

Executive Summary -  
ROMP Site No. 10  
Four Monitor Wells

Location - ROMP Site No. 10 is located approximately 3 miles east of Kings Highway on the DeSoto-Charlotte County line in Charlotte County. The site is in Section 3, Township 40 South, Range ~~22~~<sup>23</sup> East and at latitude 27°15'28", longitude 82°00'28".

Site Easement - This site was obtained from Punta Gorda Isles, Inc. on November 2, 1973 for the sum of one dollar. The Easement is 50 feet by 200 feet and was obtained for a period of fifty years. This easement is recorded in O.R. Book 455, Pages 957 through 959 at the Charlotte County Courthouse.

Geology - The site is located on the Pamlico Terrace at an elevation of + 10 feet above mean sea level (MSL). All geologic data was obtained from drill cuttings from land surface to 917 feet below land surface datum (LSD).

Summers  
Reports  
DLM  
11-84

The general geology of the site is as follows:

0-30'	Sand and Marl
30'-60'	Tamiami Formation
60'-400'	Hawthorn Formation
400'-600'	Tampa Limestone
600'-880'	Suwannee Limestone
880'-917'	Ocala Group

Hydrogeology - It appears as though at least four (4) separate artesian systems were penetrated during the construction of the deep well at Shell Creek.

The first artesian zone appears in the Tamiami and upper Hawthorn formations between ± 30 to ± 150 feet below LSD. It is separated from the water table

by 10 feet of sand and marl which is most likely the Caloosahatchee Marl. This first zone is then separated from the second artesian zone by  $\pm 50$  feet of clayey limestone. Flow tests conducted on the first artesian zone indicate flows around 800 gallons per minute (GPM).

The second artesian zone is found between  $\pm 180$  and  $\pm 470$  feet below LSD, in the lower Hawthorn and upper Tampa limestones. This zone is separated from the lower Tampa limestone by  $\pm 50$  feet of mixed sand, limestone, and dolomite. This zone was the most productive zone tested with yields from 500 to 1200 GPM.

The third artesian zone is found in the lower Tampa limestone between  $\pm 510$  and  $\pm 590$  feet below LSD. Although the lithologic log does not indicate any confining materials, the electric log shows a definite increase in resistivity at  $\pm 550$  feet below LSD. The flow rates in the third zone are between 500 and 600 GPM indicating a decrease in permeability from the above two artesian zones and tighter limestone.

The fourth artesian zone is located between  $\pm 630$  and  $\pm 915$  feet below LSD. This zone probably extends deeper into the Ocala Group before a confining bed separates it from the fifth zone in the Avon Park. The flows in this zone are the lowest of all four zones ranging between 30 and 550 GPM and decreasing with depth which indicates the relative tightness of these limestones. The artesian heads increase with depth through all four zones with there being a  $\pm 10$  foot difference in head between zones 1 and 2,  $\pm 12$  foot difference between zones 2 and 3, and a  $\pm 22$  foot difference between zones 3 and 4. All four zones have heads great enough to cause this well to flow naturally.

Well Construction - All four of the wells at ROMP Site No. 10 were constructed under a contract between the U.S.G.S. and the Meridith Corporation in April and May, 1975 at a cost of \$69,342.50 or \$38.70 per foot.

A. Well No. 1 - the deep well is 917 feet deep and was constructed by using 95 feet of 8 inch steel work casing and 595 feet of 4 inch steel well casing both of which were grouted in place by Halliburton. The well was then drilled out to 917 feet below LSD.

B. Well No. 2 - the intermediate or 575 feet deep well was constructed by using 65 feet of 8 inch steel work casing and 303 feet of 4 inch steel well casing. The casings were grouted in place and then drilled out to 575 feet below LSD.

C. Well No. 3 - the shallow or 270 feet deep well was constructed by using 110 feet of 4 inch steel well casing which was grouted in place and then drilled out to 270 feet below LSD.

D. Well No. 4 - the water table monitor well was constructed by using 20 feet of 4 inch PVC well casing with 10 feet of 40 slot PVC well screen.

Geophysical Logs - Electric and caliper logs were run on all three artesian wells.

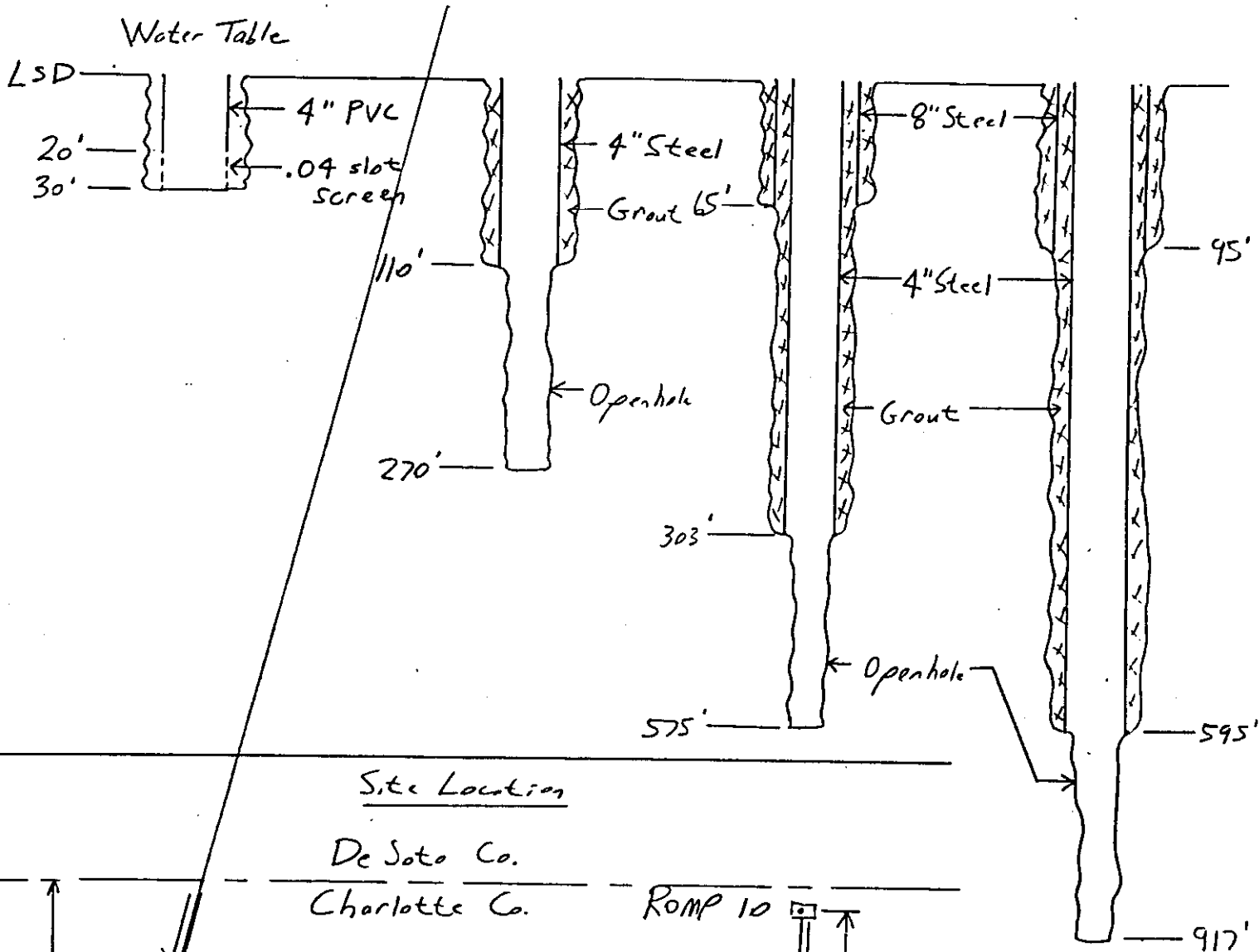
Type of Monitor - The water table well is designed to monitor the water table whereas the shallow artesian well is a Hawthorn monitor, the intermediate artesian well is a lower Hawthorn-Tampa monitor, and the deep artesian well is a Suwannee-Ocala monitor well.

Water Quality - Analyses were conducted on all four wells at this site. The analysis on the water table well showed the water to be of excellent quality. The analysis on the 270 feet deep well shows the chloride,

fluoride, and total dissolved solids to be in excess of the recommended drinking water limits. The analysis on the 575 feet deep well indicates that the sulfate, fluoride, and total dissolved solids exceed drinking limits. The analysis on the 917 feet deep well shows the fluoride, total dissolved solids, and sulfate levels to be above the recommended limits.

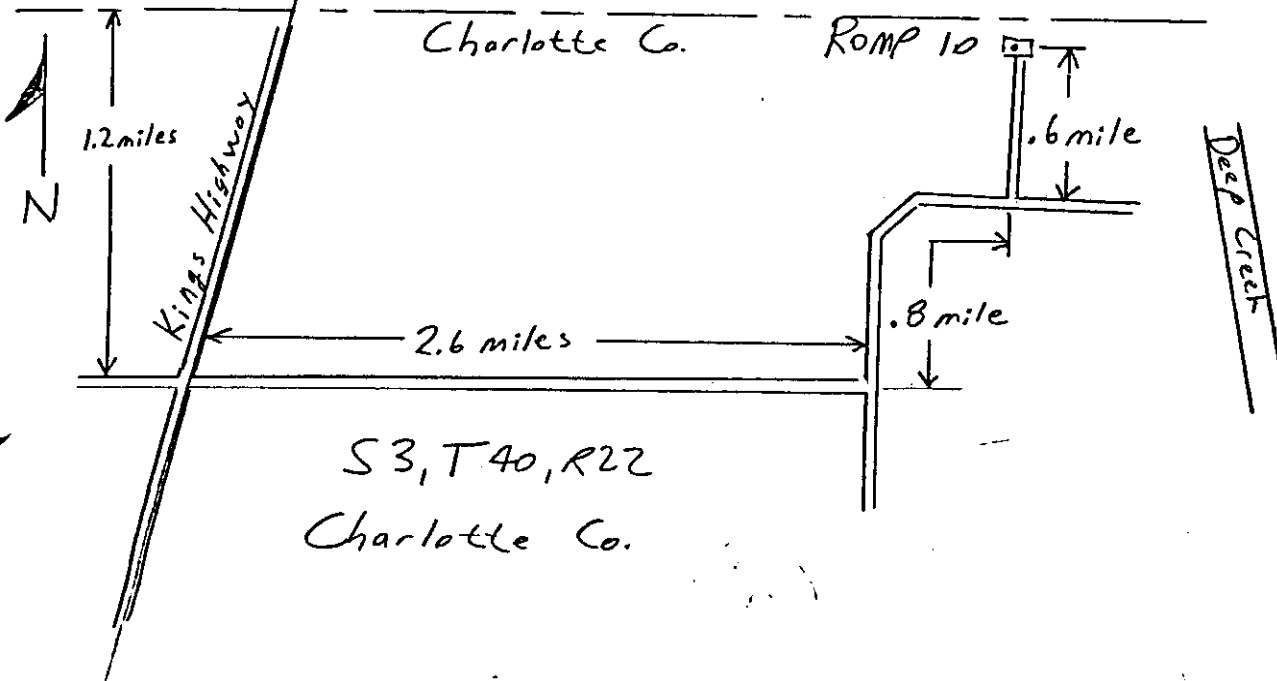
U.S.G.S. Notification - The U.S.G.S. administered this contract.

# As Built Well Diagrams



## Site Location

De Soto Co.  
Charlotte Co.



S3, T40, R22  
Charlotte Co.

ROMP 10 "DEEP CREEK  
ADDENDUM TO EXECUTIVE SUMMARY  
MONITOR WELL PLUGGING AND MODIFICATION  
BASIN 20/SECTION 3, TOWNSHIP 40S, RANGE 23E  
PARCEL NO. 20-020-001

10-12-93

J.L. DECKER

- I. SITE LOCATION
- II. GEOLOGY AND HYDROLOGY
- III. WELL CONSTRUCTION, WELL PLUGGING AND MODIFICATION
- IV. WATER QUALITY FOLLOWING MODIFICATION OF WELLS
- V. RECOMMENDATIONS FOR THE WELLSITE

I. SITE LOCATION

The ROMP 10 "Deep Creek" wellsite is located about 3 miles east of Kings Highway in Charlotte County. The wellsite can be found near the end of E. Guapore Dr. in the Deep Creek Subdivision (Figure 1). The wellsite has a 50' x 200' perpetual easement and an 100' x 200' temporary construction easement. The ROMP 10 wellsite is located in the NW 1/4 of the NW 1/4 of the NE 1/4 of Section 3, Township 40 S., Range 23 E., at latitude 27° 01' 52"N, longitude 82° 00' 00".

II. GEOLOGY AND HYDROLOGY

The ROMP 10 "Deep Creek" wellsite lies within the physiographic province known as the Gulf Coastal Lowlands (Figure 2). The wellsite is located in Charlotte County on the Pamlico terrace at an elevation of about 10' above NGVD.

Principal drainage in the wellsite vicinity is Deep Creek, a tributary of Peace River.

The general geology of the wellsite is as follows:

0-30'	Undifferentiated Sand and Clay
30'-70'	Peace River Formation (Hawthorn Group)
70'-610'	Arcadia Formation (Hawthorn Group)
610'-880'	Suwannee Limestone
880'-	Ocala Limestone
Total Depth--917'	

The general hydrology of the wellsite is as follows:

~30' - ~150'	1st Artesian Zone--flow rate (800 GPM)
~180' - ~470'	2nd Artesian Zone--flow rate (500-1200 GPM)
~510' - ~590'	3rd Artesian Zone--flow rate (500-600 GPM)
~630' - ~915'	4th Artesian Zone--flow rate (30-550 GPM)

Note: flow rates were determined before plugging and plug-backs. The artesian heads increase with depth through all zones. Before modification and plug-back, there was a ~10' difference between zones 1 and 2, a ~12' difference between zones 2 and 3, and a ~22' difference between zones 3 and 4. Note: the 4th artesian zone extends deeper into the Ocala Limestone. A semi-confining bed probably separates the 4th artesian zone from the 5th artesian zone that may exist in the lower Ocala Limestone and the upper Avon Park Formation. A 6th artesian zone will probably be found in the highly transmissive zone of the Avon Park Formation. Exploratory drilling would determine the extent of the 4th artesian zone. Exploratory drilling would also verify the existence and extent of the 5th and 6th artesian zones.

### III. WELL CONSTRUCTION, WELL PLUGGING AND MODIFICATION

Initially, four monitor wells were constructed at the ROMP 10 wellsite by Meridith Corporation in 1975.

The Suwannee-Ocala monitor well had 95' of 8" dia. steel casing, 595' of 4" dia. steel casing installed and cement grouted to land surface. An open hole extended from 595' to 917' below LSD. This well monitored water quality and potentiometric surface in the 4th artesian zone.

Due to improper cement-grouting of the steel casings during initial construction and the subsequent deterioration of steel casings from highly mineralized water, substantial leakage occurred in the well's annulus. It was determined that interaquifer exchange of water probably affected the validity of water quality and potentiometric surface data collected.

Before cement-grouting the well from 917' to land surface, Florida Geophysical was contracted to complete a total of 36 perforations in the casing at the following intervals: 138', 230', 320', 391', 421', 470', 525' and 575' below LSD.

The casing perforations allowed the cement grout to flow upward and harden in the annular space between the 8" dia. and the 4" dia. steel casings and also the annular space between the 4" dia. steel casing and the borehole. The well was then plugged from bottom to land surface.

The lower intermediate monitor was initially constructed with an open hole that extended through the 2nd and 3th artesian zones. This intermediate monitor well had 65' of 8" dia. steel casing and 303' of 4" dia. steel casing set and cement-grouted to land surface. Originally, an open hole existed between 303' and 575' below LSD. This well was eventually plugged from 575' to 473' below LSD to increase the separation between the intermediate

and upper Floridan aquifer systems. This well now monitors the 2nd artesian zone. The well head assembly had deteriorated and was leaking. The well head was rebuilt so that data collection could continue (Figure 3). In 1991, it was determined by a caliper log and a video camera survey that the lower 80'-100' of the steel casing had deteriorated to point where the well would either have to be abandoned and plugged with cement or rehabilitated. It was decided that ROMP 10 "Deep Creek" was an important data point. Both the upper and lower intermediate wells were rehabilitated.

An 1 1/4" PVC casing was set, extending from 321' below LSD to 2.5' above LSD. Three packers were set around the 1 1/4" PVC casing at a depth of 320' below LSD. The well's annulus was gravel-packed from 320' to 308' below LSD. The well was then cement-grouted from 308' to land surface. See Figure 4 for well construction specifications.

The upper intermediate well straddles and monitors the 1st and 2nd artesian zones. This well was initially constructed by setting and cement-grouting 4" dia. steel casing from land surface to 110' below LSD. The open hole interval originally extended from 270' to 110' below LSD (Figure 5). The well was plugged with cement-grout from 270' to 202' below LSD. The well head assembly of this well had also deteriorated from highly mineralized water. The well head assembly was rebuilt as shown in Figure 5. In early 1992, it was determined that this well also needed to be rehabilitated. Seventy two feet (72') of 1 1/4" PVC casing, .030" slotted well screen (130'-202' below LSD) and 130' of 1 1/4" PVC casing was set into the borehole. The well's annulus from 202' to 120' was sand-packed with 6-20 type silica sand. A bentonite seal extends from 120' to 118' below LSD. The well's annulus was then cement-grouted from 118' below LSD to land surface. See Figure 6 for construction of the well and well head assembly.

A surficial water table monitor also exists on the wellsite. This well was constructed by setting 10' of 4" dia. PVC, .040" slotted well screen (20'-30' below LSD) and 20' of 4" dia. PVC casing in the borehole (Figure 7).

#### IV. WATER QUALITY AND GEOPHYSICAL LOGGING

In the lower intermediate monitor (303'-473' below LSD), specific conductivity was measured at 1471 Umhos. The chloride and sulfate concentrations were 420 mg/l and 220 mg/l respectively. The temperature value as 26° C.

Water samples collected from the upper intermediate monitor showed



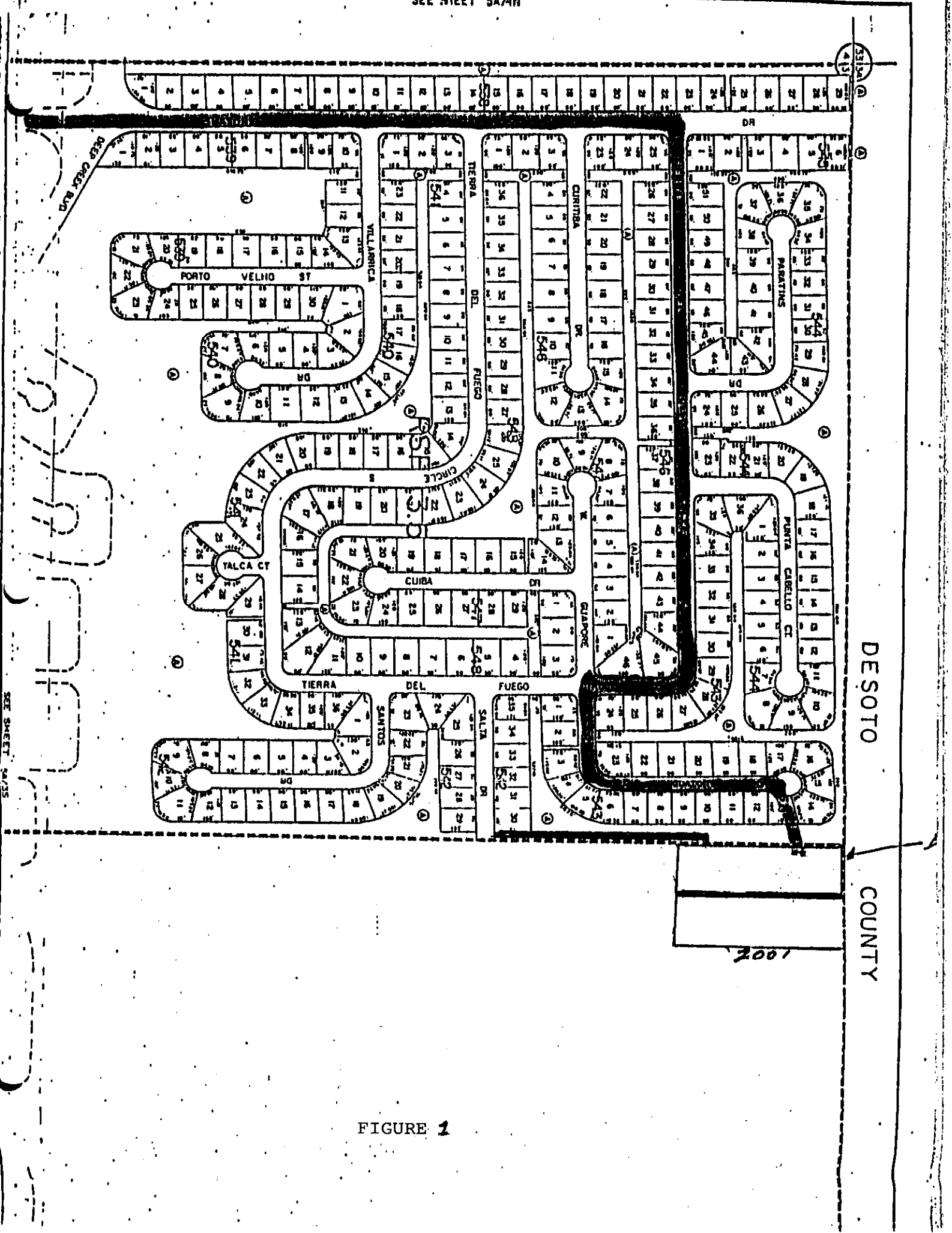
specific conductivities ranging from 1300 Umhos to 1350 Umhos. Chloride concentrations ranged between 330 mg/l and 340 mg/l, while sulfate concentrations were 120 mg/l and 130 mg/l respectively. Temperature values were both 25<sup>0</sup> C (See ROMP File).

A water quality sample retrieved from the surficial monitor indicated that the specific conductivity value was 355 Umhos. The chloride concentration was 32.4 mg/l, while the sulfate concentration was 10.9 mg/l. The temperature value was 24<sup>0</sup> C.

A suite of geophysical logs was completed on the lower and upper intermediate monitor wells prior to rehabilitation. See the ROMP 10 file for all logs completed since the initial construction of the monitors at the ROMP 10 "Deep Creek" wellsite.

#### V. RECOMMENDATIONS

In the event this ROMP 10 "Deep Creek" wellsite is retained as a wellsite, it is recommended that a replacement well be drilled to replace the upper Floridan monitor that was plugged. The six inch (6") casing should be set about 630' below LSD. The open hole interval would probably extend from 630' to about 880' below LSD, the base of the Suwannee Limestone. Another lower intermediate monitor should be constructed to monitor the 3rd artesian zone (510'-590' below LSD). Exploratory drilling and data collection would refine the depths when constructing the new wells.



DESOTO COUNTY

FIGURE 1

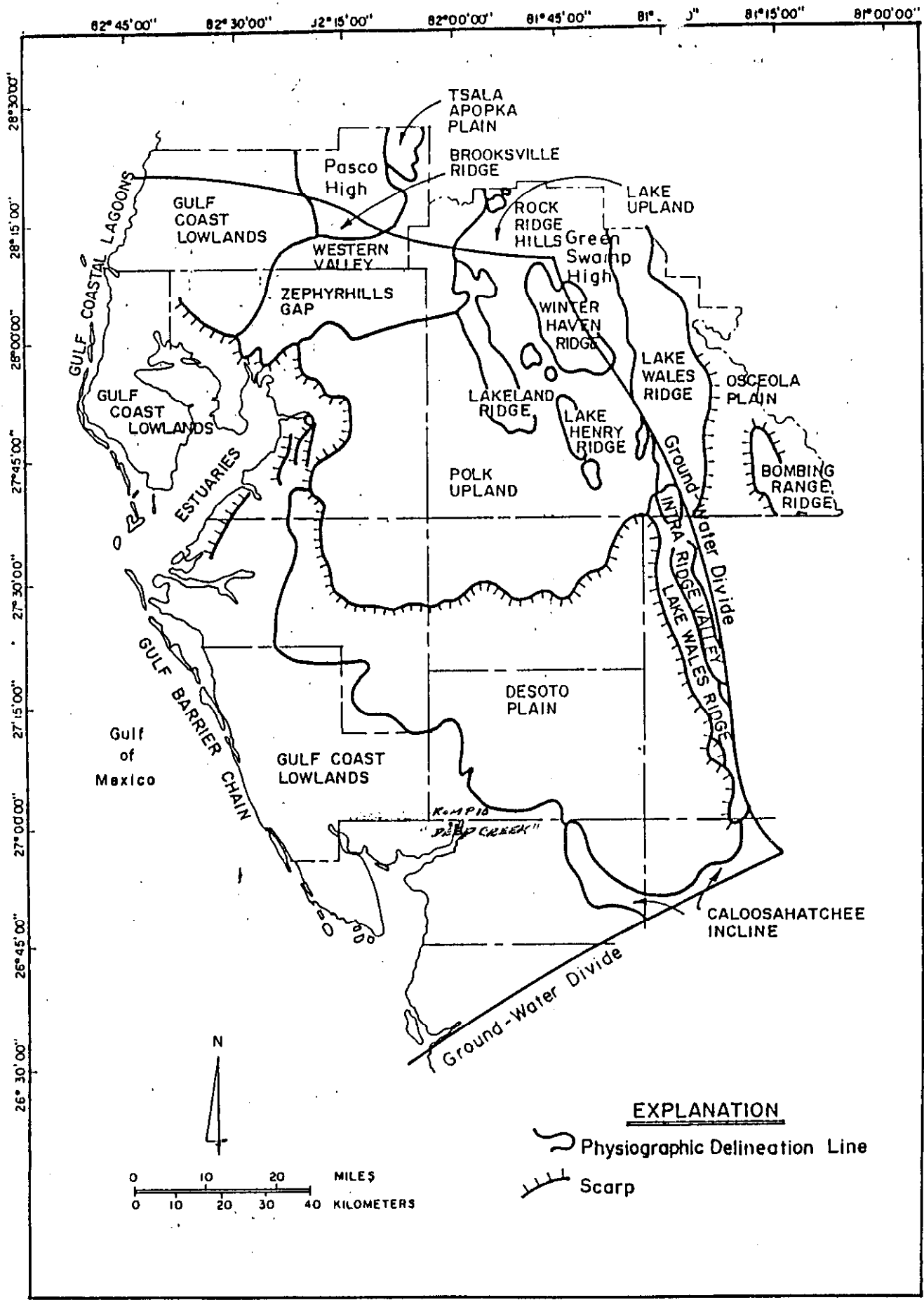


Figure 2. Physiographic map of the Southern West-Central Florida Ground-Water Basin (modified from White, 1970)

# ROMP 10 DEEP CREEK

## LOWER INTERMEDIATE MONITOR AS BUILT

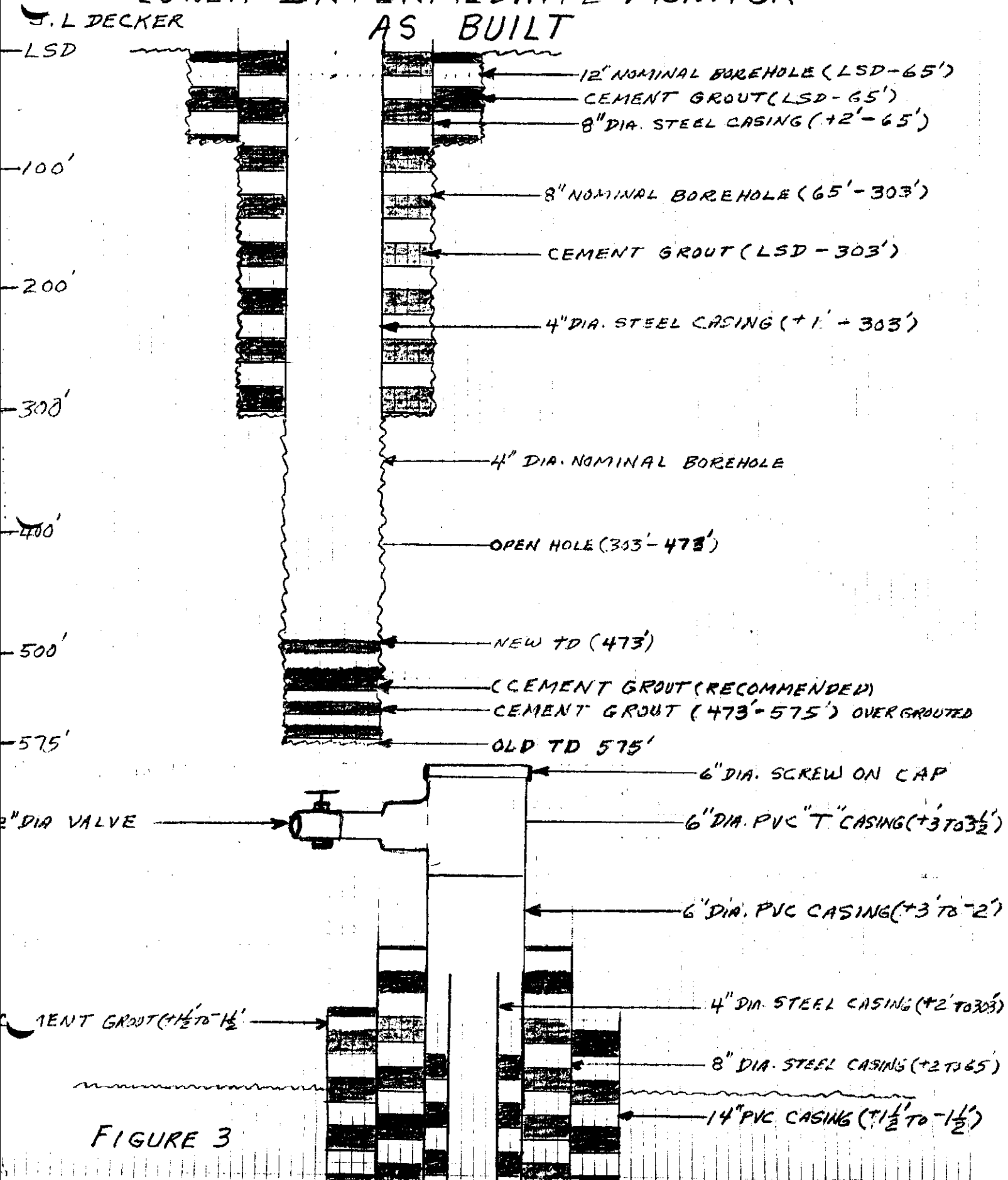
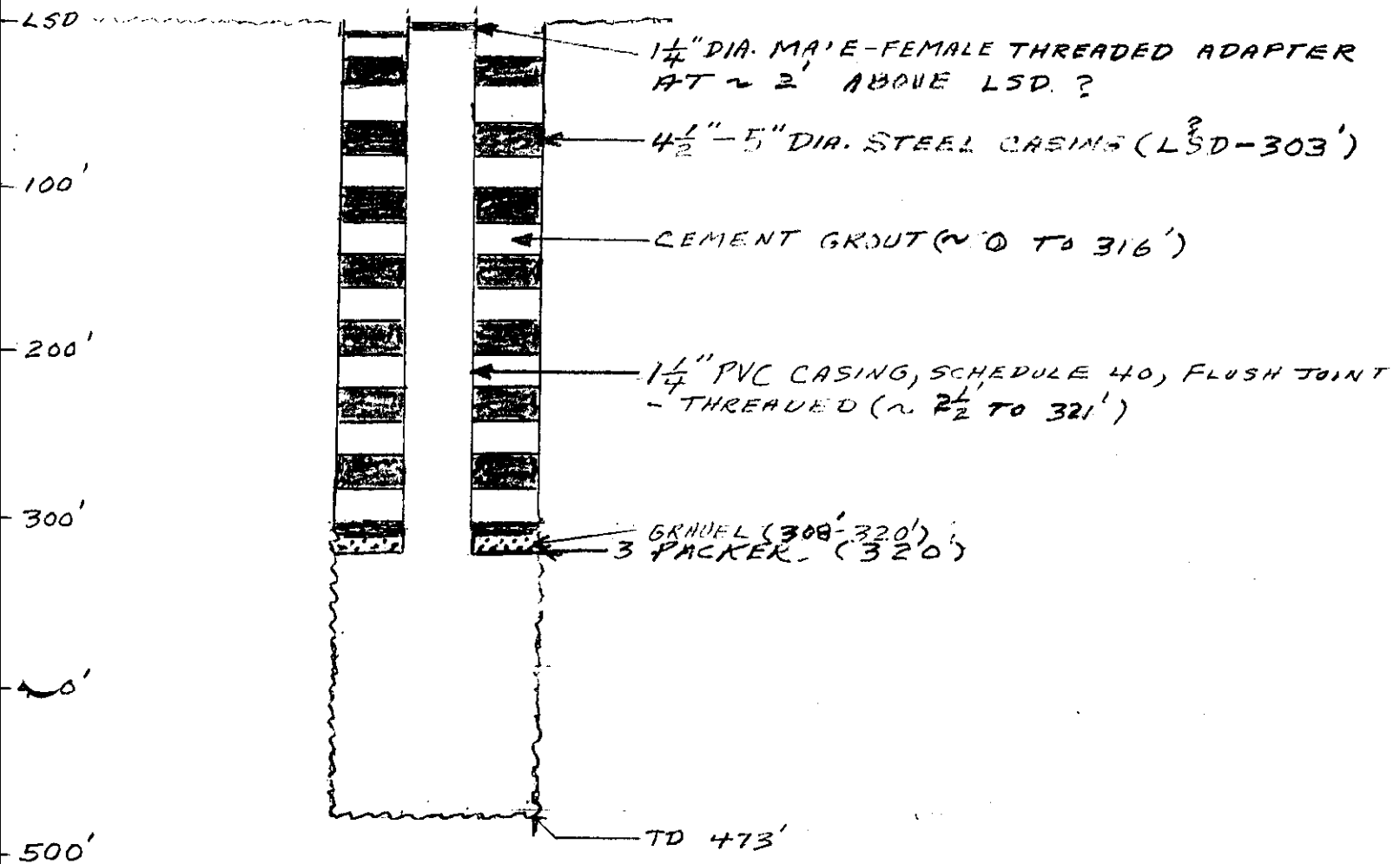


FIGURE 3

# ROMP 10 DEEP CREEK

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## LOWER INTERMEDIATE MONITOR AS BUILT



1. 1 1/4" PVC CASING - SCHEDULE 40 (0 - 320')
2. PACKERS (320')
3. GRAVEL (315' - 320')
4. CEMENT GROUT (0' - 315')

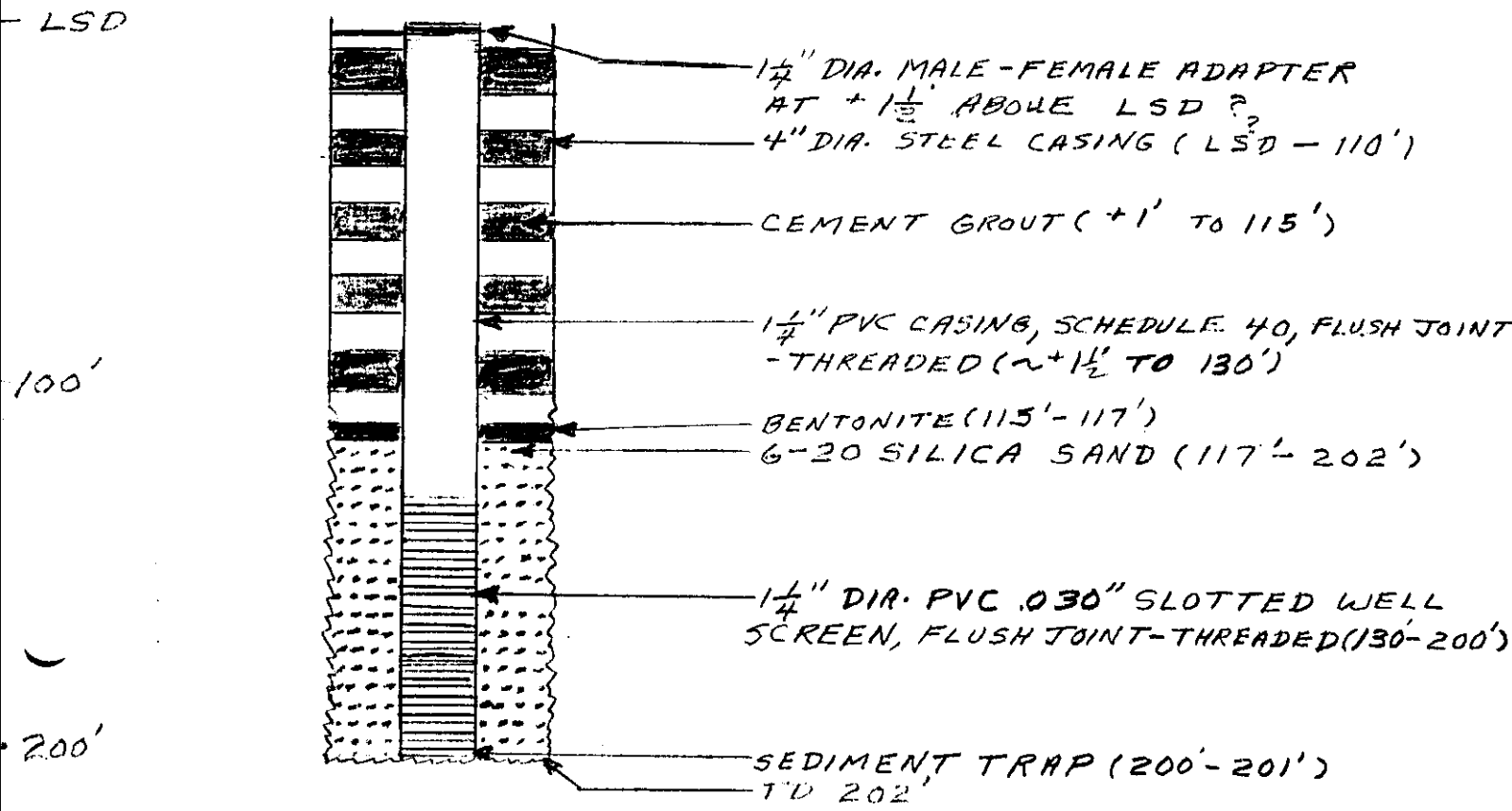
FIGURE 4

# ROMP 10 "DEEP CREEK"

J.L. DECKER

1-17-91  
1-09-92  
1-14-92

## SHALLOW INTERMEDIATE MONITOR AS BUILT



1. SEDIMENT TRAP -(200'-201')
2. 1 1/4" DIA. PVC .030" SLOTTED WELL SCREEN -(130'-200')
3. 1 1/4" DIA PVC, SCHEDULE 40 (~ 0' - 130')
4. 6-20 SILICA SAND (115' - 202')
5. CEMENT GROUT ( 0' TO 115 ')
- 6 BENTONITE (115' - 117')

FIGURE 5

# ROMP 10 "DEEP CREEK" SHALLOW INTERMEDIATE MONITOR

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AS BUILT

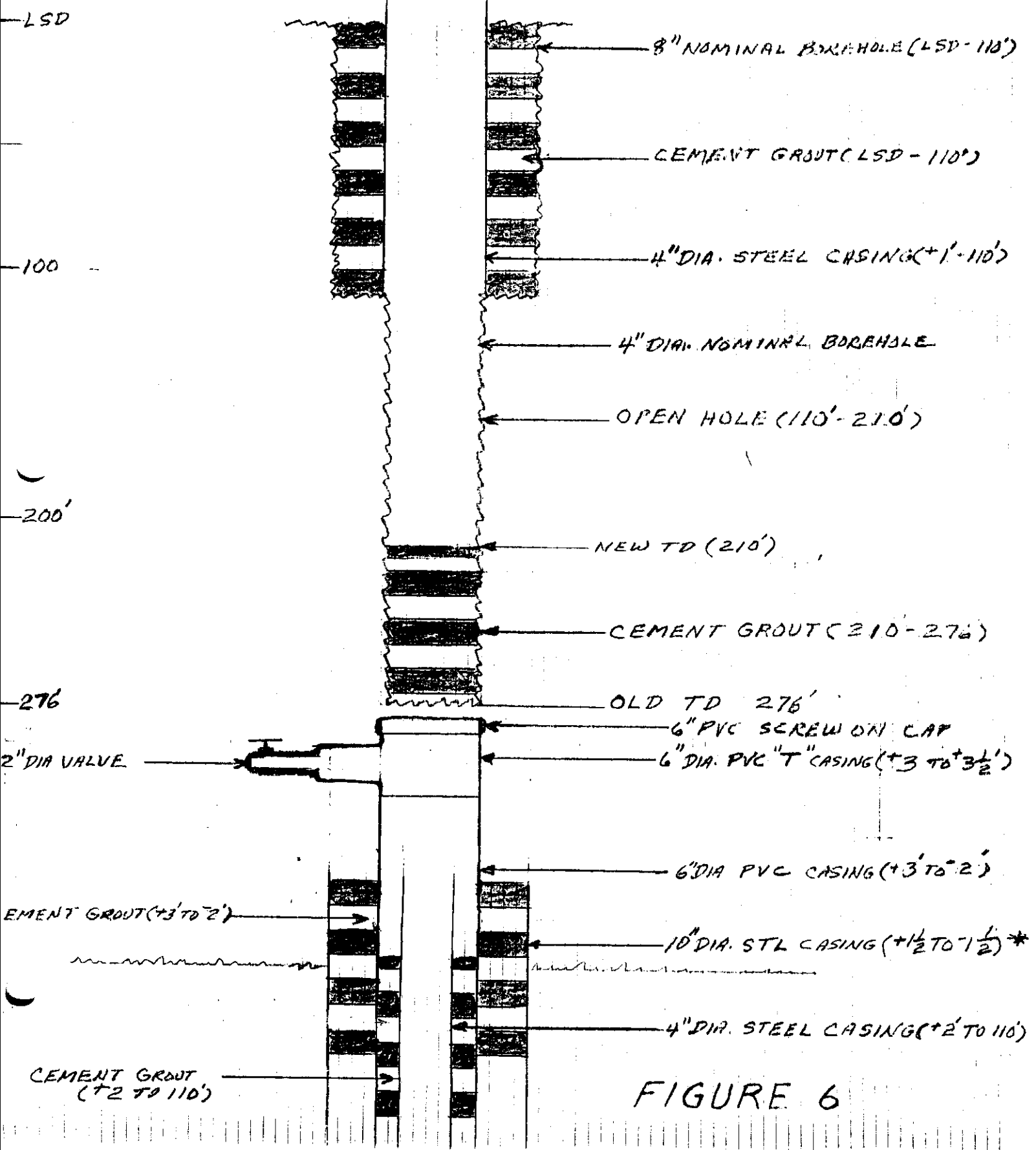


FIGURE 6

ROMP 10 "DEEP CREEK"  
SURFICIAL MONITOR  
AS BUILT

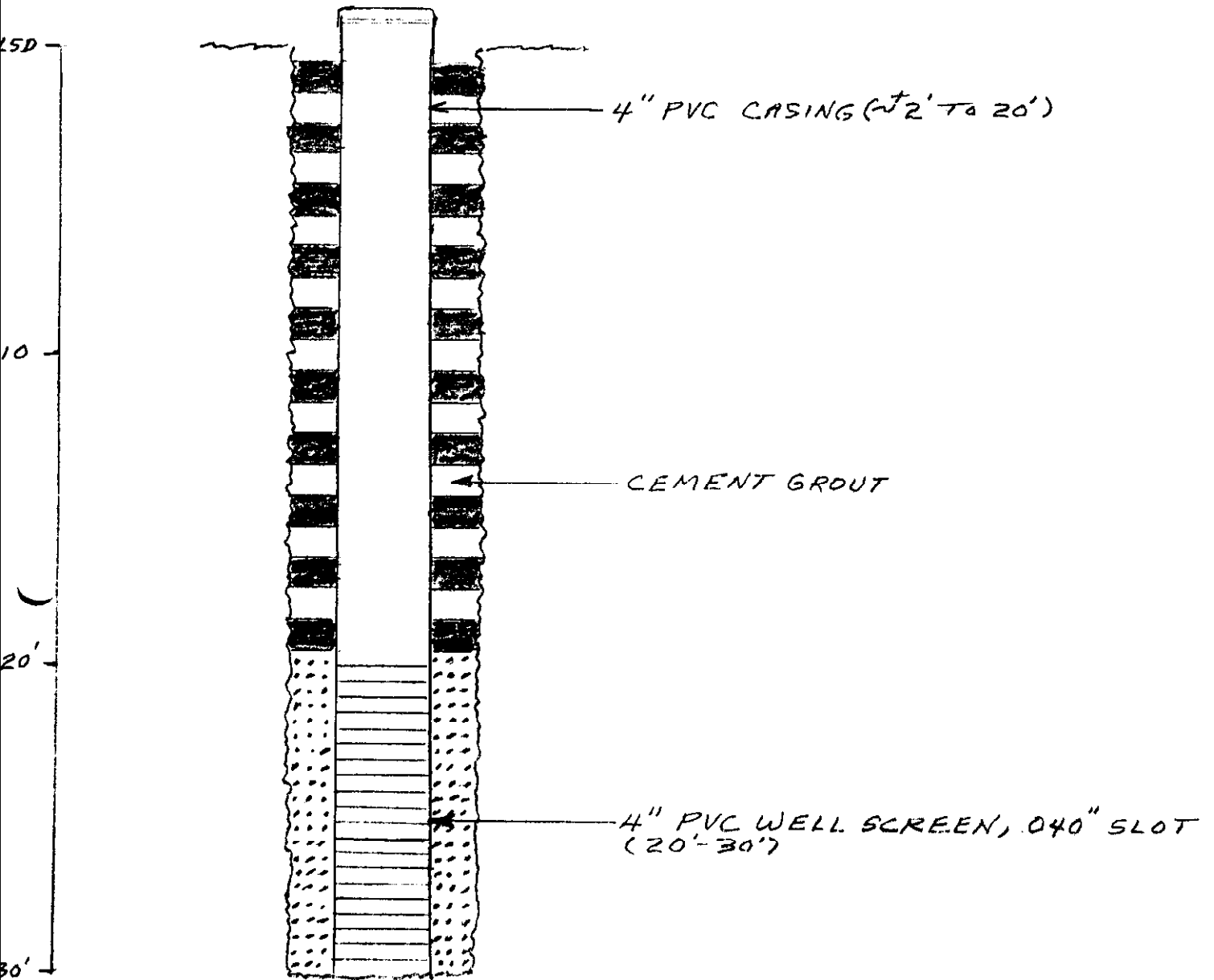


FIGURE 7



## LITHOLOGIC WELL LOG PRINTOUT

SOURCE - FGS

WELL NUMBER: W-12684  
 TOTAL DEPTH: 00910 FT.  
 SAMPLES - NONE

COUNTY - CHARLOTTE  
 LOCATION: T.40S R.23E S.03 AC  
 LAT = 27D 01M 30S  
 LON = 82D 00M 28S  
 ELEVATION: 19 FT

COMPLETION DATE: /05/91  
 OTHER TYPES OF LOGS AVAILABLE - NONE

OWNER/DRILLER:ROMP 10, SWFWMD / USGS DEEP CREEK TEST WELL

WORKED BY:RICHARD GREEN, 5/91  
 SAMPLE QUALITY: FAIR TO POOR - CUTTINGS (FORMATION PICKS TENTATIVE)

0.	-	20.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
20.	-	70.	122PCRV	PEACE RIVER FM.
70.	-	610.	122ARCA	ARCADIA FM.
610.	-	.	123SWNN	SUWANNEE LIMESTONE

WORKED BY:REVISED PICKS BY HOLLY WILLIAMS 1997

0.	-	30.	090UDSC	UNDIFFERENTIATED SAND AND CLAY
30.	-	80.	122PCRV	PEACE RIVER FM.
80.	-	590.	122ARCA	ARCADIA FM.
460.	-	510.	122NOCA	NOCATEE MEMBER OF ARCADIA FM.
590.	-	.	123SWNN	SUWANNEE LIMESTONE

0	-	10	SAND; GRAYISH ORANGE POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY GRAIN SIZE: MEDIUM; RANGE: COARSE TO FINE ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: IRON STAIN-01%
10	-	20	SAND; VERY LIGHT ORANGE POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY GRAIN SIZE: MEDIUM; RANGE: COARSE TO FINE ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: PHOSPHATIC SAND-01%, CALCILUTITE-01%
20	-	30	SAND; YELLOWISH GRAY POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY GRAIN SIZE: MEDIUM; RANGE: COARSE TO FINE ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY POOR INDURATION CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX ACCESSORY MINERALS: CALCILUTITE-01%, CLAY-01% PHOSPHATIC SAND-02% PHOSPHATE IS BLACK/GRAY, AND WELL ROUNDED
30	-	40	SAND; YELLOWISH GRAY POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY GRAIN SIZE: MEDIUM; RANGE: COARSE TO FINE ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: CALCILUTITE-01%, CLAY-01% PHOSPHATIC SAND-03%, PHOSPHATIC GRAVEL-01%
40	-	50	SAND; YELLOWISH GRAY TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY GRAIN SIZE: MEDIUM; RANGE: COARSE TO FINE ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY POOR INDURATION CEMENT TYPE(S): CALCILUTITE MATRIX, CLAY MATRIX ACCESSORY MINERALS: CALCILUTITE-01%, CLAY-01% PHOSPHATIC SAND-03%, PHOSPHATIC GRAVEL-01%
50	-	60	SAND; YELLOWISH GRAY TO LIGHT OLIVE GRAY POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY GRAIN SIZE: MEDIUM; RANGE: FINE TO MEDIUM ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY UNCONSOLIDATED ACCESSORY MINERALS: PHOSPHATIC SAND-03%, CLAY-01% WELL SORTED

60 - 70 DOLOSTONE; LIGHT OLIVE GRAY TO YELLOWISH GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
10-50% ALTERED; EUHEDRAL  
GRAIN SIZE: MICROCRYSTALLINE  
RANGE: FINE TO MICROCRYSTALLINE; GOOD INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: QUARTZ SAND-25%, PHOSPHATIC SAND-10%  
PHOSPHATIC GRAVEL-05%, QUARTZ SAND-10%  
OTHER FEATURES: SUCROSIC  
FOSSILS: SHARKS TEETH

70 - 80 SAND; YELLOWISH GRAY TO LIGHT OLIVE GRAY  
POROSITY: POSSIBLY HIGH PERMEABILITY  
GRAIN SIZE: MEDIUM; RANGE: FINE TO COARSE  
ROUNDNESS: ROUNDED TO SUB-ANGULAR; MEDIUM SPHERICITY  
POOR INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC GRAVEL-05%  
PHOSPHATIC SAND-10%, DOLOMITE-10%  
OTHER FEATURES: DOLOMITIC  
FOSSILS: SHARKS TEETH

80 - 90 DOLOSTONE; YELLOWISH GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
10-50% ALTERED; EUHEDRAL  
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE  
GOOD INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-10%  
IRON STAIN-01%  
OTHER FEATURES: SUCROSIC

90 - 100 AS ABOVE

100 - 110 AS ABOVE

110 - 120 DOLOSTONE; YELLOWISH GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
10-50% ALTERED; EUHEDRAL  
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE  
GOOD INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-10%, QUARTZ SAND-15%  
IRON STAIN-01%, PHOSPHATIC GRAVEL-01%  
OTHER FEATURES: SUCROSIC

120 - 130 DOLOSTONE; YELLOWISH GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
10-50% ALTERED; EUHEDRAL  
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE  
MODERATE INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-10%  
OTHER FEATURES: SUCROSIC  
CUTTINGS MUCH FINER, LESS PHOSPHATIC SAND

130 - 140 DOLOSTONE; YELLOWISH GRAY TO GRAYISH BROWN  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
10-50% ALTERED; EUHEDRAL  
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE  
MODERATE INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-10%  
OTHER FEATURES: SUCROSIC

140 - 150 AS ABOVE  
AS 120-130'

150 - 160 DOLOSTONE; YELLOWISH GRAY TO LIGHT OLIVE GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
10-50% ALTERED; EUHEDRAL  
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE  
GOOD INDURATION  
CEMENT TYPE(S): DOLOMITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-08%  
OTHER FEATURES: SUCROSIC

160 - 170 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
GRAIN TYPE: BIOGENIC, CALCILUTITE  
10% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MICROCRYSTALLINE  
RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, QUARTZ SAND-01%  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
FOSSILS: BRYOZOA, ECHINOID, FOSSIL FRAGMENTS

170 - 180 AS ABOVE

180 - 190 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE  
20% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MICROCRYSTALLINE  
RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-08%  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION

190 - 200 AS ABOVE  
SLIGHTLY MORE RECRYSTALLIZED THAN ABOVE; CUTTINGS ARE FINER

200 - 210 AS ABOVE

210 - 220 AS ABOVE

220 - 230 AS ABOVE

230 - 240 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE  
20% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MICROCRYSTALLINE  
RANGE: FINE TO MICROCRYSTALLINE; GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-10%  
PHOSPHATIC GRAVEL-03%  
PHOSPHATE IS BLACK/BROWN, WELL ROUNDED

240 - 250 AS ABOVE

250 - 260 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
20% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MICROCRYSTALLINE  
RANGE: FINE TO MICROCRYSTALLINE; GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
ACCESSORY MINERALS: PHOSPHATIC SAND-04%, QUARTZ SAND-05%  
OTHER FEATURES: SUCROSIC, MEDIUM RECRYSTALLIZATION  
FOSSILS: ECHINOID, BRYOZOA

260 - 270 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY  
POROSITY: INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-03%  
PHOSPHATIC GRAVEL-01%  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
HIGH RECRYSTALLIZATION, DOLOMITIC

270 - 280 AS ABOVE

280 - 290 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY  
POROSITY: INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-01%, QUARTZ SAND-02%  
IRON STAIN-01%

OTHER FEATURES: HIGH RECRYSTALLIZATION

290 - 300 AS ABOVE  
WITH SOME PUNKY, WHITE CARBONATE FRAGMENTS - SHELLS (?)

300 - 310 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE, INTERGRANULAR  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: SPAR-02%  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
FOSSILS: BRYOZOA, FOSSIL FRAGMENTS

310 - 320 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE, INTERGRANULAR  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: SPAR-01%  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, BENTHIC FORAMINIFERA  
BRYOZOA

320 - 330 AS ABOVE

330 - 340 LIMESTONE; WHITE TO VERY LIGHT GRAY  
POROSITY: INTERCRYSTALLINE, INTERGRANULAR  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: SPAR-01%, PHOSPHATIC SAND-02%  
QUARTZ SAND-02%  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, BRYOZOA

340 - 350 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY  
POROSITY: INTERCRYSTALLINE, INTERGRANULAR  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: QUARTZ SAND-35%, PHOSPHATIC SAND-05%  
SPAR-02%  
OTHER FEATURES: HIGH RECRYSTALLIZATION  
MEDIUM RECRYSTALLIZATION  
VERY SANDY

350 - 360 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY  
POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: QUARTZ SAND-10%, PHOSPHATIC SAND-03%  
SPAR- %  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
LOW RECRYSTALLIZATION  
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS

360 - 370 LIMESTONE; VERY LIGHT GRAY TO WHITE  
POROSITY: INTERGRANULAR  
GRAIN TYPE: BIOGENIC, CALCILUTITE  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
ACCESSORY MINERALS: QUARTZ SAND-03%, PHOSPHATIC SAND-03%  
SPAR-01%  
OTHER FEATURES: LOW RECRYSTALLIZATION  
MEDIUM RECRYSTALLIZATION  
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS

370 - 380 LIMESTONE; WHITE TO LIGHT OLIVE GRAY  
POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
GRAIN TYPE: CRYSTALS, BIOGENIC  
GOOD INDURATION  
CEMENT TYPE(S): SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-05%  
OTHER FEATURES: HIGH RECRYSTALLIZATION, DOLOMITIC

- HIGHLY RECRYSTALLIZED; SOME CAVINGS
- 380 - 390 AS ABOVE
- 390 - 400 LIMESTONE; GRAYISH BROWN TO LIGHT OLIVE GRAY  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY  
 GRAIN TYPE: CRYSTALS, BIOGENIC  
 GRAIN SIZE: MICROCRYSTALLINE  
 RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION  
 CEMENT TYPE(S): SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-05%  
 OTHER FEATURES: HIGH RECRYSTALLIZATION, SUCROSIC, DOLOMITIC  
 COMMENTS AS ABOVE
- 400 - 410 AS ABOVE  
 MORE CAVINGS (?)
- 410 - 420 AS ABOVE
- 420 - 430 AS ABOVE
- 430 - 440 LIMESTONE; WHITE TO VERY LIGHT GRAY  
 POROSITY: LOW PERMEABILITY, INTERCRYSTALLINE, INTERGRANULAR  
 GRAIN TYPE: CRYSTALS, BIOGENIC, CALCILUTITE  
 GRAIN SIZE: MICROCRYSTALLINE  
 RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-08%  
 SPAR- %  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 LOW RECRYSTALLIZATION  
 FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS
- 440 - 450 AS ABOVE  
 VARIABLY SANDY - 10-15%; (SAME CUTTING FRAGMENTS HAVE VERY  
 ABUNDANT QUARTZ SAND)
- 450 - 460 LIMESTONE; WHITE TO VERY LIGHT GRAY  
 POROSITY: LOW PERMEABILITY, INTERCRYSTALLINE, INTERGRANULAR  
 GRAIN TYPE: CRYSTALS, BIOGENIC, CALCILUTITE  
 GRAIN SIZE: MICROCRYSTALLINE  
 RANGE: VERY FINE TO MICROCRYSTALLINE; GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-15%  
 SPAR- %  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 LOW RECRYSTALLIZATION  
 FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ECHINOID
- 460 - 470 DOLOSTONE; GRAYISH BROWN TO VERY LIGHT ORANGE  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, INTERGRANULAR  
 10-50% ALTERED; EUHEDRAL  
 GRAIN SIZE: VERY FINE; RANGE: FINE TO MICROCRYSTALLINE  
 GOOD INDURATION  
 CEMENT TYPE(S): DOLOMITE CEMENT  
 ACCESSORY MINERALS: QUARTZ SAND-08%, PHOSPHATIC SAND-05%  
 SILT- %  
 OTHER FEATURES: CALCAREOUS  
 FOSSILS: BENTHIC FORAMINIFERA, FOSSIL FRAGMENTS  
 SORITES FRAGMENTS NOTED
- 470 - 480 DOLOSTONE; GRAYISH BROWN  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, INTERGRANULAR  
 10-50% ALTERED; EUHEDRAL  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): DOLOMITE CEMENT  
 ACCESSORY MINERALS: PHOSPHATIC SAND-05%, QUARTZ SAND-10%  
 SILT- %  
 OTHER FEATURES: CALCAREOUS  
 FOSSILS: ECHINOID, FOSSIL FRAGMENTS
- 480 - 490 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, INTERGRANULAR  
 GRAIN TYPE: BIOGENIC, CALCILUTITE, CRYSTALS  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE

GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-10%  
 SILT- %  
 FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, BRYOZOA

490 - 500 DOLOSTONE; GRAYISH BROWN  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, INTERGRANULAR  
 10-50% ALTERED; EUBEDRAL  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): DOLOMITE CEMENT  
 ACCESSORY MINERALS: PHOSPHATIC SAND-08%, QUARTZ SAND-10%  
 SILT- %  
 OTHER FEATURES: CALCAREOUS, SUCROSIC  
 VARIABLY SILTY AND SANDY; VARIABLE TO A DOLOMITIC SILT

500 - 510 AS ABOVE

510 - 520 LIMESTONE; WHITE TO VERY LIGHT GRAY  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, INTERGRANULAR  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: PHOSPHATIC SAND-02%, QUARTZ SAND-02%  
 SILT- %, IRON STAIN-01%  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION

520 - 530 AS ABOVE

530 - 540 AS ABOVE

540 - 550 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY  
 POROSITY: INTERCRYSTALLINE, LOW PERMEABILITY, INTERGRANULAR  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: QUARTZ SAND-10%, SILT-25%  
 PHOSPHATIC SAND-10%  
 COMMENTS AS FOR 500'

550 - 560 LIMESTONE; WHITE TO VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, LOW PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: QUARTZ SAND-05%, SILT- %  
 PHOSPHATIC SAND-05%

560 - 570 LIMESTONE; WHITE TO VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, LOW PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: QUARTZ SAND-02%, PHOSPHATIC SAND-02%  
 IRON STAIN-01%

570 - 580 LIMESTONE; WHITE TO VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, LOW PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: QUARTZ SAND-08%, PHOSPHATIC SAND-03%  
 FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID

580 - 590 LIMESTONE; VERY LIGHT GRAY TO LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, LOW PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO VERY FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX

ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-02%  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 FOSSILS: FOSSIL FRAGMENTS

590 - 600 AS ABOVE

600 - 610 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, LOW PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: QUARTZ SAND-08%, PHOSPHATIC SAND-02%  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION

610 - 620 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, LOW PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL  
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO FINE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 ACCESSORY MINERALS: QUARTZ SAND-05%, PHOSPHATIC SAND-01%

620 - 630 AS ABOVE

630 - 640 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL  
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: QUARTZ SAND-01%  
 FOSSILS: FOSSIL FRAGMENTS  
 WACKESTONE TO PACKSTONE

640 - 650 AS ABOVE

650 - 660 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
 POSSIBLY HIGH PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL  
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: SPAR- %  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID

660 - 670 AS ABOVE

670 - 680 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
 POSSIBLY HIGH PERMEABILITY  
 GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL  
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: SPAR- %  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID  
 PACKSTONE (WITH ZONES OF GRAINSTONE?)

680 - 690 AS ABOVE

690 - 700 LIMESTONE; VERY LIGHT GRAY  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
 GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL  
 GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 ACCESSORY MINERALS: SPAR- %  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 HIGH RECRYSTALLIZATION

700 - 710 AS ABOVE  
 POOR SAMPLE - HAWTHORNE GROUP CAVINGS

- 710 - 720 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE  
POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
GRAIN TYPE: BIOGENIC, CALCILUTITE, SKELETAL  
GRAIN SIZE: FINE; RANGE: MICROCRYSTALLINE TO MEDIUM  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: SPAR- %  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
FOSSILS: FOSSIL FRAGMENTS, MOLLUSKS, ECHINOID  
PACKSTONE
- 720 - 730 AS ABOVE
- 730 - 740 AS ABOVE
- 740 - 750 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE  
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY  
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
85% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO MEDIUM  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ECHINOID  
PACKSTONE
- 750 - 760 AS ABOVE
- 760 - 770 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE  
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY  
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
80% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO MEDIUM  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX  
FOSSILS: MOLLUSKS, FOSSIL FRAGMENTS, ECHINOID, BRYOZOA  
SLIGHTLY MUDDIER AND MORE CRYSTALLIZED THAN ABOVE
- 770 - 780 LIMESTONE; VERY LIGHT GRAY  
POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
POSSIBLY HIGH PERMEABILITY  
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
85% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO MEDIUM  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
ACCESSORY MINERALS: SPAR- %  
OTHER FEATURES: POOR SAMPLE  
FOSSILS: ECHINOID, FOSSIL FRAGMENTS, MOLLUSKS, MILIOLIDS
- 780 - 790 LIMESTONE; VERY LIGHT GRAY  
POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
POSSIBLY HIGH PERMEABILITY  
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
85% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO MEDIUM  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
FOSSILS: ECHINOID, FOSSIL FRAGMENTS, MOLLUSKS, MILIOLIDS  
PACKSTONE TO WACKESTONE
- 790 - 800 AS ABOVE
- 800 - 810 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE  
POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY  
GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
75% ALLOCHEMICAL CONSTITUENTS  
GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE  
GOOD INDURATION  
CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
HIGH RECRYSTALLIZATION  
FOSSILS: ECHINOID, FOSSIL FRAGMENTS
- 810 - 820 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE



POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY  
 GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
 90% ALLOCHEMICAL CONSTITUENTS  
 GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 OTHER FEATURES: MEDIUM RECRYSTALLIZATION  
 HIGH RECRYSTALLIZATION  
 FOSSILS: ECHINOID, FOSSIL FRAGMENTS, MILIOLIDS  
 PACKSTONE TO WACKESTONE

820 - 830 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE  
 POROSITY: INTERGRANULAR, POSSIBLY HIGH PERMEABILITY  
 GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
 70% ALLOCHEMICAL CONSTITUENTS  
 GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX  
 OTHER FEATURES: LOW RECRYSTALLIZATION  
 FOSSILS: ECHINOID, FOSSIL FRAGMENTS

830 - 840 LIMESTONE; VERY LIGHT GRAY TO VERY LIGHT ORANGE  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE  
 POSSIBLY HIGH PERMEABILITY  
 GRAIN TYPE: BIOGENIC, SKELETAL, CALCILUTITE  
 75% ALLOCHEMICAL CONSTITUENTS  
 GRAIN SIZE: MEDIUM; RANGE: VERY FINE TO COARSE  
 GOOD INDURATION  
 CEMENT TYPE(S): CALCILUTITE MATRIX, SPARRY CALCITE CEMENT  
 OTHER FEATURES: LOW RECRYSTALLIZATION  
 MEDIUM RECRYSTALLIZATION  
 FOSSILS: BRYOZOA, MOLLUSKS, FOSSIL FRAGMENTS, MILIOLIDS  
 ECHINOID  
 WACKESTONE TO PACKSTONE

840 - 850 AS ABOVE

850 - 860 AS ABOVE

860 - 870 AS ABOVE

870 - 880 AS ABOVE  
 VERY POOR SAMPLE - ABUNDANT CAVINGS (HAWTHORNE)

880 - 890 DOLOSTONE; GRAYISH BROWN  
 POROSITY: INTERGRANULAR, INTERCRYSTALLINE, LOW PERMEABILITY  
 50-90% ALTERED;  
 GRAIN SIZE: VERY FINE; RANGE: MICROCRYSTALLINE TO GRANULE;  
 OTHER FEATURES: POOR SAMPLE, SUCROSIC  
 ABUNDANT LIMESTONE AND HAWTHORN CAVINGS

890 - 900 AS ABOVE

900 - 910 AS ABOVE  
 THIS LAST SAMPLE IS VERY POOR (ABUNDANT CAVINGS?); IT  
 CONSISTS OF COARSE, ROUNDED LIMESTONE FRAGMENTS AND SOME  
 PHOSPHATE MIXED WITH TAN DOLOMITE; THE TRUE LITHOLOGY IS  
 PRESUMED TO BE DOLOSTONE

910 TOTAL DEPTH