTHER FEATURES: CALCAREOUS, VARVED;
FOSSILS: MOLLUSKS, ECHINOID, ORGANICS;

430 - 434.5 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 12% POROSITY, MOLDIC, VUGULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, BRECCIATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CLAY-17%, DOLOMITE-04%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, GRANULAR, SPECKLED, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS;
BRECCIATED WITH DOLOMITE FRAGMENTS 1-5 MM IN LENGTH DENSE LIMESTONE, LOW POROSITY, AT 434.5' INTERVAL

434.5- 442 DOLOSTONE; LIGHT OLIVE GRAY TO OLIVE GRAY; 15% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-12%, PHOSPHATIC SAND-04%;
OTHER FEATURES: CALCAREOUS, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, ORGANICS;
TWO MAIN ZONES OF HIGH POROSITY AT 439.3 AND 440.2 OCCASIONAL CLAY LENSES AND VUGS

442 - 445.5 DOLOSTONE; LIGHT OLIVE GRAY TO OLIVE GRAY; 20% POROSITY, MOLDIC, VUGULAR, POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-15%, PHOSPHATIC SAND-10%;
OTHER FEATURES: CALCAREOUS, REEFAL, SUCROSIC, VARVED, WEATHERED;
FOSSILS: MOLLUSKS, BRYOZOA, CORAL, FOSSIL MOLDS;

445.5- 449.5 DOLOSTONE; YELLOWISH GRAY TO LIGHT GRAY; 12% POROSITY, PIN POINT VUGS, VUGULAR, MOLDIC; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, MEDIUM RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

449.5- 456 LIMESTONE; YELLOWISH GRAY TO MODERATE LIGHT GRAY; 05% POROSITY, PIN POINT VUGS, INTERGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, LAMINATED,
ACCESSORY MINERALS: CLAY-10%, PHOSPHATIC SAND-17%, DOLOMITE-05%;
OTHER FEATURES: CALCAREOUS, SPECKLED, VARVED;
FOSSILS: NO FOSSILS;
DOLOMITE PRESENT LOCALLY

456 - 459 DOLOSTONE; YELLOWISH GRAY TO LIGHT GRAY; 10% POROSITY, MOLDIC, VUGULAR, LOW PERMEABILITY; 0-10% ALTERED; ANHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-07%, PHOSPHATIC SAND-12%;
OTHER FEATURES: CALCAREOUS, SPECKLED, DOLOMITIC;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, ORGANICS;

459 - 464 SANDSTONE; YELLOWISH GRAY TO LIGHT GRAY; 05% POROSITY, PIN POINT VUGS, INTERGRANULAR, LOW PERMEABILITY;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE;
ROUNDNESS:SUB-ANGULAR; MEDIUM SPHERICITY; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, STREAKED, LAMINATED, BIOTURBATED, BRECCIATED,
ACCESSORY MINERALS: CLAY-15%, PHOSPHATIC SAND-50%, DOLOMITE-09%;
OTHER FEATURES: CALCAREOUS, SPECKLED, DOLOMITIC, GRANULAR, VARVED;
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, ORGANICS;

95% RECOVERY

464 - 466.8 CLAY; MODERATE GRAY TO MODERATE DARK GRAY; 02% POROSITY, INTERGRANULAR, LOW PERMEABILITY;
MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, DOLOMITE CEMENT, IRON CEMENT;
SEDIMENTARY STRUCTURES: LAMINATED, STREAKED, GRADED BEDDING,
ACCESSORY MINERALS: PHOSPHATIC SAND-20%, DOLOMITE-04%;
OTHER FEATURES: CALCAREOUS, SPECKLED, DOLOMITIC, PLASTIC, STRONATAL;
FOSSILS: NO FOSSILS;

466.8- 468.4 CALCARENITE; VERY LIGHT ORANGE TO MODERATE GRAY; 02% POROSITY, PIN POINT VUGS,
INTERGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED, STREAKED, BIOTURBATED,
ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CLAY-20%;
OTHER FEATURES: CALCAREOUS, GRANULAR, STRONATAL, VARIEGATED, VARVED;
FOSSILS: NO FOSSILS, ORGANICS;

468.4- 474 SILT; VERY LIGHT ORANGE TO LIGHT GRAY; 02% POROSITY, PIN POINT VUGS, INTERGRANULAR,
LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, STREAKED,
ACCESSORY MINERALS: CLAY-25%, PHOSPHATIC SAND-15%, CALCILUTITE-15%;
OTHER FEATURES: CALCAREOUS, SPECKLED, PLATY, PARTINGS, VARVED;
FOSSILS: NO FOSSILS, ORGANICS;
80% RECOVERY 469-474, MODERATELY INDURATED PHOSPHATIC LIMEY CLAY AT 472.3'

474 - 479 CLAY; VERY LIGHT ORANGE TO MODERATE GRAY; 02% POROSITY, VUGULAR, INTERGRANULAR,
LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: PHOSPHATIC SAND-20%, CALCILUTITE-15%, SILT-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, PLASTIC, GREASY;
FOSSILS: NO FOSSILS;

479 - 487.6 CALCARENITE; VERY LIGHT GRAY TO LIGHT GRAY; 02% POROSITY, VUGULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-20%, CALCILUTITE-10%, PHOSPHATIC SAND-20%, SILT-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, GRANULAR;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
SILTY, LIMEY PHOSPHATIC CLAYS AT 481.6 AND 485.7' INTERVALS

487.6- 489.5 CLAY; VERY LIGHT GRAY TO LIGHT GRAY; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CALCILUTITE-15%, PHOSPHATIC SAND-15%, SILT-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, CHALKY;
FOSSILS: NO FOSSILS;
78% RECOVERY 484-489.5

489.5- 499 CALCARENITE; VERY LIGHT GRAY TO LIGHT GRAY; 02% POROSITY, VUGULAR, INTERGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-15%, PHOSPHATIC SAND-15%, SILT-15%, CLAY-15%;
OTHER FEATURES: CALCAREOUS, CHALKY, SPECKLED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ORGANICS;
CLAY LAYER AT 494'

499 - 516.7 CALCARENITE; LIGHT GRAY TO VERY LIGHT ORANGE; 02% POROSITY, VUGULAR, LOW PERMEABILITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCILUTITE-15%, PHOSPHATIC SAND-15%, SILT-10%, CLAY-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, CHALKY, UNWASHED SAMPLE;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS, MOLLUSKS;

516.7- 519 CLAY; VERY LIGHT GRAY TO VERY LIGHT ORANGE; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING,
ACCESSORY MINERALS: CALCILUTITE-10%, HEAVY MINERALS-02%, PHOSPHATIC SAND-05%;
OTHER FEATURES: CALCAREOUS, PLASTIC;
FOSSILS: NO FOSSILS;

519 - 523.3 CALCARENITE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 05% POROSITY, VUGULAR, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-20%, HEAVY MINERALS-02%, PHOSPHATIC SAND-03%;
OTHER FEATURES: CALCAREOUS, CHALKY;

523.3- 524.8 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; NOT OBSERVED;
GRAIN TYPE: CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CALCILUTITE-20%, CLAY-20%, HEAVY MINERALS-03%;
OTHER FEATURES: CALCAREOUS, CHALKY;
FOSSILS: NO FOSSILS;

524.8- 525.8 SILT; GRAYISH BROWN TO DARK YELLOWISH BROWN; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED, MOTTLED,
ACCESSORY MINERALS: CALCILUTITE-10%, CLAY-15%, HEAVY MINERALS-05%;
OTHER FEATURES: CALCAREOUS, PLATY, STROMATAL, PARTINGS;
FOSSILS: NO FOSSILS, ORGANICS;

525.8- 539 CALCARENITE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 03% POROSITY, VUGULAR, INTERGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-15%, CLAY-15%, HEAVY MINERALS-03%, PHOSPHATIC SAND-03%;
OTHER FEATURES: CALCAREOUS, SPECKLED, CHALKY;
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS;

539 - 549.5 CALCARENITE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 02% POROSITY, INTERGRANULAR, VUGULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-10%, CLAY-12%, HEAVY MINERALS-07%;
OTHER FEATURES: CALCAREOUS, SPECKLED, VARVED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ORGANICS;
DUSKY YELLOW CLAY LAYER AT 544.6; GREEN CLAY AT 544.0'; DOLOMITIC CHUNKS AT 543.2', 92% RECOVERY 549-554

549.5- 554 CLAY; LIGHT OLIVE TO VERY LIGHT ORANGE; NOT OBSERVED; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, MASSIVE, MOTTLED,
ACCESSORY MINERALS: SILT-10%, CALCILUTITE-07%, HEAVY MINERALS-05%;
OTHER FEATURES: CALCAREOUS, PLASTIC, MUDDY, VARVED;
FOSSILS: NO FOSSILS, ORGANICS;

554 - 557 CALCARENITE; LIGHT GRAY TO GRAYISH OLIVE; 02% POROSITY, PIN POINT VUGS, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, MOTTLED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-10%, SILT-10%, HEAVY MINERALS-05%, CLAY-15%;
OTHER FEATURES: CALCAREOUS, CHALKY, SPECKLED, VARVED, VARIEGATED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS;

557 - 561.2 CLAY; LIGHT GRAY TO VERY LIGHT ORANGE; 02% POROSITY, FRACTURE, LOW PERMEABILITY;
MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, STREAKED, BIOTURBATED,
OTHER FEATURES: CALCAREOUS, CHALKY, VARVED, VARIEGATED, STROMATAC;
FOSSILS: NO FOSSILS, ORGANICS;

561.2- 564.4 CLAY; VERY LIGHT GRAY TO VERY LIGHT ORANGE; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: SILT-10%, HEAVY MINERALS-02%;
OTHER FEATURES: CALCAREOUS, PLASTIC;
FOSSILS: NO FOSSILS;
CALCARENITE LAYER AT 563.4

564.4- 576 CLAY; LIGHT OLIVE GRAY TO OLIVE GRAY; 02% POROSITY, FRACTURE, LOW PERMEABILITY;
MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING,
ACCESSORY MINERALS: SILT-10%, HEAVY MINERALS-04%;
OTHER FEATURES: CALCAREOUS, SPECKLED, PARTINGS, PLASTIC, CHALKY;
FOSSILS: NO FOSSILS, ORGANICS;
PINKISH GRAY LIMESTONE AT 571.4; 90% RECOVERY 569-574'

576 - 583 CALCARENITE; YELLOWISH GRAY TO LIGHT OLIVE; 02% POROSITY, FRACTURE, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED,
ACCESSORY MINERALS: SILT-17%, HEAVY MINERALS-04%;
OTHER FEATURES: CALCAREOUS, SPECKLED, VARIEGATED;
FOSSILS: NO FOSSILS;

583 - 591.7 CLAY; LIGHT GRAY TO GREENISH BLACK; 02% POROSITY, FRACTURE, LOW PERMEABILITY;
MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, LAMINATED, MOTTLED,
ACCESSORY MINERALS: HEAVY MINERALS-02%, SILT-10%;
OTHER FEATURES: CALCAREOUS, PLASTIC, VARIEGATED, VARVED;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS;
LIMESTONE LAYER AT 591.2; INCREASINGLY CALCAREOUS TOWARDS 589' INTERVAL

591.7- 604 CALCARENITE; MODERATE LIGHT GRAY TO VERY LIGHT ORANGE; 02% POROSITY, PIN POINT VUGS,
LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, LAMINATED,
ACCESSORY MINERALS: CLAY-20%, HEAVY MINERALS-04%, PHOSPHATIC SAND-10%, SILT-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, VARVED;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS;

90% RECOVERY 589-594'; 88% RECOVERY 599-604'

604 - 613.5 CLAY; OLIVE GRAY TO LIGHT OLIVE GRAY; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, MOTTLED,
ACCESSORY MINERALS: SILT-10%, CALCILUTITE-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED, WEATHERED, CHALKY, VARVED;
FOSSILS: NO FOSSILS, ORGANICS;

613.5- 617.8 LIMESTONE; YELLOWISH GRAY TO MODERATE DARK GRAY; 10% POROSITY, VUGULAR, MOLDIC,
LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, STREAKED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-07%, SPAR-10%;
OTHER FEATURES: CALCAREOUS, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, ORGANICS;
CALCARENITE PRESENT; 87% RECOVERY 613.5-617.8'

617.8- 629 CLAY; VERY LIGHT GRAY TO LIGHT GRAY; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED,
ACCESSORY MINERALS: HEAVY MINERALS-04%, CALCILUTITE-10%;
OTHER FEATURES: CALCAREOUS, SPECKLED;
FOSSILS: NO FOSSILS, ORGANICS;
INTERVAL IS MOSTLY SLIGHTLY CALCAREOUS CLAY CALCILUTITE LAYER AT 624.6

629 - 631 LIMESTONE; VERY LIGHT GRAY TO MODERATE LIGHT GRAY; 10% POROSITY, VUGULAR, MOLDIC,
LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-15%;
OTHER FEATURES: CALCAREOUS, WEATHERED, CHALKY;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, FOSSIL FRAGMENTS, ORGANICS;

631 - 639.6 CALCILUTITE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 02% POROSITY, INTERGRANULAR,
LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-40%, HEAVY MINERALS-02%, PHOSPHATIC SAND-03%;
CLAY INTERVAL AT 637.6

639.6- 641.8 CLAY; VERY LIGHT GRAY TO LIGHT GRAY; NOT OBSERVED; POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: SILT-03%, HEAVY MINERALS-02%;
OTHER FEATURES: CALCAREOUS, CHALKY, PLASTIC;
FOSSILS: FOSSIL FRAGMENTS;

641.8- 644 CALCARENITE; LIGHT GRAY TO LIGHT OLIVE GRAY; 02% POROSITY, INTRAGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, NODULAR,
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, SILT-05%, HEAVY MINERALS-04%, CLAY-30%;
OTHER FEATURES: CALCAREOUS, SPECKLED;
FOSSILS: FOSSIL MOLDS, ORGANICS;
60% RECOVERY 639.6-644

644 - 649 CLAY; DARK GREENISH GRAY; 0N% POROSITY, POOR INDURATION;
CEMENT TYPE(S): CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: SHALE-20%;
OTHER FEATURES: PLASTIC;
FOSSILS: NO FOSSILS, ORGANICS;
THIS CLAY INTERVAL IS A WAXY DARK GREEN "SHALE"

649 - 650.4 SANDSTONE; DARK GREENISH GRAY TO MODERATE LIGHT GRAY; 04% POROSITY, INTERGRANULAR, LOW PERMEABILITY;
GRAIN SIZE: FINE; RANGE: VERY FINE TO MEDIUM;
ROUNDNESS: SUB-ANGULAR TO ROUNDED; MEDIUM SPHERICITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BRECCIATED, INTERBEDDED,
ACCESSORY MINERALS: CLAY-20%, HEAVY MINERALS-03%, PHOSPHATIC SAND-05%, CALCITE-05%;
OTHER FEATURES: CALCAREOUS, POOR SAMPLE, GRANULAR, SPECKLED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, ORGANICS;

650.4- 650.7 CALCARENITE; WHITE TO VERY LIGHT GRAY; 03% POROSITY, INTERGRANULAR, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-20%, HEAVY MINERALS-03%, PHOSPHATIC SAND-04%;
OTHER FEATURES: CALCAREOUS, GRANULAR, SPECKLED, WEATHERED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ORGANICS;

650.7- 654 SHALE; GREENISH BLACK; NOT OBSERVED; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, FISSILE,
ACCESSORY MINERALS: CLAY-15%, HEAVY MINERALS-02%, QUARTZ SAND-01%;
OTHER FEATURES: CALCAREOUS, PLATY, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS;
47% RECOVERY

654 - 656.3 SHALE; VERY LIGHT GRAY TO GREENISH BLACK; 03% POROSITY, FRACTURE, LOW PERMEABILITY; MODERATE INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, FISSILE, LAMINATED,
ACCESSORY MINERALS: CLAY-20%;
OTHER FEATURES: CALCAREOUS, CHALKY, VARIEGATED, WEATHERED, STROMATAL;
GREEN SHALE INTERBEDDED WITH WHITE CHALK

656.3- 664.5 CALCARENITE; VERY LIGHT GRAY TO VERY LIGHT ORANGE; 05% POROSITY, MOLDIC, INTERGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BRECCIATED, BIOTURBATED,
ACCESSORY MINERALS: QUARTZ SAND-30%, CLAY-20%, HEAVY MINERALS-02%, PHOSPHATIC SAND-03%;
OTHER FEATURES: CALCAREOUS, BROWN ANHYDRITE CRYSTALS, GRANULAR, CHALKY, VARVED;
FOSSILS: MOLLUSKS, WORM TRACES, FOSSIL FRAGMENTS, ORGANICS;

664.5- 665.5 SANDSTONE; VERY LIGHT GRAY TO LIGHT GRAY; 05% POROSITY, INTERGRANULAR, LOW PERMEABILITY;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE;
ROUNDNESS: SUB-ANGULAR TO ANGULAR; LOW SPHERICITY; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-20%, HEAVY MINERALS-03%, PHOSPHATIC SAND-04%, CALCILUTITE-20%;
OTHER FEATURES: CALCAREOUS, GRANULAR, CHALKY, WEATHERED, VARVED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, ORGANICS;
GASTROPOD MOLDS

665.5- 674 LIMESTONE; YELLOWISH GRAY TO VERY LIGHT GRAY; 04% POROSITY, VUGULAR, LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, NODULAR, GRADED BEDDING, BIOTURBATED,
ACCESSORY MINERALS: CLAY-15%, HEAVY MINERALS-02%, IRON STAIN-01%, QUARTZ SAND-08%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY, WEATHERED, SPECKLED;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
70% RECOVERY 665.5-674'

674 - 686 LIMESTONE; LIGHT GRAY TO VERY LIGHT ORANGE; 02% POROSITY, INTERGRANULAR, FRACTURE,
LOW PERMEABILITY;
GRAIN TYPE: CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING,
ACCESSORY MINERALS: CLAY-20%, HEAVY MINERALS-03%, QUARTZ SAND-10%, PHOSPHATIC SAND-02%;
OTHER FEATURES: CALCAREOUS, GRANULAR, SPECKLED, CHALKY;
FOSSILS: NO FOSSILS;
PICKED AS TOP OF SUWANNEE FORMATION

686 - 699 CALCARENITE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR,
MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): SPARRY CALCITE CEMENT, DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, GRADED BEDDING, BIOTURBATED,
ACCESSORY MINERALS: CLAY-05%, DOLOMITE-10%;
OTHER FEATURES: CALCAREOUS, COQUINA, LOW RECRYSTALLIZATION, GRANULAR, SUCROSIC;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, ORGANICS;
75% RECOVERY 689-694'

699 - 714 CALCARENITE; YELLOWISH GRAY TO VERY LIGHT ORANGE; 15% POROSITY, INTERGRANULAR,
PIN POINT VUGS, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-02%;
OTHER FEATURES: CALCAREOUS, COQUINA, GRANULAR;
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS, BENTHIC FORAMINIFERA;
SEVERAL GRAY CALCAREOUS CLAY LENSES, AVERAGES 2% DOLOMITE FROM 699-709'; TRACE HEAVY
MINERALS FROM 706-709'

714 - 729 CALCARENITE; YELLOWISH GRAY TO VERY LIGHT ORANGE; 10% POROSITY, INTERGRANULAR,
POSSIBLY HIGH PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): SPARRY CALCITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED, BIOTURBATED, BEDDED,
ACCESSORY MINERALS: CLAY-05%, GLAUCONITE-01%;
OTHER FEATURES: CALCAREOUS, COQUINA, GRANULAR;
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, MOLLUSKS, ORGANICS;

CLAY LAYER AT 725.7' ABUNDANT PELECYPOD & GASTROPOD MOLDS AND MICROFOSSILS NEAR 725'

729 - 744 CALCARENITE; VERY LIGHT ORANGE TO VERY LIGHT GRAY; 05% POROSITY, INTERGRANULAR,
LOW PERMEABILITY, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE; GOOD INDURATION;
CEMENT TYPE(S): CLAY MATRIX, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: GRADED BEDDING, INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-15%, CALCILUTITE-10%, HEAVY MINERALS-03%;
OTHER FEATURES: CALCAREOUS, GRANULAR, COQUINA;
FOSSILS: BENTHIC FORAMINIFERA, MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
TRACE HEAVY MINERALS ONLY AT 734-738'

744 - 759 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 10% POROSITY, INTERGRANULAR,
PIN POINT VUGS, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-10%, CALCILUTITE-15%, DOLOMITE-05%;
OTHER FEATURES: CALCAREOUS, GRANULAR, DOLOMITIC, CHALKY;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, FOSSIL MOLDS;
MINOR DOLOMITE PRESENT FROM 749-755 INTERVAL, 88% RECOVERY 744-749', 76% RECOVERY 754-759'

759 - 774 LIMESTONE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 12% POROSITY, MOLDIC, FRACTURE, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-15%, CALCILUTITE-40%;
OTHER FEATURES: CALCAREOUS, DOLOMITIC, CHALKY, WEATHERED, VARVED;
WELL-INDURATED DOLOMITE LAYER AT 764.1

774 - 789 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 15% POROSITY, INTERGRANULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-10%, CALCILUTITE-20%;
OTHER FEATURES: CALCAREOUS, GRANULAR, REEFAL;
FOSSILS: MOLLUSKS, BRACHIOPOD, FOSSIL MOLDS, CORAL;

789 - 804 CALCARENITE; VERY LIGHT ORANGE TO VERY LIGHT GRAY; 20% POROSITY, VUGULAR, INTERGRANULAR, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, INTRACLASTS, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-05%, CALCILUTITE-20%, GLAUCONITE-01%;
OTHER FEATURES: CALCAREOUS, REEFAL, GRANULAR;
FOSSILS: MOLLUSKS, BRACHIOPOD, CORAL, FOSSIL FRAGMENTS, FOSSIL MOLDS;
SOLUTION CHANNELS FROM 797.3-799; LARGE WORM TUBE AT 802'

804 - 824 CALCARENITE; VERY LIGHT ORANGE; 15% POROSITY, INTERGRANULAR, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-07%, CALCILUTITE-15%;
OTHER FEATURES: CALCAREOUS, GRANULAR;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, FOSSIL MOLDS;
AVERAGE OF 85% RECOVERY OVER THESE CALCARENITE INTERVALS

824 - 839 CALCARENITE; YELLOWISH GRAY TO VERY LIGHT ORANGE; 15% POROSITY, INTERGRANULAR, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CLAY-05%, CALCILUTITE-20%;
OTHER FEATURES: CALCAREOUS, GRANULAR, CHALKY;
FOSSILS: MOLLUSKS, BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, FOSSIL MOLDS;

839 - 849.5 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 10% POROSITY, INTERGRANULAR, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-20%, SPAR-08%, CLAY-03%;
OTHER FEATURES: CALCAREOUS, GRANULAR, CHALKY;
FOSSILS: MILIOLIDS, FOSSIL FRAGMENTS, FOSSIL MOLDS, BRYOZOA, MOLLUSKS;

849.5- 859 CALCARENITE; YELLOWISH GRAY TO GRAYISH ORANGE; 35% POROSITY, INTERGRANULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-25%, SPAR-10%, CLAY-01%;
OTHER FEATURES: CALCAREOUS, GRANULAR, COQUINA;
FOSSILS: MILIOLIDS, ECHINOID, BRYOZOA, FOSSIL FRAGMENTS, FOSSIL MOLDS;
THIS LIMESTONE IS ESSENTIALLY A MILLIOIDAL LIMESTONE, TRACE DICTYCONUS COOKEI, SOME PELECYPOD MOLDS

859 - 874 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 10% POROSITY, INTERGRANULAR, MOLDIC, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-15%, SPAR-05%, CLAY-05%;
OTHER FEATURES: CALCAREOUS, GRANULAR, CHALKY, COQUINA;
FOSSILS: MILIOLIDS, MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
ECHINOID CROSS-SECTIONS, MILLIODAL COQUINA MATRIX

874 - 889 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 25% POROSITY, INTERGRANULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-20%, SPAR-10%, CLAY-01%;
OTHER FEATURES: CALCAREOUS, GRANULAR, SUCROSIC, CHALKY;
FOSSILS: MILIOLIDS, MOLLUSKS, ECHINOID, FOSSIL FRAGMENTS, FOSSIL MOLDS;

889 - 904 CALCARENITE; VERY LIGHT ORANGE TO GRAYISH ORANGE; 20% POROSITY, INTERGRANULAR, MOLDIC, POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-20%, SPAR-10%, CLAY-01%;
OTHER FEATURES: CALCAREOUS, GRANULAR, COQUINA, CHALKY;
FOSSILS: MILIOLIDS, ECHINOID, FOSSIL FRAGMENTS, FOSSIL MOLDS, BRYOZOA;
CALCILUTITE LAYER AT 903'

904 - 913 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 05% POROSITY, INTERGRANULAR, LOW PERMEABILITY, MOLDIC;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE-15%, SPAR-01%, CLAY-02%;
OTHER FEATURES: CALCAREOUS, GRANULAR, CHALKY;
FOSSILS: MILIOLIDS, BRYOZOA, ECHINOID, FOSSIL FRAGMENTS, FOSSIL MOLDS;

913 - 914 DOLOSTONE; MODERATE BROWN TO DARK YELLOWISH BROWN; 02% POROSITY, FRACTURE, LOW PERMEABILITY; 90-100% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MASSIVE,
ACCESSORY MINERALS: CHERT-03%;
OTHER FEATURES: DOLOMITIC, SPLINTERY;
FOSSILS: MOLLUSKS, FOSSIL MOLDS;

914 - 917 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 05% POROSITY, INTERGRANULAR, LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT, CLAY MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCILUTITE-15%, SPAR-01%, CLAY-02%;
OTHER FEATURES: CALCAREOUS, CHALKY;
FOSSILS: MILIOLIDS, FOSSIL FRAGMENTS, FOSSIL MOLDS;

917 - 919 DOLOSTONE; MODERATE YELLOWISH BROWN; 06% POROSITY, PIN POINT VUGS, LOW PERMEABILITY; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MASSIVE,
ACCESSORY MINERALS: CHERT-01%;
OTHER FEATURES: DOLOMITIC, GRANULAR, SUCROSIC;
FOSSILS: MILIOLIDS, MOLLUSKS, FOSSIL FRAGMENTS, FOSSIL MOLDS;
ALTERNATING LAYERS OF DOLOMITE; 90% RECOVERY

919 - 924 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 03% POROSITY, FRACTURE, LOW PERMEABILITY, PIN POINT VUGS; 50-90% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, ;
SEDIMENTARY STRUCTURES: , , BRECCIATED, , ,
OTHER FEATURES: DOLOMITIC, HIGH RECRYSTALLIZATION, SUCROSIC, MEDIUM RECRYSTALLIZATION;
FOSSILS: MOLLUSKS, FOSSIL MOLDS, MILIOLIDS, FOSSIL FRAGMENTS;

95% RECOVERY 919-924'; WELL WAS DRILLED TO THIS DEPTH ON 4-23-84 AND THEN DRILLED TO 1700 FEET AT A LATER DATE; THE INTERVAL FROM 0-924 WAS DESCRIBED BY JIM CLAYTON, AND 924-1700 BY JOHN DECKER

924 - 925 DOLOSTONE; DARK YELLOWISH BROWN TO MODERATE YELLOWISH BROWN; 03% POROSITY, LOW PERMEABILITY, FRACTURE, INTRAGRANULAR; 90-100% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, MASSIVE,
ACCESSORY MINERALS: CALCILUTITE- %, CLAY- %;
OTHER FEATURES: COQUINA, CALCAREOUS, HIGH RECRYSTALLIZATION;
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS;

925 - 930 DOLOSTONE; GRAYISH BROWN TO DARK YELLOWISH BROWN; 03% POROSITY, LOW PERMEABILITY,
INTRAGRANULAR; 50-90% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, MASSIVE,
OTHER FEATURES: SUCROSIC, MEDIUM RECRYSTALLIZATION;

930 - 940 DOLOSTONE; MODERATE BROWN TO MODERATE YELLOWISH BROWN; 03% POROSITY, LOW PERMEABILITY,
INTRAGRANULAR; 50-90% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, MASSIVE,
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC;
INTERBEDDED DOLOMITE, CALCILUTITE AND FINE-GRAINED CALCARENITE

940 - 946 DOLOSTONE; DARK YELLOWISH BROWN TO GRAYISH BROWN; 03% POROSITY, LOW PERMEABILITY,
INTRAGRANULAR; 50-90% ALTERED; ANHEDRAL;
GRAIN SIZE: CRYPTOCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, SILICIC CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-02%;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC;
MORE INTERBEDDED CALCILUTITE

946 - 950 CALCARENITE; VERY LIGHT ORANGE TO YELLOWISH GRAY; 16% POROSITY, INTERGRANULAR,
LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CALCILUTITE-05%, CALCITE-02%, DOLOMITE-05%;
OTHER FEATURES: CALCAREOUS, CHALKY, WEATHERED, LOW RECRYSTALLIZATION;
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS;
CLAY-RICH CALCILUTITE

950 - 955 CALCARENITE; YELLOWISH GRAY TO LIGHT GRAYISH GREEN; 12% POROSITY, INTERGRANULAR,
LOW PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CALCILUTITE-30%, CLAY-20%, SILT- %, DOLOMITE- %;
OTHER FEATURES: CALCAREOUS, CHALKY, COQUINA, LOW RECRYSTALLIZATION;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA;
TOP OF CRYSTAL RIVER FORMATION, POSSIBLE LEPIDOCYCLINA FRAGMENT

955 - 965 CALCILUTITE; VERY LIGHT ORANGE; 16% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCITE- %, DOLOMITE-01%;
OTHER FEATURES: COQUINA, CALCAREOUS, CHALKY, LOW RECRYSTALLIZATION;
FOSSILS: FOSSIL FRAGMENTS, FOSSIL MOLDS, BENTHIC FORAMINIFERA;
LEPIDOCYCLINA OCALANA OR LEPIDOCYCLINA CHAPERI; ALTERED FOSSIL FRAGMENTS PRESENT

965 - 980 CALCILUTITE; VERY LIGHT ORANGE TO MODERATE ORANGE PINK; 18% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCITE- %;
OTHER FEATURES: CHALKY, CALCAREOUS, LOW RECRYSTALLIZATION, COQUINA;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA;

980 - 995 CALCILUTITE; VERY LIGHT ORANGE TO MODERATE PINK; 18% POROSITY, INTERGRANULAR,
PIN POINT VUGS;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GRAIN SIZE: VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
OTHER FEATURES: CHALKY, CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA;

995 - 1010 CALCARENITE; VERY LIGHT ORANGE TO MODERATE PINK; 20% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCILUTITE- %;
OTHER FEATURES: CHALKY, CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: BENTHIC FORAMINIFERA;
NUMMULITES VANDERSTOKI FROM 1000-1010', ALSO OPERCULINOIDES, LIMESTONE VARYING BETWEEN
CALCILUTITE TO CALCARENITE

1010 - 1025 CALCARENITE; VERY LIGHT ORANGE TO MODERATE PINK; 20% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCILUTITE- %;
OTHER FEATURES: CHALKY, CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: BENTHIC FORAMINIFERA;

1025 - 1040 CALCARENITE; VERY LIGHT ORANGE TO MODERATE PINK; 18% POROSITY, INTERGRANULAR;
GRAIN TYPE: CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
OTHER FEATURES: CHALKY, CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS;

1040 - 1051 CALCARENITE; MODERATE YELLOWISH BROWN TO VERY LIGHT ORANGE; 15% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, SILICIC CEMENT, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: CALCILUTITE- %, DOLOMITE- %;
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION, GRANULAR, DOLOMITIC;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS;
CALCAREOUS DOLOMITE; FOSSIL CASTS, OPERULINOIDES & NUMMILITES

1051 - 1055 DOLOSTONE; LIGHT BROWN; 18% POROSITY, INTERGRANULAR, PIN POINT VUGS,
POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCILUTITE- %;
OTHER FEATURES: CALCAREOUS, GRANULAR, MEDIUM RECRYSTALLIZATION, SUCROSIC;

1055 - 1070 DOLOSTONE; MODERATE BROWN; 04% POROSITY, INTRAGRANULAR, PIN POINT VUGS,
FRACTURE; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC, SPLINTERY;

1070 - 1075 DOLOSTONE; MODERATE BROWN; 04% POROSITY, INTRAGRANULAR, INTERGRANULAR,
PIN POINT VUGS; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: LIMESTONE-40%;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC, COQUINA;
LAYER OF LIMESTONE PRESENT

1075 - 1080 LIMESTONE; LIGHT BROWN TO VERY LIGHT ORANGE; 25% POROSITY, INTERGRANULAR,
POSSIBLY HIGH PERMEABILITY;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE-40%;
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION, GRANULAR;

1080 - 1100 DOLOSTONE; LIGHT BROWN; 18% POROSITY, INTERGRANULAR,
POSSIBLY HIGH PERMEABILITY; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: LIMESTONE-30%;
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION, GRANULAR, COQUINA, SUCROSIC;
1085-1100 IS SOFT FRIABLE CALCAREOUS DOLOMITE

1100 - 1110 AS ABOVE

1110 - 1115 AS ABOVE

1115 - 1120 AS ABOVE

1120 - 1125 DOLOSTONE; LIGHT BROWN; 14% POROSITY, INTERGRANULAR; 10-50% ALTERED;
SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: DOLOMITE-50%;
OTHER FEATURES: DOLOMITIC, LOW RECRYSTALLIZATION, CALCAREOUS;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS;
LAYER OF DOLOMITIC LIMESTONE ALSO PRESENT; NUMMILITES PRESENT

1125 - 1130 DOLOSTONE; MODERATE YELLOWISH BROWN; 14% POROSITY, INTERGRANULAR;
10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: DOLOMITE-50%;
OTHER FEATURES: DOLOMITIC, MEDIUM RECRYSTALLIZATION, COQUINA, CALCAREOUS;

1130 - 1140 DOLOSTONE; GRAYISH ORANGE PINK TO LIGHT GREENISH YELLOW; INTERGRANULAR;
10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: LIMESTONE-50%;
OTHER FEATURES: GRANULAR, CALCAREOUS, MEDIUM RECRYSTALLIZATION;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, BRYOZOA, ECHINOID, CORAL;
INTERBEDDED DOLOMITE AND DOLOMITIC LIMESTONE, OPERCULINOIDES, BRYOZOAN "PAVEMENT",
NUMMILITES AND FOSSIL CASTS

1140 - 1160 LIMESTONE; GRAYISH ORANGE PINK TO LIGHT BROWN; INTERGRANULAR, INTRAGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: DOLOMITE-40%;
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION, SUCROSIC;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, SPICULES, ECHINOID;
NUMEROUS CASTS WITHIN DOLOMITIC LIMESTONE MATRIX, ECHINOID PARTS

1160 - 1165 NO SAMPLES

1165 - 1170 NO SAMPLES

1170 - 1180 NO SAMPLES

1180 - 1200 LIMESTONE; LIGHT GREENISH YELLOW TO MODERATE PINK; INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BIOTURBATED,
ACCESSORY MINERALS: DOLOMITE-20%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, MEDIUM RECRYSTALLIZATION, SUCROSIC;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, ECHINOID;
SAME COMMENT AS 1160' INTERVAL

1200 - 1215 LIMESTONE; LIGHT GREENISH YELLOW TO YELLOWISH GRAY; 35% POROSITY, INTERGRANULAR,
INTRAGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL CAST;
GRAIN SIZE: VERY FINE; RANGE: VERY FINE TO GRAVEL; POOR INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED, BIOTURBATED,
ACCESSORY MINERALS: DOLOMITE-02%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, CORAL, SPICULES;

1215 - 1120 DOLOSTONE; LIGHT BROWN TO VERY LIGHT ORANGE; 20% POROSITY, INTERGRANULAR, INTRAGRANULAR; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: LIMESTONE-40%, SILT- %;
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS;

1120 - 1225 CALCILUTITE; YELLOWISH GRAY TO LIGHT OLIVE; 20% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE- %, CLAY-15%, SILT-10%;
OTHER FEATURES: CALCAREOUS, MEDIUM RECRYSTALLIZATION, CHALKY, WEATHERED;
FOSSILS: BENTHIC FORAMINIFERA;
CALCAREOUS CLAY SEAM; BOTTOM OF OCALA GROUP LIMESTONE

1225 - 1240 CLAY; YELLOWISH GRAY TO MODERATE YELLOWISH GREEN; 18% POROSITY, INTERGRANULAR; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: LIMESTONE-15%, SILT-20%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, CHALKY, WEATHERED;
CALCAREOUS CALCILUTITE CLAY

1240 - 1255 DOLOSTONE; MODERATE BROWN TO MODERATE YELLOWISH BROWN; 01% POROSITY, INTERGRANULAR, INTRAGRANULAR, FRACTURE; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-30%;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC;
INTERBEDDED CLAY AND DOLOMITE; TOP OF AVON PARK FORMATION

1255 - 1265 DOLOSTONE; MODERATE YELLOWISH BROWN TO LIGHT BROWN; 16% POROSITY, INTERGRANULAR; 10-50% ALTERED; ANHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CALCILUTITE-20%;
OTHER FEATURES: LOW RECRYSTALLIZATION;
DOLOMITIC LIMESTONE WITH PERONELLA DALLI FRAGMENTS, FOSSIL CASTS

1265 - 1275 AS ABOVE

1275 - 1280 LIMESTONE; VERY LIGHT ORANGE TO LIGHT BROWN; 16% POROSITY,
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY COARSE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: CLAY-20%, SILT-20%;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CALCAREOUS;
FOSSILS: FOSSIL FRAGMENTS;
MODERATELY INDURATED CALCAREOUS CLAY AT 1280'

1280 - 1300 CALCARENITE; LIGHT GREENISH YELLOW TO VERY LIGHT ORANGE; 18% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: SPAR- %, LIMESTONE- %, SILT- %;
OTHER FEATURES: CALCAREOUS, GRANULAR, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES;
CALCAREOUS CLAY AT 1300'

1300 - 1325 CALCARENITE; LIGHT GREENISH YELLOW TO VERY LIGHT ORANGE; 18% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: SPAR- %, LIMESTONE- %, CLAY- %, SILT- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS, ECHINOID, BENTHIC FORAMINIFERA, CONES;
COSKINOLINA FLORIDANA, DICTYOCONUS COOKEI, SPARRY CALCITE

1325 - 1330 DOLOSTONE; VERY LIGHT ORANGE TO LIGHT BROWN; 12% POROSITY, INTERGRANULAR,
INTRAGRANULAR; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, BANDED,
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, CALCAREOUS;
FOSSILS: FOSSIL FRAGMENTS;

1330 - 1340 CALCARENITE; VERY LIGHT ORANGE TO LIGHT BROWN; 18% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: LIMESTONE- %, DOLOMITE- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: ORGANICS, MILIOLIDS;

1340 - 1360 CALCARENITE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 20% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED,
ACCESSORY MINERALS: LIMESTONE- %, DOLOMITE- %, SPAR- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: ORGANICS, MILIOLIDS, FOSSIL FRAGMENTS;

1360 - 1380 AS ABOVE

1380 - 1400 AS ABOVE

1400 - 1405 CALCARENITE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 20% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: LIMESTONE- %, DOLOMITE- %, SPAR- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, CONES;

1405 - 1415 CALCARENITE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 20% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE-25%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA;
RECRYSTALLIZED ECHINOID FRAGMENT; COSKINOLINA FLORIDANA, DOLOMITIC LIMESTONE

1415 - 1435 DOLOSTONE; LIGHT BROWN TO MODERATE BROWN; 05% POROSITY, INTERGRANULAR, INTRAGRANULAR, LOW PERMEABILITY;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED,
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC;

1435 - 1445 CALCARENITE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 20% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
ACCESSORY MINERALS: DOLOMITE-01%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA, ORGANICS;

1445 - 1455 DOLOSTONE; LIGHT BROWN TO MODERATE YELLOWISH BROWN; 05% POROSITY, INTERGRANULAR, INTRAGRANULAR, FRACTURE; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED,
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC;
SILICIFIED SUCROSIC DOLOMITE

1455 - 1475 CALCARENITE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 20% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE-05%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED, COQUINA;
FOSSILS: FOSSIL FRAGMENTS, ORGANICS, CONES;
DOLOMITE-RICH LIMESTONE AT 1460' INTERVAL

1475 - 1495 CALCARENITE; LIGHT GREENISH YELLOW TO LIGHT BROWN; 18% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
ACCESSORY MINERALS: DOLOMITE- %, SILT- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED, COQUINA, GRANULAR;
FOSSILS: ORGANICS, FOSSIL FRAGMENTS;
ORGANICS AT 1485'; BRECCIATED MOTTLED APEARANCE AT 1485'

1495 - 1505 CALCARENITE; VERY LIGHT ORANGE TO LIGHT BROWN; 18% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE-15%, SILT- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: ORGANICS, FOSSIL FRAGMENTS;
CLAY-RICH LIMESTONE AT 1500' INTERVAL

1505 - 1520 CALCARENITE; MODERATE ORANGE PINK TO LIGHT BROWN; 18% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED, BANDED, LAMINATED,
ACCESSORY MINERALS: DOLOMITE- %, CLAY- %;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: ORGANICS, FOSSIL FRAGMENTS;
INTERBEDDED LIMESTONE AND DOLOMITIC LIMESTONE

1520 - 1540 CALCARENITE; VERY LIGHT ORANGE TO MODERATE ORANGE PINK; 18% POROSITY, INTERGRANULAR,
PIN POINT VUGS, INTRAGRANULAR;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BANDED,
ACCESSORY MINERALS: DOLOMITE-10%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS;
VARIABLE AMOUNTS OF DOLOMITE CONTENT IN LIMESTONE , SOME DARK BROWN SUCROSIC DOLOMITE ALSO
PRESENT

1540 - 1555 CALCARENITE; VERY LIGHT ORANGE TO LIGHT GREENISH YELLOW; 18% POROSITY, INTERGRANULAR,
PIN POINT VUGS;
GRAIN TYPE: CALCILUTITE, BIOGENIC;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: DOLOMITE-15%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: FOSSIL FRAGMENTS;
BANDED MOTTLED SUCROSIC DOLOMITE AT 1550', DICTYOCONUS PRESENT

1555 - 1560 DOLOSTONE; VERY LIGHT ORANGE TO MODERATE ORANGE PINK; 18% POROSITY, INTERGRANULAR,
PIN POINT VUGS; 10-50% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, MOTTLED,
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC, GRANULAR;

1560 - 1575 CALCARENITE; VERY LIGHT ORANGE TO MODERATE ORANGE PINK; 18% POROSITY, INTERGRANULAR;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: DOLOMITE-03%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;
FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS, CONES, ECHINOID;

1575 - 1580 AS ABOVE

1580 - 1590 AS ABOVE

1590 - 1600 AS ABOVE

1600 - 1615 CALCARENITE; VERY LIGHT ORANGE TO LIGHT BROWN; 18% POROSITY, INTERGRANULAR, PIN POINT VUGS;
GRAIN TYPE: BIOGENIC, CALCILUTITE;
GRAIN SIZE: VERY FINE; RANGE: FINE TO VERY FINE; MODERATE INDURATION;
CEMENT TYPE(S): CALCILUTITE MATRIX, DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED, BEDDED,
ACCESSORY MINERALS: DOLOMITE-50%;
OTHER FEATURES: CALCAREOUS, LOW RECRYSTALLIZATION, WEATHERED;

1615 - 1625 DOLOSTONE; MODERATE BROWN TO MODERATE BROWN; 06% POROSITY, INTERGRANULAR,
INTRAGRANULAR; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: INTERBEDDED,
ACCESSORY MINERALS: LIMESTONE-30%;
OTHER FEATURES: MEDIUM RECRYSTALLIZATION, SUCROSIC, GRANULAR;

1625 - 1645 DOLOSTONE; MODERATE BROWN; 30% POROSITY, INTRAGRANULAR, POSSIBLY HIGH PERMEABILITY,
INTERCRYSTALLINE; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: VERY COARSE; RANGE: COARSE TO GRANULE; POOR INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT, CALCILUTITE MATRIX;
SEDIMENTARY STRUCTURES: BEDDED,
ACCESSORY MINERALS: CALCILUTITE- %;
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC, GRANULAR;
COARSE "SANDY" CRYSTALLINE CALCAREOUS PERMEABLE DOLOMITE

1645 - 1660 DOLOSTONE; MODERATE BROWN TO MODERATE YELLOWISH BROWN; 08% POROSITY, INTERGRANULAR,
INTRAGRANULAR, PIN POINT VUGS; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED, MASSIVE,
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC;

1660 - 1675 AS ABOVE
POSSIBLY SECONDARY FRACTURE POROSITY AND PERMEABILITY

1675 - 1685 DOLOSTONE; GRAYISH BROWN TO GRAYISH BROWN; 08% POROSITY, INTERGRANULAR, INTRAGRANULAR; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED, MASSIVE,
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC;

1685 - 1700 DOLOSTONE; MODERATE BROWN TO DARK YELLOWISH BROWN; 08% POROSITY, INTERGRANULAR, INTRAGRANULAR; 50-90% ALTERED; SUBHEDRAL;
GRAIN SIZE: MICROCRYSTALLINE; RANGE: CRYPTOCRYSTALLINE TO MICROCRYSTALLINE;
GOOD INDURATION;
CEMENT TYPE(S): DOLOMITE CEMENT;
SEDIMENTARY STRUCTURES: BEDDED, MOTTLED, MASSIVE, BANDED,
ACCESSORY MINERALS: LIMESTONE- %;
OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC;
1655-1700' POSSIBLY SECONDARY POROSITY AND PERMEABILITY SOME FRACTURES INFILLED WITH RECRYSTALLIZED CALCITE, DOLOMITE OCCASIONALLLY EXHIBITS BRECCIATED APPEARANCE

1700 TOTAL DEPTH