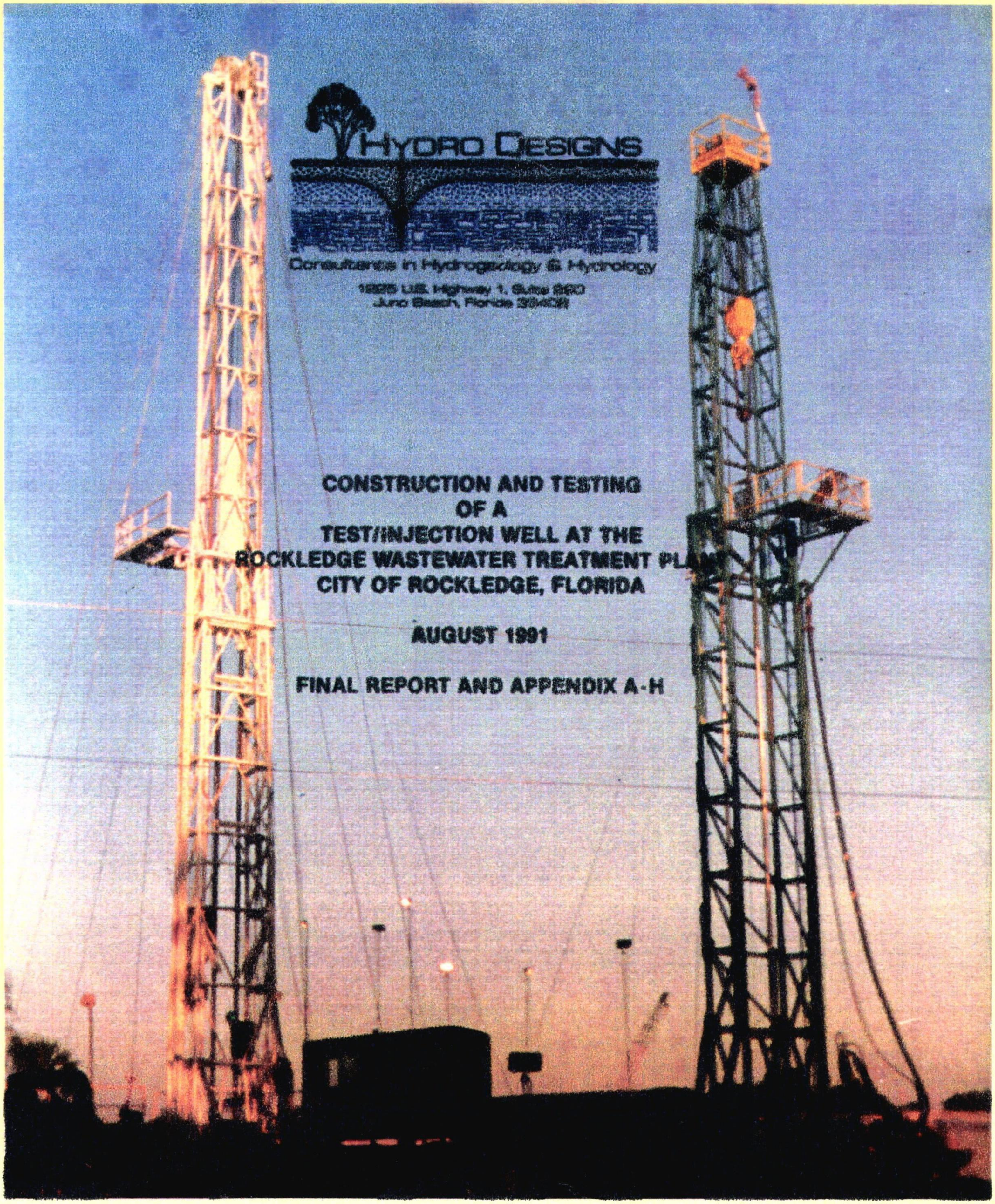

HYDRO DESIGNS

Consultants in Hydrogeology & Hydrology

1925 U.S. Highway 1, Suite 200
Juno Beach, Florida 33408

CONSTRUCTION AND TESTING OF A TEST/INJECTION WELL AT THE ROCKLEDGE WASTEWATER TREATMENT PLANT CITY OF ROCKLEDGE, FLORIDA

AUGUST 1991

FINAL REPORT AND APPENDIX A-H

CKHO WILL CONTACT HOLLYHOUSE[?] & EPA CONCERNING THIS

MEMORANDUM TO FILE
SITE VISIT - ROCKLEDGE

TO: FILE
FROM: DAW
DATE: 8-29-91
TIME: 10:30 A.M. - 2:00 P.M.
ATTENDING: DAW, GARRY MILLER (GM)

ON THE ABOVE REFERENCED DATE, GM AND MYSELF (DAW) CONDUCTED A SITE VISIT AT ROCKLEDGE WWTP TO SEE THE NEW PLANT AND INJECTION WELL PURSUANT TO ISSUANCE OF A LETTER OF AUTHORIZATION TO USE SAID INJECTION WELL. OUR TOUR GUIDE WAS CYNTHIA GERSTER (INGRAM) LICENSE # 007290 WHICH EXPIRES 12-31-91. THIS PLANT HAS HISTORICALLY DISCHARGED TO THE RIVER AND IS DUE TO CEASE DOING SO IN 2-3 MONTHS. BOTH NO3 AND P HAVE BEEN RECENTLY TO HIGH IN THE EFFLUENT. THE ANALYSIS ARE PROVIDED BY BIONOMICS LABS. THEY WANT TO BE FULLY POERATIONAL IN 5-6 WEEKS. THEIR EPA CONTACT IS KAREN BURKIE. THEIR INTENTION IS TO CHLORINATE THE EFFLUENT PRIOR TO INJECTION. THEY HAVE A DECHLORINATION FACILITY (SIO2) CAPABLE OF REDUCING [CL] 0.2 PPM HOWEVER THEY DO NOT INTEND TO DECHLORINATE INJECTED FLUIDS PRIOR TO INJECTION.

THEY HAVE IN PLACE DUAL CONTINUOUS STRIP CHARTS RECORDERS AND INSTANT DIGITAL READOUTS FOR THE FOLLOWING:

1) PRESSURE
2) FLOW

THERE ARE NO OTHER GAGES OR METERS. AT THE TIME OF THE VISIT, THE STATIC PRESSURE WAS 9.96 PSI AND THE FLOW WAS 0 GPD. SO...

POINTS TO PONDER:

1) THEY HAVE A PERMIT TO DISCHARGE TO THE INDIAN RIVER WHICH EXPIRES 12-91. DO THEY NEED A DIMP PRIOR TO TO THEIR LETTER OF AUTHORIZATION TO INJECT ?
2) NO3 AND P ARE HEGH IN THE EFFLUENT. SHOULD WE WAIT UNTILL THIS IS CORRECTED ?
3) THEY ARE PLANNING TO CHLORINATE THE WELL EFFLUENT. IS THIS A PROBLEM ? SHOULD IT BE DECHLORINATED PRIOR TO DISCHARGE ? SHOULD WELL EFFLUENT BYPASS THE CCC ?
4) DO THEY NEED ADDITIONAL GAGES ON THE WELLHEAD ?
5) I AM STILL WAITING ON JOE HABERFELDS PACKAGE PERTAINING TO THE DEFFICIENT BACKGROUND CHEMICAL INFORMATION.

EPA-404-347-3379

Karen #7428

404-347-7428
EPA COMPLIANCE

FILE

<u>MEMORANDUM</u>

TO: DRA
FROM: DAW
DATE: 8-21-91
RE: PRIORITY ITEM #176 - REQUEST FROM THE CITY OF ROCKLEDGE FOR LETTER OF AUTHORIZATION TO INJECT - ROCKLEDGE CLASS I INJECTION WELL

PRIOR TO ISSUANCE OF A LETTER OF AUTHORIZATION I HIGHLY RECOMMEND THAT A JOINT FACILITY INSPECTION BE CONDUCTED WITH A WASTE WATER TREATMENT PLANT INSPECTOR AND SOMEONE WITH UIC (ME).

OTHERWISE, WE WILL BE WAITING FOR TAC COMMENTS ANYWAY.

THIS IS A NEW PLANT AND I AM NOT EVEN SURE OF THEIR PERMIT STATUS.

RESPONSE TO THE REQUEST IS DUE 9-6-91 SO I RECOMMEND THAT THE INSPECTION TAKE PLACE IN THE VERY NEAR FUTURE.

CITY OF ROCKLEDGE

1600 Huntington Lane
Rockledge, FL 32955-2660

P.O. Box 560488
Rockledge, FL 32956-0488

[redacted]

Telephone 407/690-3978 • Fax 407/690-3987

James P. McKnight
City Manager

August 5, 1991

Mr. Carlos Rivero-deAguilar, P.E.
Water Facilities Administrator
Florida Department of Environmental Regulation
Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Re: Final Well Construction Report
Class I Test/Injection Well
S&G Project No. 8802-02-02
Rockledge, Florida

Dear Mr. deAguilar:

We are pleased to submit the enclosed report titled *Construction and Testing of a Test/Injection Well at the Rockledge Wastewater Treatment Plant, City of Rockledge, Florida* for review by the Department staff and representatives of other agencies on the Technical Advisory Committee (TAC). The report satisfies special condition number 7 of our FDER construction permit No. UCO5-161506 dated October 4, 1989 and condition number 1 of the application for an operational permit.

We are applying for an operational permit concurrently with this submittal under separate cover. However, in accordance with specific condition No. 25 of the construction permit, we request the Department give permission to begin injecting effluent within the next 30 days. This will allow the development of site specific data to assist in your review of the operational permit and remove effluent discharge into the Indian River system, the project's initial objective.

If you have any questions in this matter, do not hesitate to contact us or our Engineering Consultant, Smith and Gillespie Engineers, Inc.

Sincerely,

CITY OF ROCKLEDGE

James P. McKnight
City Manager

JPM:b[2]

cc: TAC Members: Anne Bradner, USGS
Robert Mann, U.S. EPA, Atlanta
Rick Levin, SJRWMD
Richard Duerling, FDER, Tallahassee
Duane Watroba, FDER, Orlando
Smith and Gillespie Engineers, Inc.

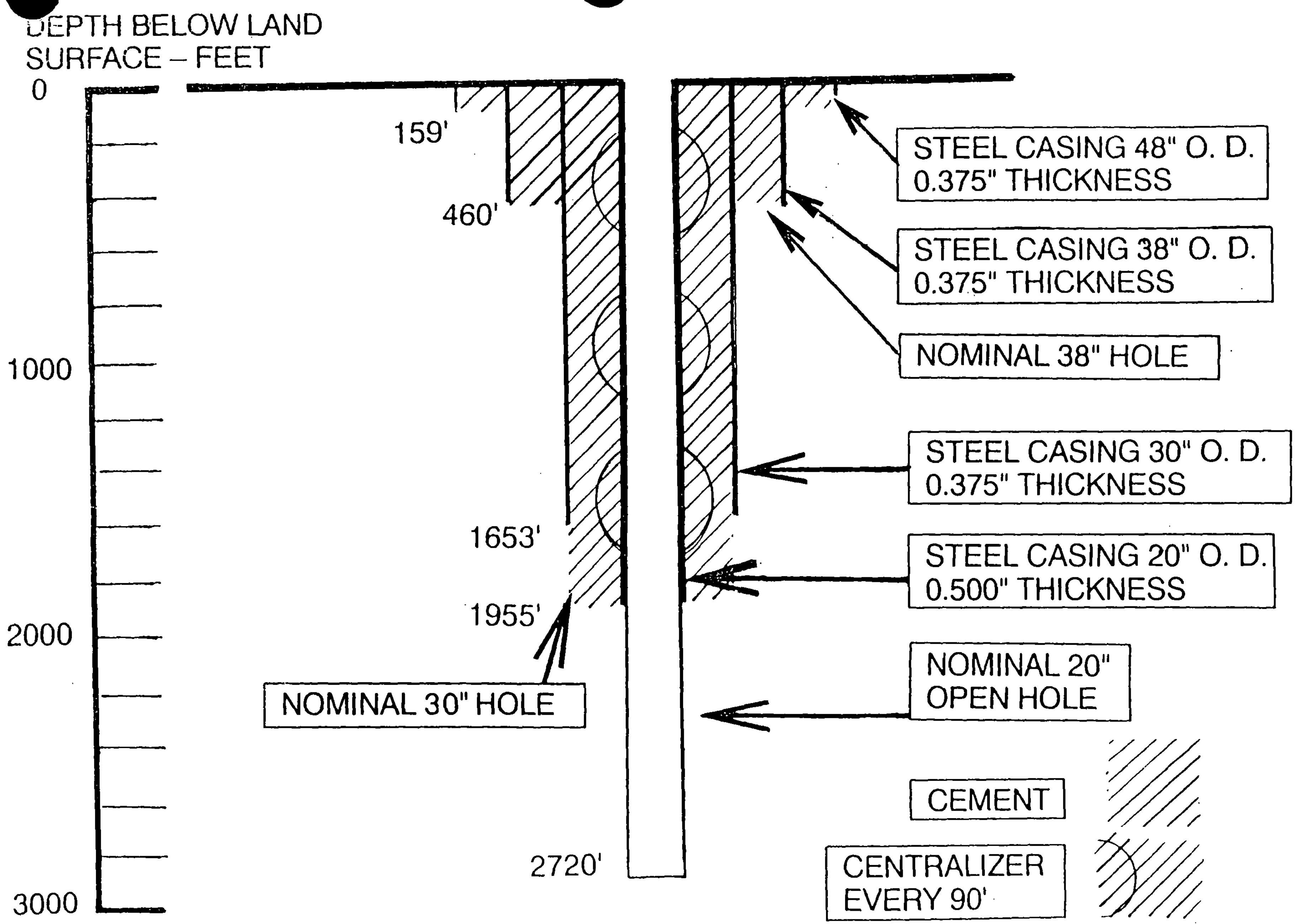

FIGURE 8 COMPLETED INJECTION WELL

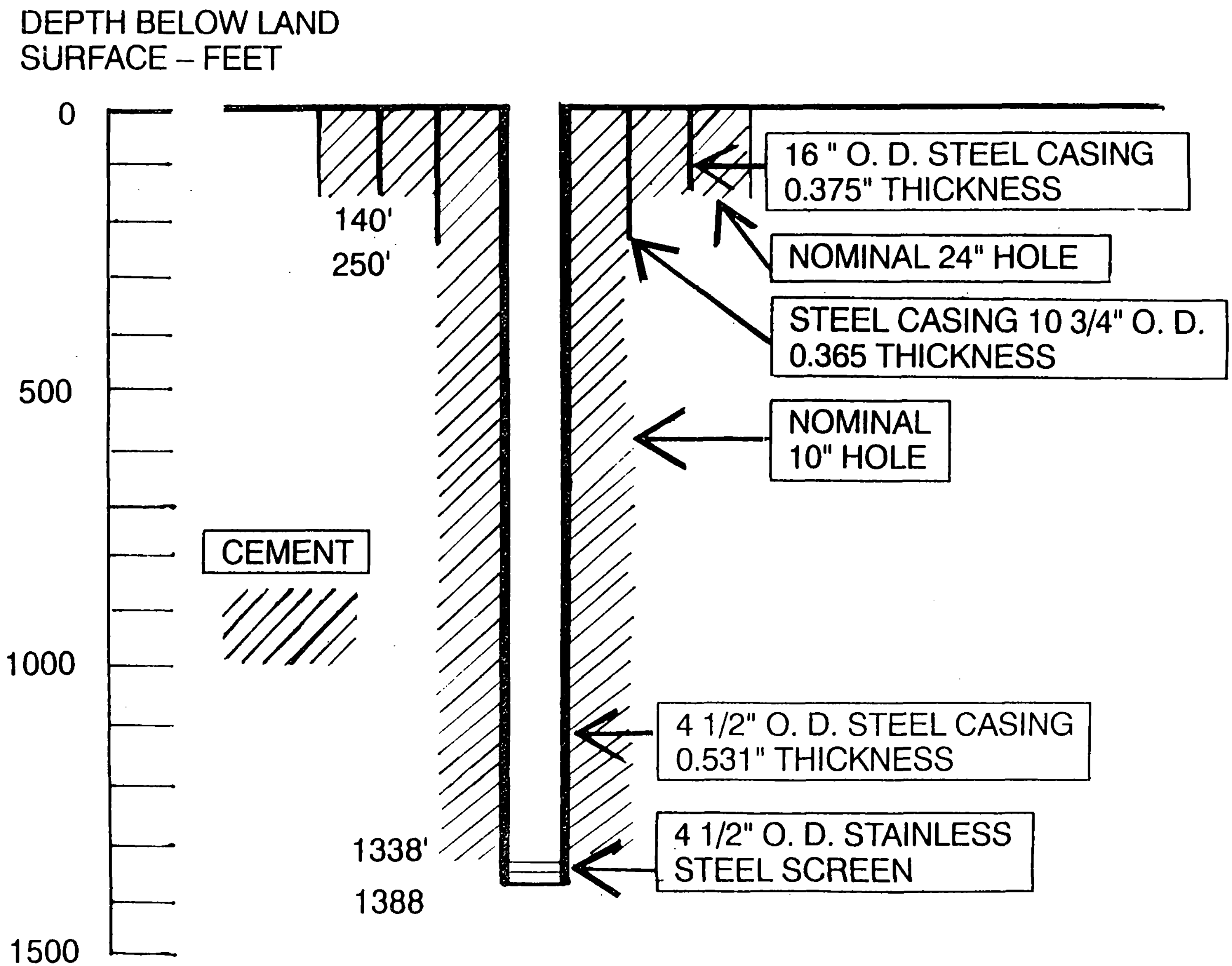

FIGURE 9 DEEP FLORIDAN MONITOR WELL

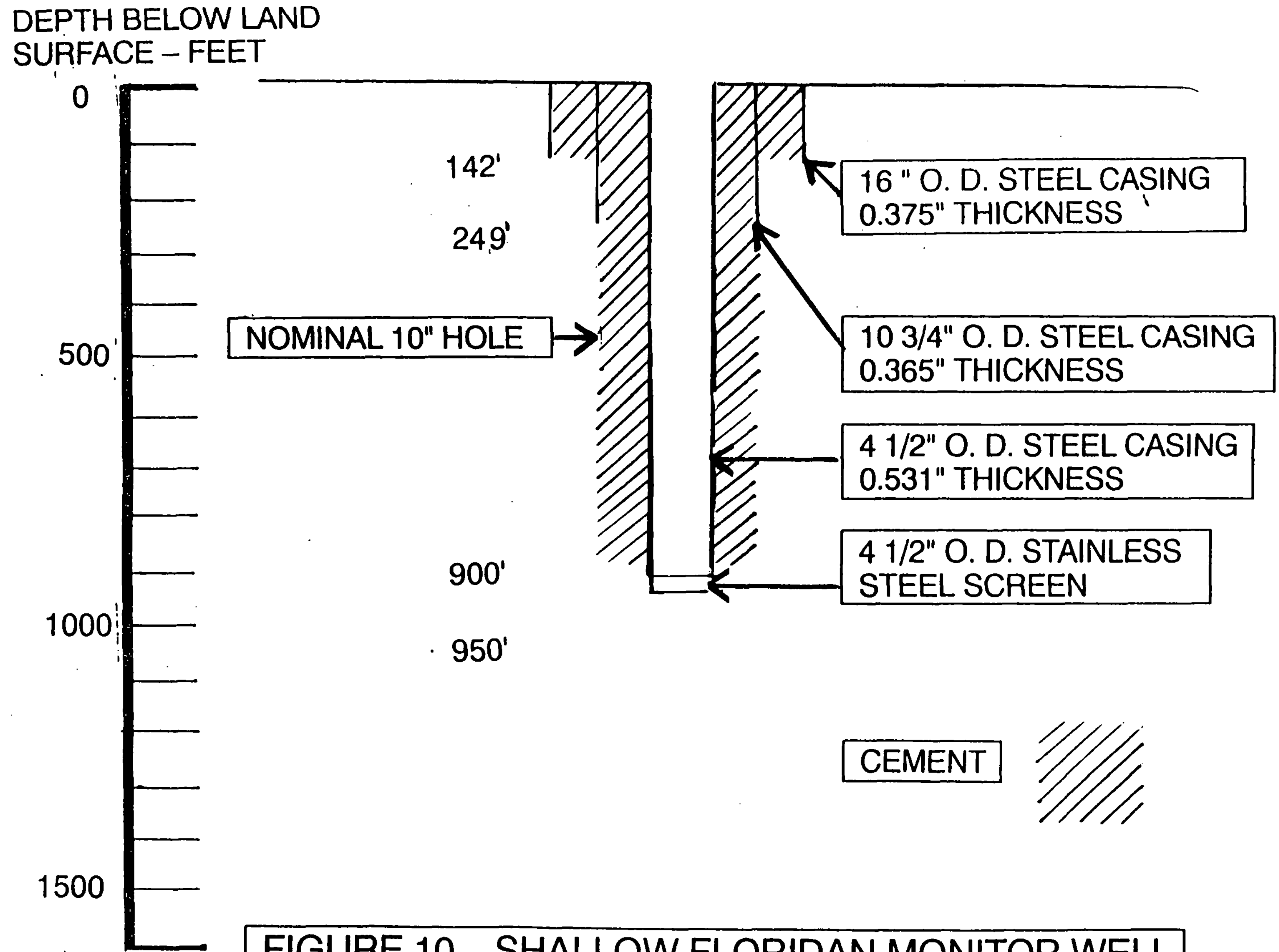

FIGURE 10 SHALLOW FLORIDAN MONITOR WELL

HYDRO DESIGNS
Consultants in Hydrogeology & Hydrology

1225 U.S. Highway 1, Suite 246
Juno Beach, Florida 33408
(407) 626-8250

CONSTRUCTION AND TESTING
OF A
TEST/INJECTION WELL
ROCKLEDGE WASTEWATER TREATMENT PLANT
CITY OF ROCKLEDGE, FLORIDA

PREPARED FOR

SMITH AND GILLESPIE ENGINEERS, INC.
PROJECT NO. 8802-02-02

AUGUST 1991

PREPARED BY

HYDRODESIGNS, INC.

HYDRO DESIGNS
Consultants in Hydrogeology & Hydrology

1225 U.S. Highway 1, Suite 246
Juno Beach, Florida 33408
(407) 626-8250

Mr. Douglas E. Layton, P.E.
Smith and Gillespie Engineers
Post Office Box 53138
Jacksonville, Florida
32201

August 8, 1991

Dear Mr. Layton,

We are pleased to submit this report titled "Construction and Testing of a Test/Injection Well at the Rockledge Wastewater Treatment Plant, City of Rockledge, Florida" for distribution to the City and regulatory agencies. The report satisfies special condition number 7 of the FDER construction permit and condition number 1 of the application for an operational permit.

The two major sections in the report are the text and appendix. The text describes the construction and testing program in detail, presents an interpretive analysis of the collected data, and contains an operation and maintenance manual and well abandonment program for the City. The appendix is quite extensive and contains all of the hydrogeological, construction and Florida Department of Environmental Regulation required information.

We appreciate the time and support that you and Alan Laduke of the City of Rockledge gave us during this project. It was instrumental in keeping this project well under budget and ahead of schedule.

Sincerely,

Michael S. Knapp, P.G.
Project Manager

Aimee Fratarcangeli
Senior Hydrogeologist

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ABBREVIATIONS COMMONLY USED IN REPORT

APL - ABOVE PAD LEVEL
BPL - BELOW PAD LEVEL
CBL - CEMENT BOND LOG
CET - CEMENT EVALUATION TOOL
CM/SEC - CENTIMETERS PER SECOND
EPA - ENVIRONMENTAL PROTECTION AGENCY
FDER - FLORIDA DEPARTMENT OF ENVIRONMENTAL REGULATION
GPD/FT - GALLONS PER DAY PER FOOT
GPM - GALLONS PER MINUTE
IP - INJECTION PRESSURE
MG/L - MILLIGRAMS PER LITER
MGD - MILLION GALLONS PER DAY
MGD/FT - MILLION GALLONS A DAY PER FOOT
MSL - MEAN SEA LEVEL
PSI - POUND PER SQUARE INCH
QA/QC - QUALITY ASSURANCE/QUALITY CONTROL
RTS - RADIOACTIVE TRACER SURVEY
SJRWMD - ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
SP. - SPECIES
SP - SPECIFIC PRESSURE
TAC - TECHNICAL ADVISORY COMMITTEE
TDS - TOTAL DISSOLVED SOLIDS
T/I - TEST/INJECTION
USDW - UNDERGROUND SOURCE OF DRINKING WATER
USGS - UNITED STATES GEOLOGICAL SURVEY
WH - WELL HEAD

CONSTRUCTION AND TESTING

OF A

TEST/INJECTION WELL AT THE

ROCKLEDGE WASTEWATER TREATMENT PLANT

CITY OF ROCKLEDGE, FLORIDA

1.0 INTRODUCTION

The City of Rockledge received a permit (No. UC05-161506) from the FDER (Florida Department of Environmental Regulation) to construct and test an injection well system at the Rockledge Wastewater Treatment Plant in October of 1990. The firms that prepared the technical specifications for the project and represented the City to the various agencies were Smith and Gillespie Engineers, Inc., of Jacksonville, Florida and HydroDesigns, Inc. of Juno Beach, Florida. Youngquist Brothers, Inc. from Fort Myers, Florida was awarded the contract for well construction and began construction activities in early October of 1990. The injection and monitor wells were completed and tested by April of 1991. Construction of the three wells required only 184 days within a 220 day time frame and cost for construction was under the total bid price by more than 25,000 dollars.

The injection well is capable of disposing of a peak hourly flow of nearly 10.50 million gallons per day (mgd) of secondarily treated sewage effluent without surpassing a downhole velocity of 8 feet per second. Initial flows should average about 2.0 mgd with hourly peaks up to 5.5 mgd. Design flows have a daily average of 4.5 mgd with hourly peaks not exceeding 10.5 mgd.

The purpose of this engineering report is to supply the specified accompanying information to the construction permit in support of a formal application for an operational permit as required by Section 17-28.33 of the Florida Administrative Code (FAC). This report summarizes the construction activities and documents the information collected and analyzed during the project. An operations and maintenance manual is included. Operations and maintenance training (computer input and program use) for the statistical analysis data will be provided to the City. The appendix contains copies of the geologic logs, geophysical logs, water quality data, injection test results, construction activity logs, a letter of abandonment and other pertinent information.

2.0 EXECUTIVE SUMMARY

INJECTION WELL

The injection well contains 1955 feet of 20" steel casing. The base of the casing is set in the lower portion of a sequence of limestone confining beds overlying the dolomites comprising the injection zones. There are also 1653 feet of 30" intermediate casing, 460 feet of 38" surface casing, and 159 feet of 48" conductor casing in the well. The major findings derived from the drilling and testing program are:

A. A zone capable of accepting the planned disposal rates exists in the injection well from a depth of 1980 feet below pad level to 2170 feet below pad level. Smaller cavernous zones were also encountered from 2170 feet to the wells' total depth of 2720 feet.

B. The total dissolved solids concentration of waters within the injection zone ranges from 29,703 mg/l to 32,747 mg/l.

C. The estimated transmissivity of the injection zone is approximately 500,000 gpd/ft and capable of accepting the planned volume of treated fluids.

D. A confining sequence exists in the lower portion of the Lake City Limestone and upper portion of the Oldsmar Limestone from a depth of 1550 feet to 1980 feet bpl.

E. Nine (9) cores totalling 52 linear feet were collected from various horizons from 1520 feet to 2420 feet bpl.

F. Vertical hydraulic conductivities of the cores ranged from 0.00014 to 0.0000000011 cm/sec.

G. The contact of waters of less than 10,000 mg/l TDS (base of USDW) with non-potable waters is at an approximate depth of 1180 feet below pad level.

DEEP FLORIDAN MONITOR WELL

The deep Floridan monitor well contains 1338 feet of 4 1/2" seamless steel casing with 50 feet of continuous slot stainless steel screen monitoring from 1338 feet to 1388 feet below land surface. The well also contains 250 feet of 10 3/4" steel surface casing and 141 feet of 16" steel conductor casing.

Significant information collected during the drilling and testing of the deep Floridan monitor well are:

A. The water level varies with barometric pressure and tidal changes but generally stands about 15.7 feet below pad level.

B. Total dissolved solids concentration of the deep monitor well waters are consistently in the range of 38,989 mg/l.

C. During the injection and recovery phases of the injection test the water level shows only a minimal response (less than 0.05 ft.) to the various pumping rates and test shutdown.

D. Two (2) cores totalling 23 linear feet were collected above and below the base of the USDW at 1131 feet and 1473 feet bpl. Vertical hydraulic conductivities were 0.000000013 cm/sec and 0.0000000003 cm/sec, respectively.

SHALLOW FLORIDAN MONITOR WELL

The shallow Floridan monitor well contains 901 feet of 4 1/2" seamless steel casing with 50 feet of continuous slot stainless steel screen. The screen is open to a monitor zone from 901 feet to 951 feet below land surface. The well also contains 249 feet of 10 3/4" steel surface casing and 142 feet of 16" steel conductor casing.

Significant information collected during the drilling and testing of the shallow Floridan monitor well are:

A. The water level varies with barometric pressure and tidal changes but normally stands about 4.3 feet above pad level.

B. Total dissolved solids concentration of the shallow monitor zone are 2,221 mg/l. These concentrations may increase as the well is continually developed.

C. There were no measurable changes of water level in the shallow monitor zone during or after the injection test.

3.0 GEOLOGIC SETTING AND LOCATION

The Rockledge test/injection well is located within the property boundary of the City's Wastewater Treatment Plant. The plant and well are located adjacent to U.S. Highway 1 and the Florida East Coast Railroad in east central Rockledge just behind the police station. The location of the Rockledge test/injection well and it's relative proximity to other injection or deep wells in Brevard County is depicted on Figure 1.

Figure 2 illustrates the position of the major geologic structural features in Florida. The most prominent feature is the Ocala Uplift, which was described by Vernon (1951) as a gentle flexure trending northwest to southeast along its crest. Within Brevard County and to the east of the Ocala Uplift is a broad low ridge or platform expressed on the erosional surface of the Ocala Group. This structure is termed the Brevard Platform (Riggs, 1979) and it plunges gently to the south-southeast and southeast. Faults have not been documented in the Brevard Platform area and it is considered tectonically stable.

4.0 GEOLOGY

The geologic units underlying the Rockledge site are summarized

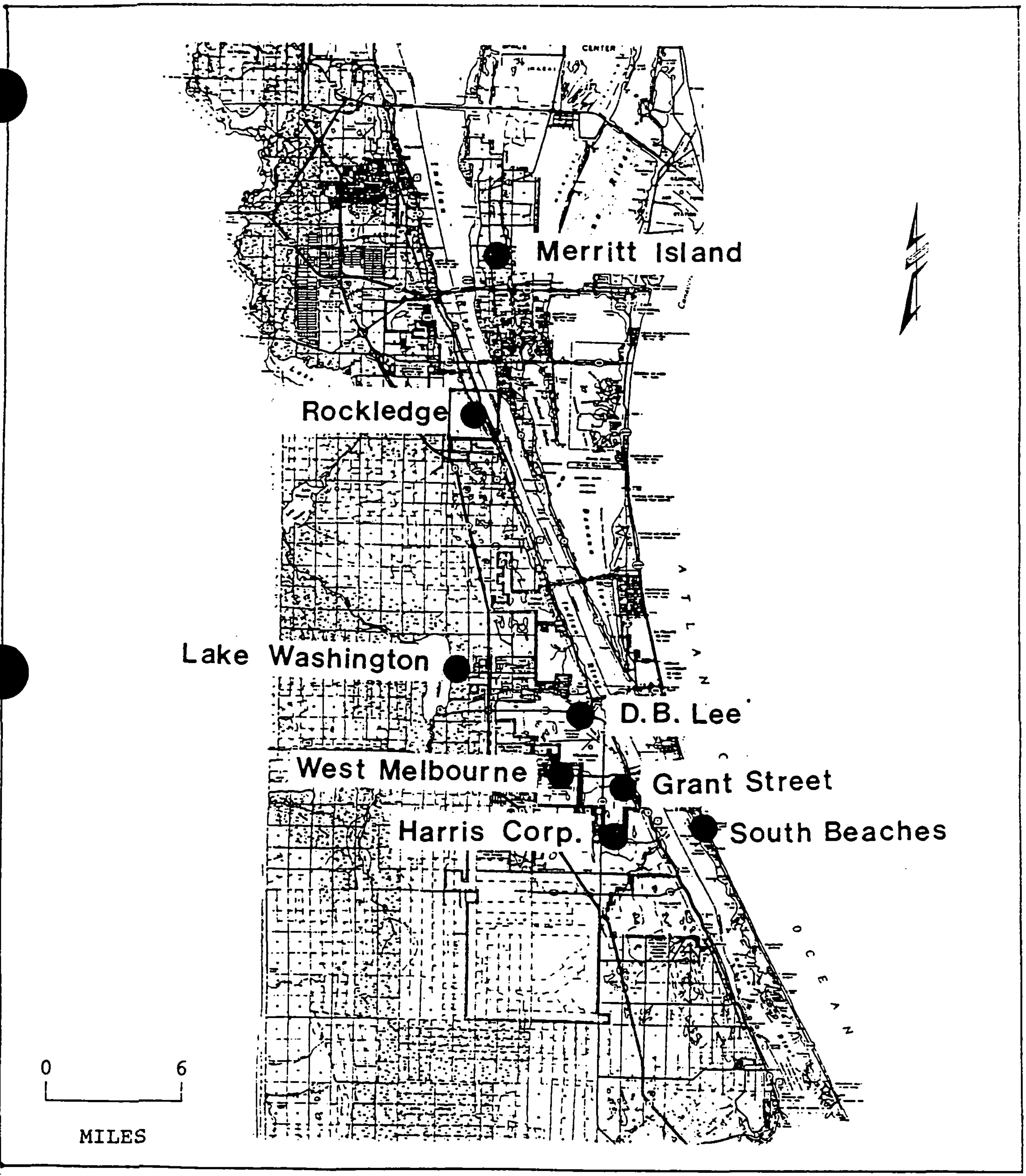


FIGURE 1 LOCATION OF THE ROCKLEDGE TEST/INJECTION WELL AND ITS RELATIVE PROXIMITY TO OTHER INJECTION AND DEEP WELLS IN BREVARD COUNTY

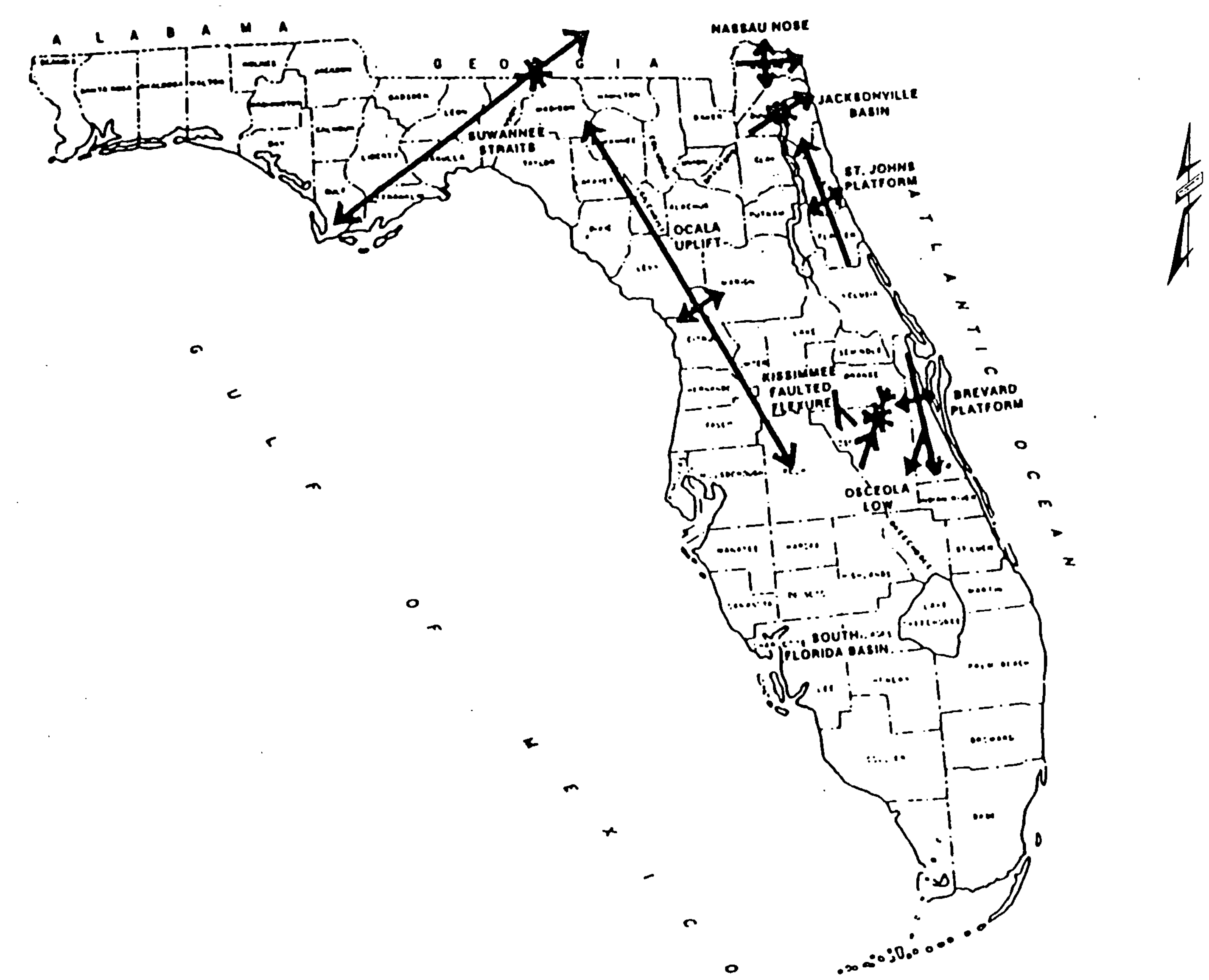


FIGURE 2 GEOLOGIC STRUCTURES OF PENINSULAR FLORIDA

in Table 4.1 and depicted on Figure 3. Appendix A contains the lithological descriptions of the cuttings and cores used to determine the stratigraphic position of the individual rock units.

TABLE 4.1 - DEPTH AND THICKNESS OF STRATIGRAPHIC UNITS

DEPTH (FT.bpl)	THICKNESS (FT.)	FORMATION
0 to 60	60	Undifferentiated Deposits and Anastasia Formation
60 to 110	50	Tamiami Formation
110 to 145	35	Hawthorn Group
145 to 250	105	Ocala Group
250 to 1690	1440	Avon Park/Lake City Limestone
1690 to 2720	1030+	Oldsmar Limestone

4.1 PALEOCENE ERATHEM

CEDAR KEYS FORMATION

The Cedar Keys Formation is the deepest and oldest Tertiary limestone encountered in south-central Florida. The unit was originally proposed by Cole (1944) and described by Chen (1965) as a gray, microcrystalline, slightly gypsiferous and rarely fossiliferous dolomite. Chen contoured the top of this unit at approximately -2500 feet msl in this area. The formation was penetrated in the South Beaches well (Dames and Moore, 1985) from 2780 feet to the total depth of the well at 2915 feet below land

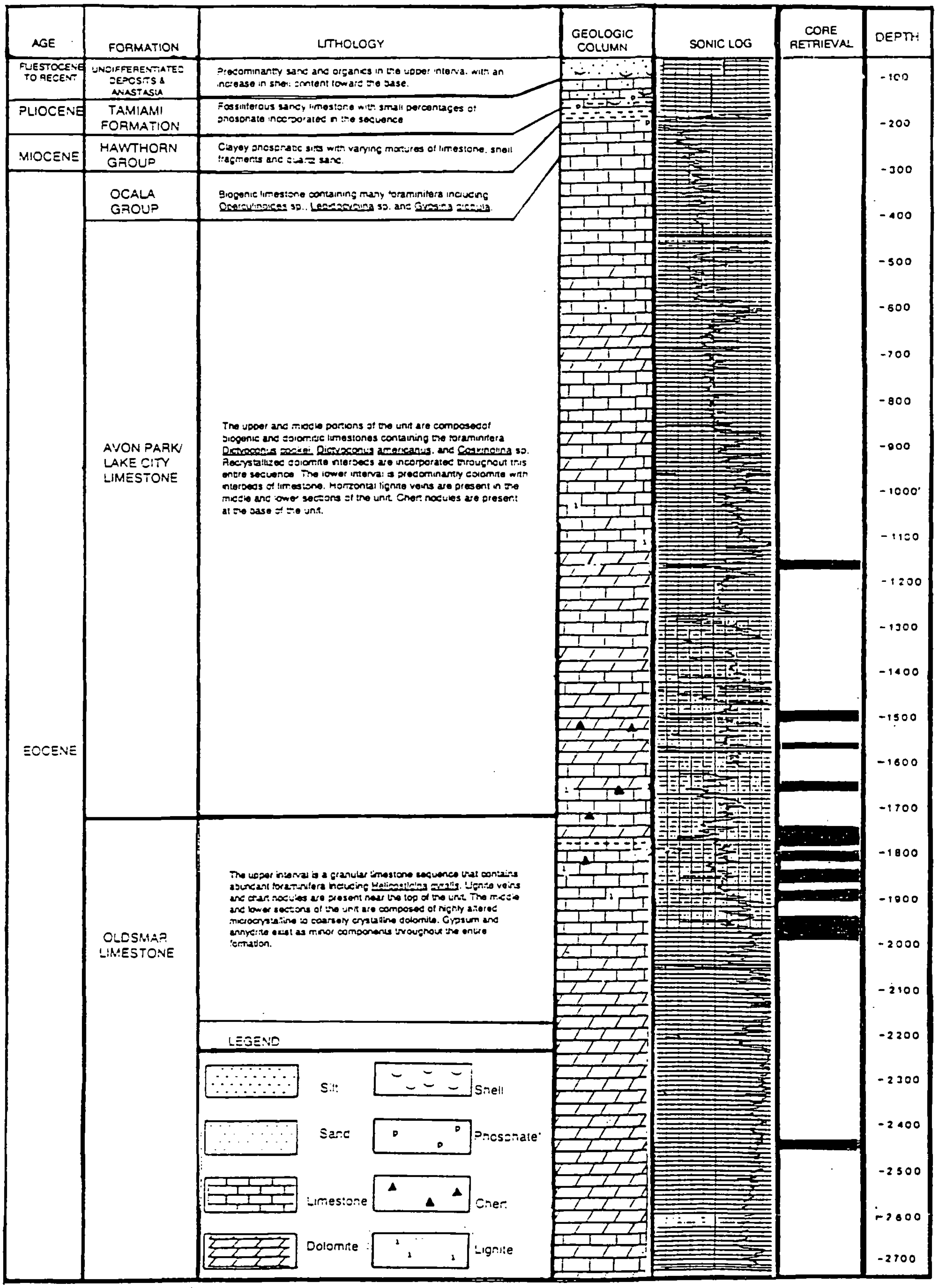


FIGURE 3 GEOLOGIC COLUMN

surface. In that well the unit occurred as a low permeability gypsiferous dolomite interbedded with anhydrite. A distinct fauna composed of the foraminifera Borelis normally occurs at the top of the unit. The Rockledge injection well never encountered the bedded anhydrite sequence or Borelis type fauna. Therefore the unit is here considered to lie below 2720 feet.

4.2 EOCENE ERATHEM

OLDSMAR LIMESTONE

Applin and Applin (1944) applied the name "Oldsmar Limestone" to a series of faunal zones overlying the Cedar Keys Formation. Chen (1965) described the unit in peninsular Florida as being predominantly dolomite and limestone with gypsum and anhydrite as minor components. In the Melbourne area he contoured the top of the unit between -1500 and -2000 feet msl and the thickness as approximately 900 feet. At a test site in Merritt Island (Geraghty and Miller, 1984), the Oldsmar was principally composed of brownish dolomites with interbedded limestone. The thickness of the unit in that well was 910 feet with highly recrystallized dolomites occurring from near -1900 feet to the top of the Cedar Keys at -2670 feet below land surface. The Oldsmar was logged from -1665 to -2700 feet below land surface in the South Beaches well. The upper portion of the unit in this well occurred as a cherty and glauconitic highly recrystallized limestone. Cavernous and possibly fractured dolomites were encountered from -2083 feet to the base of the formation.

In the Rockledge injection well, the top of the Oldsmar Limestone was penetrated at a depth of 1690 feet b.l.s. in a cherty and micritic limestone. The base of the unit was not penetrated at a depth of 2720 feet (the total depth of the injection well). Chert nodules are present from a depth of 1490 feet (in the Lake City/Avon Park) through the contact with the Oldsmar to a depth of 1770 feet. The upper interval (to a depth of 1930 feet) is a foraminiferous, granular limestone sequence that is slightly dolomitic. Lenses of chert and also lignite veins are present throughout the upper portion. Dolomite is the predominant lithology in the middle and lowermost sections and extends 770 feet to the base of the well. This dolomite is highly altered, micro to coarsely crystalline and contains minor amounts of evaporites throughout the section. The base of this dolomite is interbedded with micritic and dolomitic limestones.

LAKE CITY LIMESTONE / AVON PARK LIMESTONE

The Lake City Limestone and Avon Park Limestone were proposed by Applin and Applin (1944) for rocks of early middle Eocene and late middle Eocene age respectively in Florida. In the type area the Lake City Limestone is described as "a gray-brown, dense microcrystalline dolomite with occasional thin beds of limestone, chert, and carbonaceous material" (Ceryak, Knapp and Burnsen, 1982). The Avon Park Limestone is described as "a cream colored, chalky, limestone that contains a distinct fauna" from a type well located at the Avon Park bombing range in central Florida (Vernon, 1951). The two units are very similar lithologically and for the most part can only be separated by the guide fossils present within them. The major lithologic difference is the predominance of dolomite in the Lake City sequence.

The top of the Avon Park was contoured at near -400 feet msl and the thickness of the two units between 1200 and 1400 feet in the Melbourne area by Chen (1965). At the Merritt Island injection well the Avon Park was present at 235 feet below land surface and the total thickness of both units was 1445 feet. At the South Beaches injection well the top of the Avon Park was at 400 feet below land surface and the two units extended to 1663 feet below land surface for a total thickness of 1263 feet. The top of the Avon Park Limestone occurred at 380 feet below land surface in the Grant Street well with a combined thickness of the two units totalling 1418 feet.

The top of these two units was logged at 250 feet below land surface with a total combined thickness of 1440 feet. The major difference between the upper limestone beds in the unit and the overlying Ocala Group is the predominance of the foraminifera Dictyoconus cookei in the Avon Park beds. Lithologically the differences are slight and only in the grain sizes. Dolomite and dolomitic limestones are the predominant lithologies in the middle and basal portions of the Avon Park/Lake City Limestones. Lignite veins are recorded from 930 feet and occur throughout the interval. Chert nodules are present in the lowermost portion. The first occurrence of chert was logged at 1490 feet below land surface.

OCALA GROUP

Dall and Harris (1892) first used the term "Ocala Limestone" for limestones being quarried near the town of Ocala in Marion County, Florida. Puri (1957) raised the formation to the Ocala Group and subdivided it into three formations. Chen (1965) showed the top of the Ocala in the Melbourne area to be between -200 and -400 feet msl and the thickness near 100 to 150 feet. At the South Beaches injection well the Ocala occurred at 251 feet below land surface as a white micritic and coquinoid limestone with a large and diverse number of larger foraminifera. The unit was 149 feet thick at this site. At the City of Melbourne injection well and the Grant Street injection well, both of which are located to the south, the top of unit occurred at 272 feet and 280 feet respectively.

The top of the Ocala Group was penetrated at 145 feet below land surface. It is 110 feet thick with the Hawthorn lying unconformably above it. The Ocala normally occurs as a micritic, porous, fossiliferous limestone. Faunally, the group is marked at the top by a large quantity of the foraminifer Lepidocyclina ocalana. Other key foraminifera present in this unit include Operculinoides sp. and Gypsina Globula sp.. Near the contact with the Hawthorn (the upper 25 feet) the Ocala Group is a very pale orange (10 YR 8/2) to yellowish gray (5 Y 7/2), poorly indurated biomicrite. The middle and lowermost portions of the formation are predominantly a yellowish gray, moderately indurated, foraminiferal limestone with a high spar content.

4.3 MIOCENE ERATHEM

HAWTHORN GROUP

Dall and Harris first used the term "Hawthorn beds" for Miocene age phosphatic sediments being quarried near the town of Hawthorn in Alachua County, Florida. The Hawthorn normally consists of various mixtures of clay, quartz sand, carbonate (dolomite to limestone) and phosphates (Scott and Knapp, 1988). At the South Beaches injection well the Hawthorn was logged at 120 feet below land surface and was 131 feet thick. The unit occurred at 150 feet below land surface in the City of Melbourne injection well and is 123 feet in thickness. At the Grant Street injection well, the Hawthorn was logged at 155 feet below land surface and extended 125 feet to the top of the Ocala.

The top of the Hawthorn Group, at the Rockledge injection well, was penetrated at 110 feet below land surface and extends 35 feet to the top of the Ocala Group. The upper twenty (20) feet of the Hawthorn consists primarily of clayey phosphatic silt with small percentages of shell fragments and limestone. This sequence is bedded with micritic limestone and silty clay in the lower portion of the unit.

4.4 PLIOCENE / PLEISTOCENE ERATHEM

TAMIAMI FORMATION

Mansfield (1939) proposed the term "Tamiami limestone" for a fossiliferous sandy limestone approximately 25 feet thick, which was penetrated in shallow ditches along the Tamiami Trail (U.S. Highway 41) in southern Florida. The formation was logged at 80 feet below land surface and was 40 feet thick in the South Beaches injection well. It was present in the City of Melbourne injection well from 100 feet below land surface to the top of the Hawthorn Formation at 150 feet below land surface. At the Grant Street well the Tamiami was penetrated 100 feet below land surface and extended 55 feet to the top of the Hawthorn Group.

At the Rockledge site this formation was penetrated at 60 feet below land surface and is 50 feet thick. It is primarily a light olive gray (5 Y 6/1) to yellowish gray (5 Y 7/2), sandy, fossiliferous limestone containing varying percentages of phosphate. The lower 30 feet of the formation is marked by increases in phosphate and calcareous clay.

ANASTASIA FORMATION / UNDIFFERENTIATED DEPOSITS

These deposits vary in thickness throughout the Brevard County area. The Anastasia Formation (Sellards, 1912) is normally composed of a sandy coquina of mollusk shells held loosely together by a calcareous cement. The unit can however be moderately to well indurated depending upon the quantity and composition of cementing material. Undifferentiated deposits blanket all of Florida resulting from sea level fluctuations and terracing during the Pleistocene Age. At the Melbourne injection well and the Grant Street well these two units extended from land surface to 100 feet.

These two units were logged from land surface to a depth of 60 feet. They are composed of unconsolidated, fine to medium grained subangular sands with interbedded shell beds. Trace amounts of phosphate also exist in the section. The base of the unit is moderately indurated with sparry calcite cement.

5.0 HYDROGEOLOGY

There are four major hydrogeologic units that occur in peninsular

Florida (Vechiolli et al, 1986). These are; the surficial aquifer system, the intermediate aquifer system or confining beds, the Floridan aquifer system, and the sub-Floridan confining beds. The surficial aquifer system contains the water table and other semi-confined and unconfined water bearing zones. The intermediate confining beds are restricted to the Hawthorn Group, but other beds may be included. The Floridan aquifer system is the major regional artesian aquifer system in the southeastern United States. The top of the system normally occurs in the basal porous limestones of the Hawthorn or older Oligocene and Eocene beds. It's base is marked by the bedded anhydrites (sub-Floridan confining beds) associated with the Cedar Keys Formation (Miller, 1982). The aquifer systems penetrated at the Rockledge site are depicted on Figure 4 and discussed in the following text.

5.1 SURFICIAL AQUIFER SYSTEM

The surficial aquifer system in Brevard County varies in thickness with the depth to the top of the Hawthorn Group. The system is composed of the sands, shell beds, and sandy limestones of the Pliocene and Pleistocene age sediments. The aquifer system was 120 feet thick at the South Beaches injection well, 155 feet thick at the Grant Street well and 150 feet thick at the City of Melbourne (D.B Lee) injection well. The system can be divided into two separate aquifers in some areas based upon

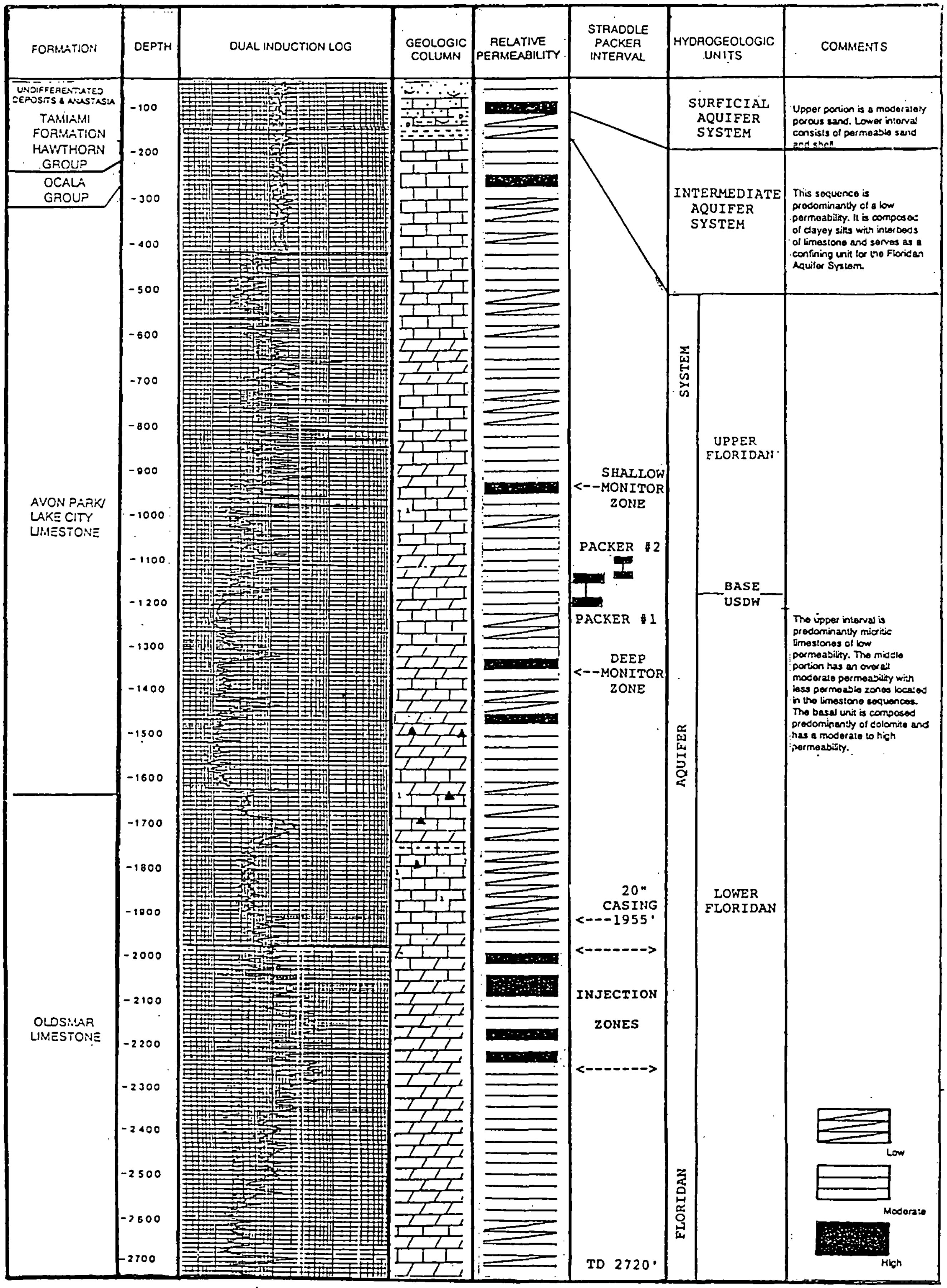


FIGURE 4 HYDROGEOLOGIC COLUMN

available shallow well log information. A silty sand sometimes occurs at approximately 40 feet below land surface that retards the vertical flow of water within the aquifer system. Underlying the silty sand are Anastasia shell beds and sandy limestones from the Tamiami Formation. These formations compose a semi-confined to semi-unconfined water table driven aquifer in many areas.

The surficial aquifer system was 110 feet thick at the Rockledge well. It is an unconfined aquifer and under water table conditions. The Undifferentiated Deposits and Anastasia Formation occurred as a highly porous leached sand and shell sequence to 60 feet below pad level. The confining/semi-confining unit dividing the aquifer system in many areas was not present at the Rockledge site. The Tamiami occured as a sandy limestone and exhibited an overall moderate permeability due to the presence of loosely consolidated sand and shell. The water productive zones were in the upper section whereas the basal portion of the unit increased in silt and clay and was of lower permeability.

5.2 INTERMEDIATE CONFINING BEDS

The intermediate confining beds are associated with the Hawthorn Group in this area of Florida. The sequence is composed of low permeability silty and clayey sediments that separate and effectively confine the Floridan aquifer system. This system was

125 feet thick at the Grant Street well, 131 feet thick at the South Beaches injection well and 123 feet thick at the City of Melbourne (D.B. Lee) injection well.

At Rockledge the intermediate confining beds were 35 feet thick. These beds were contained wholly within the Hawthorn Group. The confining beds extended from 110 feet to the top of the Ocala Group at 145 feet below land surface. This aquifer system is composed of varying amounts of silty sand and phosphatic clayey limestone. This confining sequence is easily detected on the natural gamma ray log by large "kicks". These kicks are associated with the radioactive emissions attributed to the phosphate. The lower 10 feet of the intermediate confining beds is interbedded with limestone. The limestones are very micritic and have an overall low permeability. This confining sequence seals the Floridan aquifer from the overlying surficial aquifer system in the injection well.

5.3 FLORIDAN AQUIFER SYSTEM

The term "Floridan aquifer" was established by Parker (1955) for water bearing rocks associated with the Lake City Limestone, Avon Park Limestone, Ocala Limestone (Group), Suwannee Limestone, Tampa Limestone, and the lower parts of the Hawthorn Formation (Group) in hydrologic contact with underlying units. Miller (1982) referred to these beds as the Tertiary Limestone Aquifer

System and showed the top of the system in the Melbourne area to be between -200 and -300 feet msl. The base he contoured at approximately -3000 feet msl in this area.

The entire thickness of the Floridan was penetrated in the South Beaches injection well from 251 feet to 2760 feet below land surface. It was also fully penetrated in the Merritt Island injection well from 126 feet to 2670 feet below land surface. The Grant Street well and the City of Melbourne (D.B. Lee) well did not penetrate the sub-Floridan confining beds. At the City of Melbourne (D.B Lee) injection well the top of the Floridan was penetrated at 273 feet below land surface. At the Grant Street well the top of the Floridan is 280 feet below land surface. Cavernous and possibly fractured zones occurred in the Merritt Island and South Beaches wells within the lower dolomite sequences of the Oldsmar Limestone. Waters in excess of 10,000 TDS were penetrated in the South Beaches well at a depth of 1253 feet below land surface and in the Grant Street injection well at a depth of 1250 feet. The Merritt Island well located the base of the USDW at a depth of 950 feet below land surface, and in the City of Melbourne well at a depth of 1200 feet below land surface.

At the Rockledge site, the top of the Floridan aquifer system is associated with the top of the Ocala Group and occurs at 145 feet below land surface. The injection well (total depth 2720 feet) does not penetrate the entire Floridan. The upper 105 feet of the Floridan is contained in the Ocala Group. The Ocala Group is primarily composed of a very fossiliferous (foraminiferal) limestones and exhibits an overall moderate permeability due to the predominance of micrite as a cement in the rocks. The cuttings and geophysical logs from the Ocala are indicative or poor to moderately indurated limestones. The cuttings contained large amounts of sparry calcite from 170 feet to 200 feet BPL. This interval correlated geophysically with more resistive dual induction readings and faster travel times on the sonic log.

The upper portion of the Avon Park/Lake City Limestone was of a low to moderate permeability between 245 feet and 450 feet below land surface. This interval is composed of dolomitic and fossiliferous limestones that function as a semi-confining unit. There is very little activity on the geophysical logs throughout this interval. One anomaly that does appear on the caliper, dual induction and sonic logs at a depth of 450 feet in Figure 5 is a splice in the logs for continuity between logging intervals.

The interval from 450 feet to 900 feet exhibits an overall moderate permeability with less permeable zones located in two limestone sequences. These zones are located from 510 feet to 858 feet below land surface and from 690 feet to 790 feet below land surface. The interval that begins at 510 feet has a calipered hole size in excess of 25 inches (bit size 7 7/8")

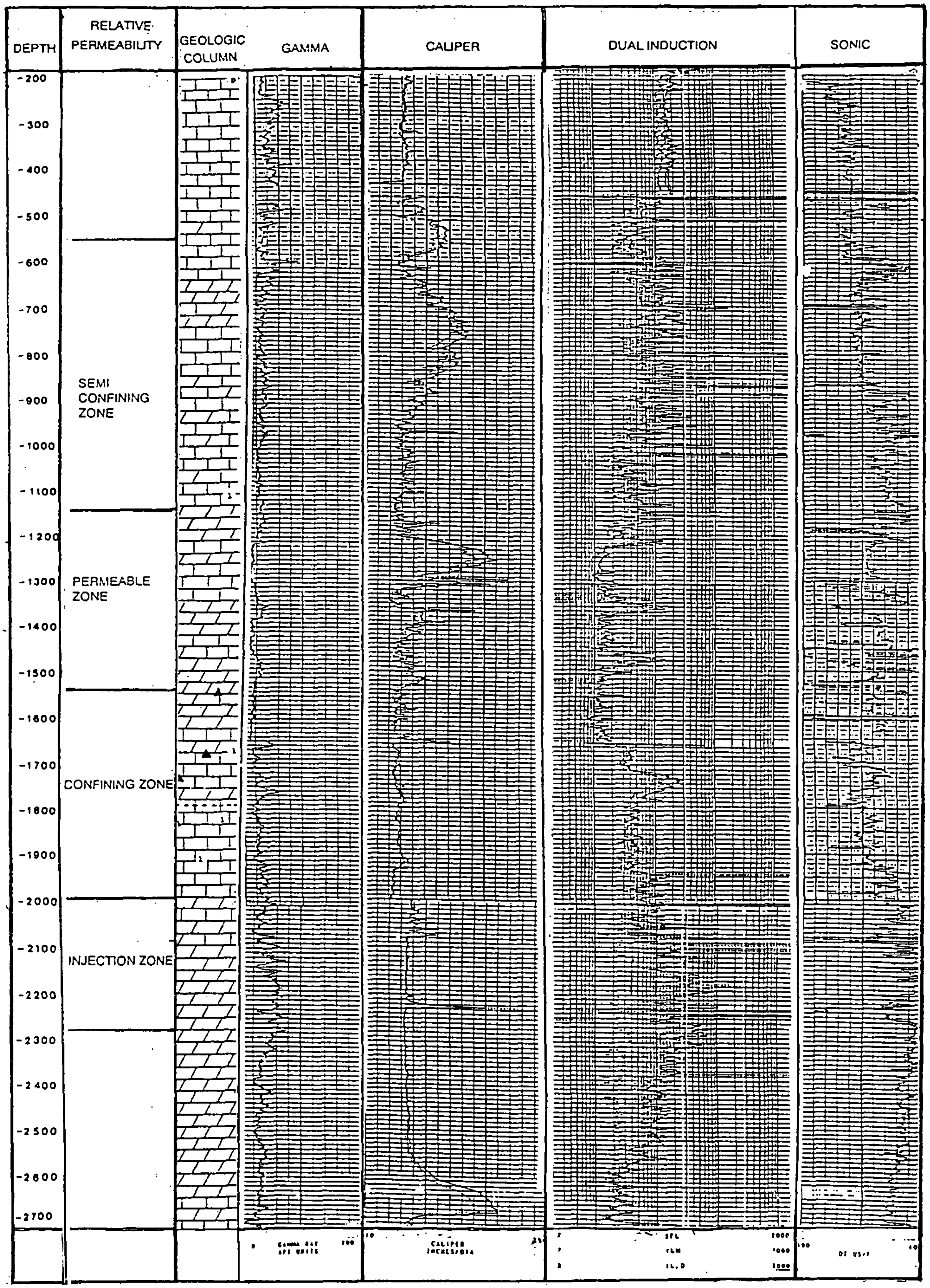


FIGURE 5 GEOPHYSICAL COLUMN

within the deep Floridan monitor well and is characterized with moderate resistivity and slower travel times on the dual induction and sonic logs respectively. The interval from 690 feet to 790 feet is a dolomitic limestone of moderate induration that also exhibits moderate resistivity and slower travel times. This interval has small interbeds of dolomite which create more activity on the dual induction log.

The geophysical logs, cuttings and cores indicate a semi-confining dolomite and limestone sequence from 900 feet to 1160 feet below land surface. Visual analysis of the cuttings indicate that the upper 50 feet of this sequence is slightly more porous than the overall unit, therefore, this interval is monitored by the shallow Floridan well. Borehole diameter is not more than one (1) inch larger than the pilot bit. Also, the dual induction displays moderate resistivity while travel times on the acoustic log are in the range of medium to slow. This interval appears to confine the waters that are less than 10,000 mg/l TDS from the more saline waters below.

Directly beneath this sequence is a cavernous dolomite interval (1160 feet to 1205 feet). The television survey displays lateral flow through this interval, however the flowmeter did not detect flow. Also a three (3) degree temperature change is apparent at 1170 feet BLS. Straddle packer tests conducted within this zone isolate the base of the USDW between 1133 feet and 1200 feet BLS.

From 1205 feet to 1290 feet below land surface is a foraminiferous limestone that appears to be reworked. The cuttings indicate portions of this interval to be composed of up to 80% foram tests. This limestone correlates with a large cavity (1190' to 1235') discovered in the D.B. Lee injection well located to the south of the Rockledge site.

From 1290 feet to 1550 feet are semi-permeable to permeable dolomites. Overall, this unit exhibits a slightly higher resistivity and faster transit times than the limestone above. Cores retrieved from this interval have a coefficient of permeability ranging from 0.0000000011 to 0.0000000003 cm/sec. Within these dolomites are three zones with higher relative permeabilities. The first interval is from 1290 feet to 1340 feet bpl. It is characterized by highly altered, cavernous dolomite. Lateral flow was visible on the T.V. survey through this zone. The second interval is a sucrosic dolomite that is recorded on the lithologic logs as having very good visible porosity. It is present from a depth of 1345 feet to 1375 feet below land surface. The third interval that exhibits higher permeability is a cavity located from 1440 to 1450 feet below land surface. The T.V. survey showed inflow of water from this cavity. The sucrosic dolomite is screened in the deep Floridan well which monitors from 1338 feet 1388 feet.

The base of the Avon Park/Lake City Limestone and the upper portion of the Oldsmar Limestone collectively serve as the primary confining unit overlying the injection zone. This interval is 430 feet thick extending from 1550 feet to 1980 feet below land surface. Cores retrieved within this section have recorded coefficients of permeability ranging from 0.00000001 cm/sec to 0.00014 cm/sec. Lithologic and geophysical logs of this interval document the predominance of low permeability limestones throughout the section.

The top of these confining beds (from 1650 feet to 1710 feet) are micritic limestones with interbeds of crystalline dolomite. These dolomite interbeds vary in thickness from 2 inches to 2 feet and possess occasional seams of evaporites. Directly beneath this interval (1710' - 1770'), dolomite is the prevalent lithology although it is still bedded with micritic and dolomitic limestones. This interval has a higher resistivity on the dual induction log and slightly faster transit times on the sonic log. The long-short normal also peaked in this dolomite sequence. The section from 1770 feet to 1930 feet is a limestone unit that is chalky, rather pure and dolomitic in sections. This sequence shows little activity on the geophysical logs due to its overall micritic nature. The confining sequence shows an average gauge hole of 13 inches. One cavity that appears to be at 1650 feet (the base of the intermediate casing) is probably just a washout interval that is sometimes created at the base of casing during drilling operations beneath that casing string.

A highly altered dolomite lies directly beneath the confining beds and extends to the total depth of the well (2720 feet). This dolomite is the primary zone for effluent disposal. The caliper log shows small cavities located between 2000 feet and 2100 feet. There is also one major cavity located from 2220 feet to 2230 feet below land surface. Geophysically, the sonic log shows that the fastest travel times recorded in the well are through the injection zone. The base of the well from 2250 to 2720 feet contains dense, and in some areas very permeable dolomites. This lower section, however, has an overall moderate permeability. The dolomites are well indurated, highly altered and dense with vugular and intracrystalline porosity. This lower sequences shows an average gauge bore hole (increasing in diameter through a limestone interval) and moderate resistivities on the dual induction log.

6.0 WELL DRILLING AND CONSTRUCTION

The injection well and associated monitor wells were constructed by Youngquist Bros., Inc. from Fort Myers, Florida. Well construction commenced on October 25th, 1991 with pilot hole drilling for the deep Floridan monitor well. Construction and testing activities were completed on April 26th, 1991. Construction of the three wells required only 184 days within a 220 day time frame and cost for construction was under the total bid price by more than $25,000.00. The configuration of the injection and monitoring system is shown on Figure 6.

6.1 TEST/INJECTION WELL

The injection well is designed to dispose of 10.50 mgd of secondarily treated sewage effluent at peak flow with an expected average flow of 4.50 mgd. Maximum well head pressures have been calculated at various flow rates and are depicted on Figure 7. The injection well design is depicted on Figure 8. The injection casing was set at 1955 feet below pad level. It is 20 inches in outside diameter, new, seamless steel casing and has a wall thickness of 0.500 inch. The intermediate string of casing was set at 1653 feet below pad level. It is a 30 inch diameter casing that has a wall thickness of 0.375 inch. The surface casing was set at 460 feet below pad level. It is a 38 inch diameter casing with a wall thickness of 0.375 inch. A 48 inch diameter conductor casing was installed to a depth of 159 feet below land surface. It has a wall thickness of 0.375 inch. Mill certificates for the various casing strings are found in Appendix E. The injection, intermediate and surface casings were all cemented in place with sulfate-resistant cement (ASTM Type II or API Florida Class H). The cementing program is described in Appendix E.

The following is a synopsis of the construction and testing activities on the test/injection well.

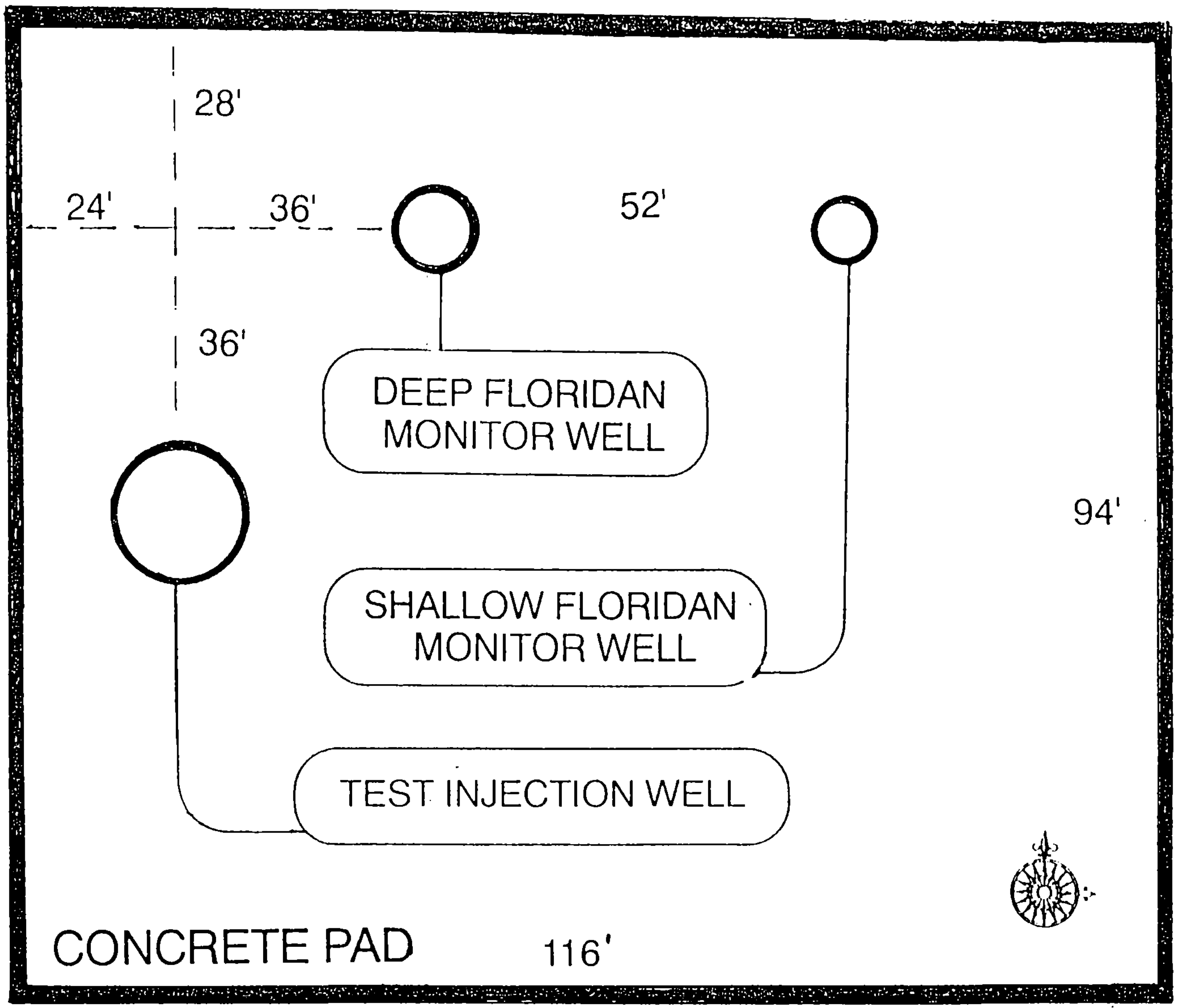
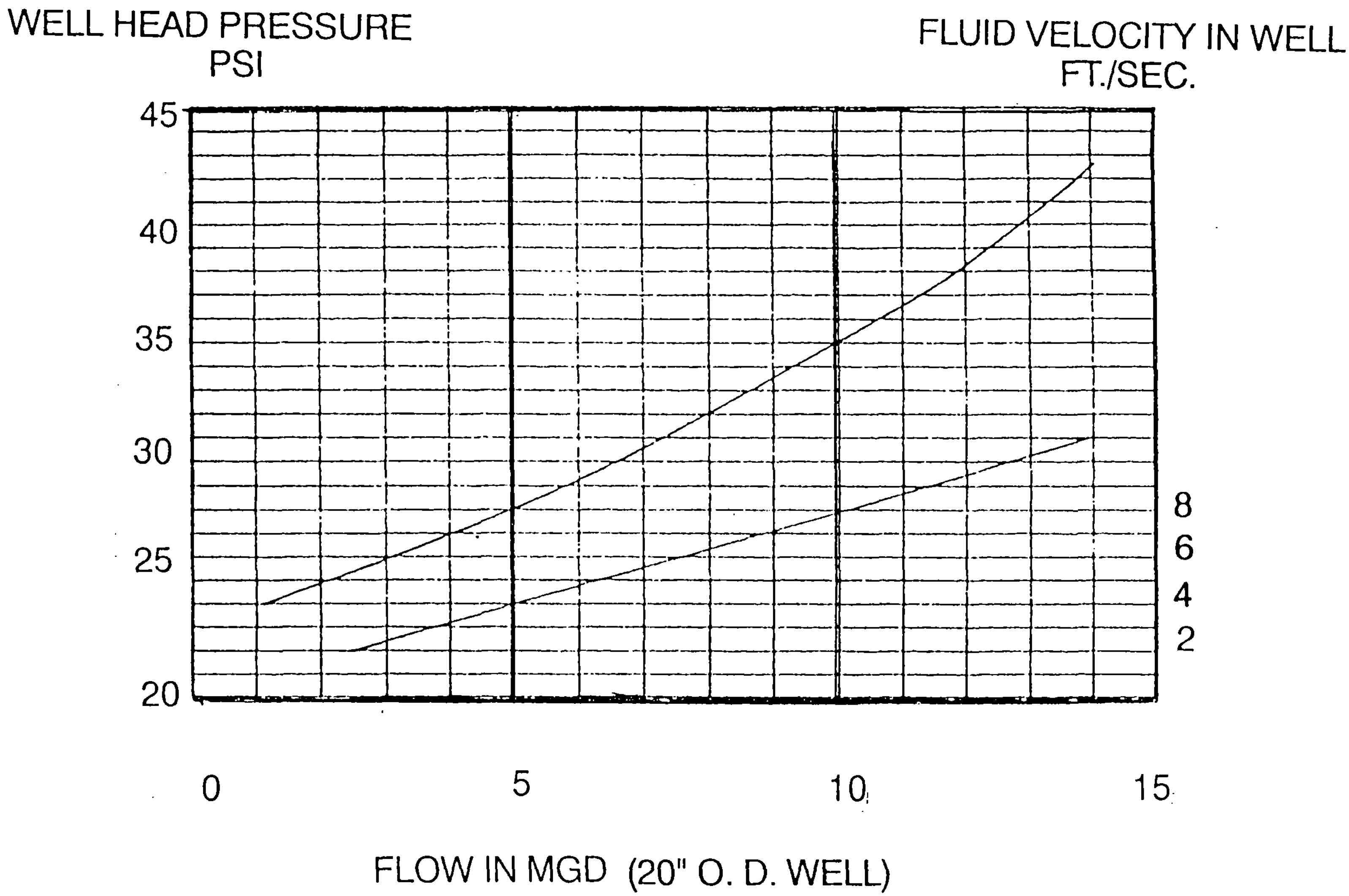


FIGURE 6 SITE LAYOUT FOR TEST / INJECTION AND MONITOR WELLS



ASSUMPTIONS

1. DENSITY DIFFERENTIAL = 21 PSI
2. BOTTOM HOLE DRIVING PRESSURE = 4.3 PSI AT 12 MGD
3. HAZEN & WILLIAMS COEFFICIENT C = 100

FIGURE 7 WELL HEAD PRESSURES AT VARIOUS FLOW RATES

TABLE 6.1 TEST/INJECTION WELL CONSTRUCTION SCHEDULE

112490	Mobilization and assembly of drill rig on drilling pad completed.
112890	Drill 12 1/4" pilot hole to 125 feet by the mud rotary method.
111290	Continue drilling 12 1/4" pilot hole to 152 feet. Ream pilot hole with 52 1/2" hole opener 0'- 61'.
113090	Continue reaming with 52 1/2" hole opener 61'- 141'.
120190	Ream to targeted depth of 158' bls. Set 156 feet of 48" spiral weld steel casing. Pressure grout 48" steel casing with 471 cubic feet of neat cement in one lift.
120390	Tag cement inside casing at 154 feet. Begin drilling 12 1/4" pilot hole 154'- 301'.
120490	Drill 12 1/4" pilot hole to targeted depth of 456' bls. Smith International runs gyroscopic log on 12 1/4" pilot hole.
120690	Florida Geophysical runs caliper, natural gamma, dual induction,acoustic velocity, fluid resistivity, SP and temperature logs.
120790	Ream pilot hole with 46 1/2" hole opener 154'- 184'.
120890	Ream with 46 1/2" hole opener 184'- 305'.
120990	Ream with 46 1/2" hole opener 305'- 399'.
121090	Ream with 46 1/2" hole opener 399'- 460'. Run geophysical logs on reamed hole. Florida Geophysical runs caliper log.
121190	Set 450 feet of 38" spiral weld steel casing. Florida Cement pressure grouts 38" casing with 986 cubic feet of 6% bentonite and 454 cubic feet of neat cement in one lift.
121290	Florida Geophysical runs temperature log on cemented casing. Tag cement at 244 feet inside casing. Cement in the annular space is within 2 feet of land surface. Perform pressure test on 38" casing at 125 psi.
121390	Begin drilling 12 1/4" pilot hole by reverse air drilling method (460'- 466').
121490	Drill 12 1/4" pilot hole 466'- 753'.
121590	Drill 12 1/4" pilot hole 753'- 1023'.
121690	Drill 12 1/4" pilot hole 1023'- 1264'.
121790	Drill 12 1/4" pilot hole 1264'- 1436'.
121890	Drill 12 1/4" pilot hole 1436'- 1520'.
121990	Retrieve core #1: 1520'-1530'. 30% recovery Drill 12 1/4" pilot hole 1520'- 1584'.
122090	Drill 12 1/4" pilot hole 1584'- 1624'. Retrieve core #2: 1624'- 1639'. 53% recovery.
122190	Drill 12 1/4" pilot hole 1624'- 1650. Smith International runs gyroscopic log.

	Florida Geophysical runs caliper, natural gamma, and sonic logs.
122290	Continue running geophysical logs. Florida Geophysical runs sonic, dual induction, fluid resistiviey, SP, temperature and flowmeter logs.
122790	Begin reaming the pilot hole (reverse air) with 36 1/2" hole opener (453'- 456').
122890	Ream pilot hole with 36 1/2" hole opener 456'- 591'.
122990	Ream pilot hole with 36 1/2" hole opener 591'- 672'.
123090	Ream pilot hole with 36 1/2" hole opener 672'- 834'.
123190	Ream pilot hole with 36 1/2" hole opener 834'- 917'.
010191	Ream pilot hole with 36 1/2" hole opener 917'- 950'.
010291	Ream pilot hole with 36 1/2" hole opener 950'- 979'.
010391	Ream pilot hole with 36 1/2" hole opener 979'- 1018'.
010491	Ream pilot hole with 36 1/2" hole opener 1018'- 1113'.
010591	Ream pilot hole with 36 1/2" hole opener 1113'- 1155'.
010691	Ream pilot hole with 36 1/2" hole opener 1155'- 1181'.
010791	Ream pilot hole with 36 1/2" hole opener 1181'- 1277'.
010891	Ream pilot hole with 36 1/2" hole opener 1277'- 1327'.
010991	Ream pilot hole with 36 1/2" hole opener 1327'- 1348'.
011091	Ream pilot hole with 36 1/2" hole opener 1348'- 1369'.
011191	Ream pilot hole with 36 1/2" hole opener 1369'- 1439'.
011291	Ream pilot hole with 36 1/2" hole opener 1439'- 1463'.
011391	Ream pilot hole with 36 1/2" hole opener 1463'- 1475'.
011491	Ream pilot hole with 36 1/2" hole opener 1475'- 1530'.
101591	Ream pilot hole with 36 1/2" hole opener 1530'- 1600'.
011691	Ream pilot hole with 36 1/2" hole opener 1600'- 1657'. Total Depth.
011791	Superior Survey Systems runs gyroscopic log. Florida Geophysical runs caliper log.
011891	Run 42 sections of 30" steel casing into hole.
011991	Cement 30" casing. Florida Cement pumps 739 cubic feet of neat cement (pressure grout). Let set for 16 hours. STAGE ONE. Tag top of cement at 1484 feet. Florida Cement pumps 157 cubic feet of neat cement. Let set for 7 hours. STAGE TWO.
012091	Tag top of cement at 1446 feet. Florida Cement pumps 560 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours. STAGE THREE. Tag top of cement at 1349 feet. Florida Cement pumps 560 cubic feet of neat with 12% bentonite mixture. Let set for 22 hours. STAGE FOUR.
012191	Tag top of cement at 1262 feet. Florida Cement pumps 476 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours. STAGE FIVE.
012191	Tag top of cement at 1120 feet. Florida Cement pumps 672 cubic feet of neat with 12% bentonite mixture. Let set for 12 hours.
012291	Tag top of cement at 961 feet. Florida Cement pumps 550 cubic feet of neat with 12%

bentonite mixture. Let set for 12 hours.
Tag top of cement at 817 feet.
Florida Cement pumps 420 cubic feet of neat with 12% bentonite mixture. Let set for 14 hours.

012391 Tag top of cement at 709 feet.
Florida Cement pumps 567 cubic feet of neat with 12% bentonite mixture. Let set for 12 hours.

012491 Tag top of cement at 565 feet.
Florida Cement pumps 84 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours.
Tag top of cement at 542 feet.
Florida Cement pumps 683 cubic feet of neat with 12% bentonite mixture. Let set for 13 hours.

012591 Tag top of cement at 450 feet.
Florida Cement pumps 521 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours.
Tag top of cement at 270 feet.

012691 Florida Cement pumps 694 cubic feet of neat with 12% bentonite mixture. Let set for 48 hours.

012791 Perform pressure test on 30" casing at 105 psi.

012891 Drill 12 1/4" pilot hole 1657'- 1715'.

012991 Drill 12 1/4" pilot hole 1715'- 1755'.
Retrieve CORE # 3 - 1755'- 1770'. 66% recovery.

013091 Drill 12 1/4" pilot hole 1755'- 1790'.
Retrieve CORE # 4 - 1790'- 1805'. 55% recovery.

013191 Drill 12 1/4" pilot hole 1790'- 1835'.
Retrieve CORE # 5 - 1835'- 1846'. 72% recovery.

020191 Drill 12 1/4" pilot hole 1835'- 1893'.

020291 Retrieve CORE # 6 - 1893'-1908'. Zero recovery.
Drill 12 1/4" pilot hole 1893'- 1908'.
Retrieve CORE # 7 - 1908'-1926'. 11% recovery.

020391 Drill 12 1/4" pilot hole 1908'- 1990'.

020491 Drill 12 1/4" pilot hole 1990'- 2014'.
Run geophysical logs.
Smith International runs gyroscopic log.
Florida Geophysical runs caliper, natural gamma, SP, fluid resistivity, dual induction, acoustic velocity, temperature and flowmeter logs.

020591 Complete geophysical logs.
Florida Geophysical runs sonic and VDL logs.

020691 Ream pilot hole with 28" hole opener 1651'- 1716'.

020791 Ream pilot hole with 28" hole opener 1716'- 1806'.

020891 Ream pilot hole with 28" hole opener 1806'- 1930'.

020991 Ream pilot hole with 28" hole opener 1930'- 1960'.
Total Depth.
Run geophysical logs.
Smith International runs gyro log.
Florida Geophysical runs caliper log.

201091 Standby for TAC concurrence for injection string depth.

021391 Receive TAC approval for 20" casing depth.
Run 20" O.D. steel casing into hole.

021491 Run 20" O.D. steel casing to 1955' BLS.

Florida Cement pressure grouts 20" casing with 784 cubic feet of neat cement. STAGE #1.

021591 Tag top of cement at 1728 feet.

Florida Cement pumps 320 cubic feet of neat cement. STAGE #2.

021691 Tag top of cement at 1630 feet.

Florida Cement pumps 875 cubic feet of neat with 8% bentonite mixture. STAGE #3.

Tag top of cement at 1278 feet.

Florida Cement pumps 897 cubic feet of neat with 4% bentonite mixture. STAGE #4.

021791 Tag top of cement at 907 feet.

Florida Cement pumps 897 cubic feet of neat with 4% bentonite mixture. STAGE #5.

Tag top of cement at 546 feet.

Florida Cement pumps 723 cubic feet of neat with 4% bentonite mixture. STAGE #6.

021891 Tag top of cement at 255 feet. Schlumberger runs CBL survey on injection string. Florida Cement pumps 448 cubic feet of neat cement. STAGE #7. Tag top of cement at 74 feet. Florida Cement pressure grouts to surface with 185 cubic feet of neat cement.

022191 Hook up drill string and circulate inside 20" casing.

022291 Run pressure test on 20" casing at 100 psi.

Drill through cement plug inside 20" casing with 12 1/4" bit.

022391 Drill 12 1/4" pilot hole 2014'- 2079'.

022491 Drill 12 1/4" pilot hole 2079'- 2101'.

022591 Retrieve CORE #8 - 2101'- 2112'. Zero recovery.

Drill 12 1/4" pilot hole 2101'- 2105'.

022691 Drill 12 1/4" pilot hole 2108'- 2195'.

022791 Drill 12 1/4" pilot hole 2195'- 2227'.

022891 Drill 12 1/4" pilot hole 2227'- 2255'.

030191 Drill 12 1/4" pilot hole 2255'- 2340'.

030291 Drill 12 1/4" pilot hole 2340'- 2406'.

030391 Retrieve CORE #9 - 2406'- 2460'; 92% recovery.

Drill 12 1/4" pilot hole 2406'- 2460'.

030491 Drill 12 1/4" pilot hole 2460'- 2650'.

030591 Drill 12 1/4" pilot hole 2650'- 2720'. Total Depth.

030591 Superior Survey Systems runs gyroscopic log.

030691 Run geophysical logs.

Florida Geophysical runs natural gamma, caliper, acoustic velocity, temperature, dual induction, sp and resistivity logs.

Ream pilot hole with 17 1/2" hole opener 1922'- 1925'.

030791 Ream pilot hole with 17 1/2" hole opener 1925'- 1936'.

030891 Ream pilot hole with 17 1/2" hole opener 1936'- 2006'.

030991 Ream pilot hole with 17 1/2" hole opener 2006'- 2135'.

031091 Ream pilot hole with 17 1/2" hole opener 2135'- 2208'.

031191 Ream pilot hole with 17 1/2" hole opener 2208'- 2326'.

031291 Ream pilot hole with 17 1/2" hole opener 2236'- 2459'.

031391 Ream pilot hole with 17 1/2" hole opener 2459'- 2705'.

031491	Ream pilot hole with 17 1/2" hole opener 2705'- 2720'; Total Depth. Ream 17 1/2" reamed hole with 18 1/2" hole opener 1922'- 2930'.
031591	Ream 17 1/2" reamed hole with 18 1/2" hole opener 2030'- 2465'.
031691	Ream 17 1/2" reamed hole with 18 1/2" hole opener 2465'- 2720'. Total Depth.
031791	Run geophysical logs. Superior Survey Systems runs gyroscopic log. Florida Geophysical runs caliper and temperature logs and point water samples each 100 feet of open hole 1970'- 2700'.
031891	Remove drill pipe from rig.
031991	Begin fresh water flush prior to TV survey.
032191	Florida Geophysical runs TV survey of injection well casing and open hole to 2094 feet. Blacked out to bottom.
032291	Schlumberger runs radioactive element tracer survey using I-131. Continue fresh water flush.
032391	Stop flush. 247,900 gallons of fresh water utilized.
032791	Begin positioning and assembling pumps and piping for injection test.
040991	Drilling rig moved off pad.
041491	Test pumps and lines constructed for injection test. Pumped 180,000 gallons of effluent water.
041691	Florida Geophysical begins 48 hour logging of temperature and pressure at depth of 1940 feet prior to injection test.
041891	Injection test. Pumped 8 hours at rates of 3000 - 4000 gallons per minute and one hour at rates of 7600 - 8200 gallons per minute using effluent water from sewage treatment plant. Total of 2,154,000 pumped for test.
042691	Schlumberger runs post injection radioactive element tracer survey and temperature logs.

6.2 DEEP FLORIDAN MONITOR WELL

The deep Floridan monitor well was the first well constructed and tested. This well is designed to monitor the first permeable bed above the lower confining sequence. The deep Floridan monitor well is located 51 feet east-northeast of the injection well as depicted on Figure 6. The monitor well design is shown on Figure

9. The borehole was drilled to a total depth of 1506 feet below land surface and was backfilled with cement to a depth of 1396 feet. The final as-built well is 1388 feet deep and contains 1338 feet of 4 1/2 inch seamless steel casing that has a wall thickness of 0.531 inch. There is 50 feet of continuous slot stainless steel (0.030 slot) screen set from 1338 feet to 1388 feet below pad level. This screen is gravel packed with silica sand gravel. A 10 3/4 inch surface casing is set at 250 feet below pad level. This casing has a wall thickness of 0.365 inch. A conductor casing (16 inch O.D.and 0.375 inch wall thickness) was set to a depth of 140 feet below land surface. The mill certificates for the casings and the cementing program are shown in Appendix E.

The following is a synopsis of the drilling and testing activities on the deep Floridan monitor well. Weekly summaries of all construction activities are present in Appendix G.

TABLE 6.2 DEEP FLORIDAN MONITOR WELL CONSTRUCTION SCHEDULE

101590	Drill pad completed. Water table monitor wells installed at each corner of pad.
102490	PreConstruction meeting.
102590	Drill pilot hole by mud rotary drilling process Drill 7 7/8" pilot hole to 142 feet below land surface. Florida Geophysical runs natural gamma, temperature, sonic, dual induction, fluid resistivity, caliper, and SP.
102690	Ream pilot hole with 24" carbide button bit to 145 feet using mud rotary drilling process. Florida Geophysical runs caliper log (0'-140').

Install 16" conductor casing to the top of the Floridan Aquifer System at 140 feet below land surface.
Florida Cement grouts casing in one stage with 532 cubic feet of neat cement.

102790 Florida Geophysical runs temperature survey while cement cures for 48 hours.

102890 Perform pressure test on conductor casing at 125 psi.

102990 Top of cement inside casing tagged at 130 feet below land surface.
Drill 7 7/8" pilot hole from 130 feet to 245 feet using mud rotary process.

103090 Florida Geophysical runs caliper, natural gamma, dual induction, acoustic velocity, temperature, fluid resistivity and SP logs.
Ream hole with 14 3/4" button bit (mud rotary) from 146 to 216 feet.

103190 Continue reaming from 216 feet to targeted depth of 245 feet b.l.s. Florida Geophysical runs caliper log on reamed hole. Install 10 3/4" steel surface casing to 240 feet below land surface.
Florida Cement pressure grouts surface casing in two lifts with 393 cubic feet of neat cement.
Wait for cement to cure 48 hours before pressure test.

110390 Perform pressure test at 125 psi.
Start drilling pilot hole to 1500 feet with 9 5/8" carbide button bit using reverse air drilling process.
Drill 9 5/8" pilot hole 240'- 266'.

110490 Drill 9 5/8" pilot hole 266'- 461'.

110590 Drill 9 5/8" pilot hole 461'- 804'.

110690 Drill 9 5/8" pilot hole 804'- 1054'.

110790 Drill 9 5/8" pilot hole 1054' 1131'.
CORE # 1 - 1131'- 1146'.

110890 Retrieve core # 1 - 1131'- 1146'.
Drill 9 5/8" pilot hole 1131'- 1300'.

110990 Drill 9 5/8" pilot hole 1300'- 1361'.

111090 Drill 9 5/8" pilot hole 1361'- 1463'.

111190 CORE # 2 - 1463'- 1473'.
Retrieve core #2 1463 feet - 1473 feet.
Drill 9 5/8" pilot hole 1463'- 1500'.

111290 Drill 9 5/8" pilot hole 1500'- 1505'. Total Depth.
Superior Survey Systems runs gyroscopic survey
Florida Geophysical runs sonic, caliper and dual induction logs under static conditions. Logs performed while pumping the well include fluid resistivity, temperature, flowmeter, point samples and T.V.survey.
Approximately two well volumes developed during logging.

111490 TAC meeting held on site.
Based on data collected, it was decided to move screened interval up the hole from the originally planned interval of 1400'- 1450' to a depth of 1340'-1390'.

111590	Conduct straddle packer test #1: 1148.5'- 1202.5'. Start straddle packer test #2: 1125'- 1133'.
111690	Complete straddle packer test #2. Base of USDW determined to be between 1133 feet and 1200 feet. Florida Cement Company begins grouting lower portion of hole (beneath monitor screen) with neat cement.
111790	Complete grouting from 1506' to 1396' in 5 stages and 238 cubic feet of neat cement.
111890	Tag cement at 1396 feet. Install 4 1/2" monitoring casing, with 50 foot screened interval on bottom, to 1388 feet. Set stainless steel (30,000 slot) screen from 1338 feet to 1388 feet below land surface and gravel pack to 1326 feet below land surface with 93 cubic feet of quartz gravel. Florida Cement pumps 6 cubic feet of neat cement on top of gravel pack. Let set for 6 hours.
111990	Tag top of cement at 1321 feet. Florida Cement pumps 101 cubic feet of neat cement. Let set for 8 hours. STAGE ONE. Tag top of cement at 1265 feet. Florida Cement pumps 112 cubic feet of neat cement. Let set for 8 hours. STAGE TWO. Tag top of cement at 1217 feet.
112090	Florida Cement pumps 78 cubic feet of neat cement. Let set for 8 hours. STAGE THREE. Tag cement at 1140 feet. Florida Cement pumps 168 cubic feet of neat with six percent bentonite mixture. Let set for 8 hours. STAGE FOUR. Tag top of cement at 988 feet.
112090	Florida Cement pumps 196 cubic feet of neat with six percent bentonite mixture. Let set for 8 hours. STAGE FIVE. Tag top of cement at 819 feet. Florida Cement pumps 90 cubic feet of neat with six percent bentonite mixture. Let set for 15 hours. STAGE SIX.
112190	Two loads of cement received and loaded into silos. Tag cement at 770 feet. Florida Cement pumps 224 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours. STAGE SEVEN.
112290	Tag top of cement at 653 feet. Florida Cement pumps 168 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours. STAGE EIGHT. Tag top of cement at 540 feet. Florida Cement pumps 224 cubic feet of neat and six percent bentonite mixture. Let set for 6 hours. STAGE NINE. Tag cement at 521 feet.

Florida Cement pumps 168 cubic feet of neat and six percent bentonite mixture. Let set for 7 hours.
STAGE TEN.

112390 Tag top of cement at 428 feet.
Florida Cement pumps 196 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours.
STAGE ELEVEN.
Tag top of cement at 349 feet.
Florida Cement pumps 112 cubic feet of neat and six percent bentonite mixture. Let set for 12 hours.
STAGE TWELVE.

112490 Tag top of cement at 315 feet.
Florida Cement pumps 224 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours.
STAGE THIRTEEN.
Tag top of cement at 157 feet in annular of 10 3/4" casing.
Annulus between the 10 3/4" and 4 1/2" casings left open from 157 feet to land surface so that Schlumberger can accurately calibrate tools used for cement bond and cement evaluation surveys.
SUMMARY: 2061 cubic feet of cement was pumped to pressure grout the 4 1/2" casing from 1326 feet to 157 feet below land surface and 238 cubic feet was pumped for the bottom plug. Ninety three (93) cubic feet of quartz gravel was utilized for packing around the screen for a total volume of 2392 cubic feet, which is 136% of theoretical volume.

021891 Schlumberger runs CBL and temp logs.

022091 Florida Cement pressure grouts 4 1/2" casing to surface with 51 cubic feet of neat cement.

022491 Develop well for 18 hours. Approximately 18 well volumes pumped.

022791 Develop well at 10 GPM for 3 hours.
Bionomics Lab. takes samples.

030191 Develop well a 10 GPM for 1 hour.
Bionomics Lab. takes sample.

031791 Begin water level monitoring prior to T/I well flush.
Water levels monitored from today through 4/20/91.

031991 Monitor water level during injection well flush for T. V. survey.

032191 Install casing and T-valve to 5.30 feet above pad level.

032391 Begin water level monitoring prior to injection test of T/I well.

041891 Monitor water level during injection test.
Begin recovery monitoring of water level.

042091 End recovery monitoring of water level.

6.3 SHALLOW FLORIDAN MONITOR WELL

The shallow Floridan monitor well is located 95 feet to the east-northeast of the injection well and 52 due east of the deep Floridan monitor well as shown on Figure 6. This well was designed to monitor the deepest permeable zone within the Floridan containing waters that do not exceed a total dissolved solids concentration of 10,000 mg/l (base of USDW). Well construction details are depicted on Figure 10. The borehole was drilled to a total depth of 960 feet. The well itself is 951 feet in depth and contains 901 feet of 4 1/2" diameter seamless monitor casing that has a wall thickness of 0.531 inch. There is 50 feet of continuous slot stainless steel screen (0.030 slot size) set from 901 feet to 951 feet below land surface. This screen is gravel packed with silica sand gravel. A 10 3/4 inch surface casing is set at 249 feet below land surface. This casing has a wall thickness of 0.365 inch. A 16 inch diameter conductor casing was set at a depth of 142 feet below pad level. This casing has a wall thickness of 0.375 inch. Mill certificates for the casings and the cementing schedules are in Appendix E.

The following is a brief synopsis of the drilling and testing of the shallow Floridan monitor well.

TABLE 6.3 - SHALLOW FLORIDAN MONITOR WELL CONSTRUCTION SCHEDULE

112990	Skid monitor well rig from deep monitor well to proposed shallow monitor well location.
120490	Begin drilling 7 7/8" pilot hole (mud rotary) 0'- 28'.
120590	Drill 7 7/8" pilot hole 28'- 90'.
120690	Drill 7 7/8" pilot hole 90'- 145'.
120790	Florida Geophysical runs caliper, gamma, dual induction, SP, fluid resistivity, sonic and temperature logs.
120890	Ream pilot hole (mud rotary) with 24" hole opener 0'- 145'. Florida Geophysical runs caliper log on 24" reamed hole.
	Set 140 feet of 16" seamless steel casing.
120990	Florida cement pressure grouts 16" casing with 364 cubic feet of neat cement in one lift.
	Let cement cure for 48 hours.
121190	Tag cement inside casing at 130 feet.
	Drill 7 7/8" pilot hole 145'- 242'.
	Florida Geophysical runs caliper, gamma, fluid resistivity, temperature, SP, long-short normal and sonic logs.
121290	Ream pilot hole with 14 3/4" bit 145'- 243'.
	Set 240 feet of 10 3/4" steel casing.
	Florida Cement pressure grouts 10 3/4" casing to surface with 174 cubic feet of neat cement in one lift.
121390	Florida Geophysical runs temperature log on cemented casing.
	Tag cement plug inside casing at 204 feet, annular tag at 19 feet BLS.
	Wait on approval for screened interval.
121990	Perform pressure test on 10 3/4" casing at 125 psi.
123190	Receive approval for screened interval of 900'- 950'.
	Start drilling through cement plug 204'- 243'.
010191	Drill 9 7/8" hole 243'- 584' (reverse air).
010291	Drill 9 7/8" hole 584'- 959', total depth.
	Superior Survey Systems runs gyro log.
	Florida Geophysical begins caliper log and experiences equipment malfunction.
010391	Wait on parts to repair geophysical logging equipment.
010591	Florida Geophysical's logging equipment repaired.
	Run caliper, gamma, fluid resistivity, temperature, sonic, dual induction and E-logs.
010691	Run 4 1/2" screen and steel casing into hole - 51 feet of 4 1/2" stainless steel (30,000 slot) screen and 900 feet of 4 1/2" steel casing (23 sections).
	Screened interval set 899 feet - 950 feet.
	Pack 39 cubic feet of quartz gravel around screened interval of 4 1/2" casing. Develop well for two hours.

Tag top of gravel pack at 883 feet.
Florida Cement pumps 17 cubic feet of neat cement on top of gravel pack. Let set for 5 hours. STAGE ONE.
Tag top of cement at 853 feet.
Florida Cement pumps 146 cubic feet of neat cement. Let set for 6 hours. STAGE TWO.
Tag cement at 720 feet.
Florida cement pumps 146 cubic feet of neat cement. Let set for 5 hours. STAGE THREE.

010791 Tag cement at 590 feet.
Florida Cement pumps 146 cubic feet of neat cement. Let set for 5 hours. STAGE FOUR.
Tag cement at 488 feet.
Florida Cement pumps 146 cubic feet of neat cement. Let set for 5 hours. STAGE FIVE.
Tag cement at 373 feet.
Florida cement pumps 280 cubic feet of neat cement. Let set for 6 hours. STAGE SIX.
Tag cement at 220 feet inside annular of 10 3/4" casing. Total cement pumped: 881 cubic feet.

021991 Schlumberger runs CBL and temp logs.

022091 Florida Cement pressure grouts casing to surface with 90 cubic feet of neat cement.

022591 Begin developing well at a rate of 8 gpm.

022691 Stop developing well at 0806 after 24 hours, 9900 gallons and 22 well volumes. Begin pumping again 3 hours later. Collect hourly water quality. At 1545 shut off pump. Water level in well is 2'6" above pad level. Measure water level throughout night.

022791 Pump well for 5 hours for final development. Take hourly readings. Bionomics Lab samples well for full suite of chemical constituents.

030191 Develop well for 2 hours. Bionomics samples well again.

031791 Begin recording water level readings. Continue uninterrupted readings until 4/20/91.

031991 Begin 10 minute water level readings during fresh water flush for injection well T.V. survey.

032091 Continue measure water levels while pumping into injection well.

032191 Stop pumping fresh water flush into injection well. Continue uninterrupted water level readings.

032291 Pump fresh water into injection well for RTS survey. Continue water level readings through RTS survey.

032391 Stop pumping water into injection well for RTS survey. Continue uninterrupted half hour water level readings for post RTS and also background readings for injection test.

032591 Meeting on site. RE: injection test.

041691 Continue water level readings but at 15 minute intervals 48 hours before injection test.

041891 Start injection test at 1010. Begin recovery water level readings at 1910.

042091 Stop recording water level readings. No other activity on shallow Floridan monitor well.

7.0 TESTING PROGRAM

To meet the requirements of the FDER, U.S. EPA and SJRWMD the well construction program included intensive testing procedures to gather site specific geologic and hydrologic data. The program was also designed to ensure the mechanical integrity of the test/injection and monitor wells. The mechanical integrity of the wells were determined by geophysical logging (temperature and CBL), pressure tests on casing strings, and pressure (water level) monitoring during the injection test. The test/injection well also had two separate radioactive tracer surveys performed on it. This data is available in the appendix of this report.

7.1 CUTTING AND CORE RECOVERY

Cuttings were collected at 10 foot intervals in the injection and monitor wells. The lithology of the cuttings was determined under a binocular microscope with emphasis on rock type, color, texture, porosity (visual), grain type and size, induration, accessory minerals, and fossils. The geological descriptions of the cuttings from the injection and monitor wells are available in Appendix A. A total of 75 feet of core was collected from various zones in the injection well and deep Floridan monitor well. A detailed description of the cores is available in Appendix C. Pertinent information on the cores are listed in the following table.

TABLE 7.1 - CORE SAMPLES RECOVERED FROM SITE WELLS

CORE #	INTERVAL CORED	FORMATION CORED	FOOTAGE CORED	RECOVERY (FEET)	RECOVERY (%)
		INJECTION WELL			
1	1520'-1530'	LAKE CITY	10	3	30
2	1624'-1639'	LAKE CITY	15	9	60
3	1755'-1770'	OLDSMAR	15	10	66
4	1790'-1805'	OLDSMAR	15	8	53
5	1835'-1846'	OLDSMAR	11	8	72
6	1893'-1907'	OLDSMAR	14	0	0
7	1908'-1926'	OLDSMAR	18	2	11
8	2102'-2112'	OLDSMAR	10	0	0
9	2406'-2419'	OLDSMAR	13	12	92
		DEEP FLORIDAN MONITOR WELL			
1	1131'-1146'	LAKE CITY	15	15	100
2	1463'-1473'	LAKE CITY	10	8	80

PERMEABILITY ANALYSIS OF CORES

The eight core samples were tested to determine the vertical hydraulic conductivity (ASTM D2434), porosity, specific gravity (ASTM D854) and unconfined compressive strength of intact rock core specimen (ASTM D2939). This data is available in Appendix C. The core samples submitted for laboratory analysis and generalized descriptions are listed on the following tables.

TABLE 7.2 - LITHOLOGY OF CORES SENT TO LABORATORY FOR ANALYSIS

CORE #	DEPTH INTERVAL	LITHOLOGY
DMW 1	1140' 1" - 1140' 6"	DENSE DOLOMITE, INTERCRYSTALLINE VUGULAR POROSITY
DMW 2	1464' 3" - 1464' 9'	DENSE DOLOMITE, EUHEDRAL CRYSTALS, MICROCRYSTALLINE,
T/I 1	1520' 4" - 1520' 8"	DENSE DOLOMITE WITH CHERTY LIMESTONE, VUGULAR AND MOLDIC POROSITY
T/I 2	1629' 6" - 1630' 1"	LIMESTONE, WITH DOLOMITE SEAMS, INTERGRANULAR POROSITY, CHERT, AND LIGNITE VEINS, TRACE EVAPORITES
T/I 3	1758' 2" - 1758' 6"	LIMESTONE, DOLOMITIC AND MICRITE, INTERCRYSTALLINE & INTRAGRANULAR POROSITY, SPAR, FORAMS, LIGNITE
T/I 4	1796'10" - 1797' 2"	FOSSILIFEROUS LIMESTONE, MEDIUM GRAINED, MICRITE CEMENT, LIGNITE
T/I 5	1836' 3" - 1836' 8"	LIMESTONE, INTRAGRANULAR AND MOLDIC POROSITY, SPAR, MANY FORAMS
T/I 9	2410'11" - 2411' 4"	DOLOMITE, INTRACRYSTALLINE AND VUGULAR POROSITY, SUBHEDRAL TO EUHEDRAL CRYSTALS, LIGNITE

The vertical hydraulic conductivities of samples range from 2.4 x 10-3 cm/sec (injection zone) to 3.0 x 10-10 cm/sec. These parameters are listed in the following table.

TABLE 7.3 - LABORATORY ANALYSIS OF CORE SECTIONS

WELL	CORE #	INTERVAL SENT FROM CORE (depth bpl)	LENGTH (inches)	VERTICAL PERMEABILITY (cm/sec)	SPECIFIC GRAVITY	POROSITY
DMW	1	1140' 1"-1140' 6"	5	1.3x10-8	2.86	0.14
DMW	2	1464' 3"-1464' 9"	6	3.0x10-10	2.85	0.05
INJ	1	1520' 4"-1520' 8"	4	1.1x10-9	2.85	0.08
INJ	2	1629' 6"-1630' 1"	7	0.4x10-7	2.75	0.21
INJ	3	1758' 2"-1758' 6"	4	1.0x10-8	2.74	0.07
INJ	4	1796'10"-1797' 2"	4	3.8x10-4	2.74	0.32
INJ	5	1836' 3"-1836' 8"	5	1.4x10-4	2.72	0.31
INJ	9	2410'11"-2411' 4"	5	2.4x10-3	2.89	0.28

7.2 GEOPHYSICAL LOGGING

A number of borehole geophysical surveys were collected from various intervals and the total depth of the injection well and two monitor wells. The geophysical logs provided additional information on lithology, water quality, aquifer characteristics, integrity of well casings and borehole deviation. A geophysical column of the injection well is depicted on Figure 5.

The majority of the geophysical surveys were performed by Florida Geophysical, Inc. and Schlumberger, Inc.. Multi-shot directional surveys were conducted Superior Survey Systems, Inc.. Table 7.4 is a listing of the geophysical surveys performed on the wells. Copies of the logs are contained in Appendix I.

TABLE 7.4 - GEOPHYSICAL SURVEYS PERFORMED ON WELLS

TYPE OF SURVEY	INJ	DFMW	SFMW
Electrics (dual induction, SP, fluid resistivity and long-short normal)	x	x	x
Natural Gamma Ray	x	x	x
Acoustic Velocity	x	x	x
Variable Density Log (VDL)	x	x	
Temperature (absolute and differential)	x	x	x
x-y Caliper	x	x	x
Flowmeter	x	x	x
Multi-shot Directional	x	x	x
Television	x	x	
Radioactive Tracer (RTS)	x		
Cement Bond Log (CBL)	x	x	x
Point Sampler	x	x	

INTERPRETATION OF GEOPHYSICAL LOGS

Electrics (dual induction, SP, fluid resistivity, long-short normal)

The induction log is a record of the conductivity (reciprocal of resistivity) of the rocks adjacent to the borehole by inducing an electrical current to flow in the rocks. The strength of the signal received by the recording instrument is proportional to the conductivity or inversely proportional to the resistivity of the formation. In general dolomites and denser rocks are more conductive than limestones and poorly indurated sediments. Therefore, the denser rocks give higher deflections on the logs. Cavities show attenuations on dual induction logs. Fluid resistivity logs record the resistivity of the borehole fluid.

SP (spontaneous potential) logs are records of the natural potentials developed between the borehole and the surrounding rock materials. The SP and fluid resistivity log were of little use in this investigation because of the large quantities of fresh and/or salt water induced into the borehole and formation during drilling.

The dual induction log correlated well with formation lithologies. The dolomite sequences showed high conductivities whereas the limestone sequences were relatively lower in conductivity.

Natural Gamma Ray

The gamma log records natural gamma radiation emitted from formations adjacent to the borehole. Higher gamma activity is associated with minerals with high percentages of potassium, uranium, and thorium in their lattice structure. Higher gamma radiation detected in the injection and monitor well boreholes can be associated with uranium and thorium concentrated in phosphorites, clays, cherts and dolomites. The gamma ray log deflections are also influenced by hole conditions (hole diameter, casings, cement, mud weight). The natural gamma ray log is useful in hydrostratigraphic and stratigraphic correlations if lithologies are known.
The natural gamma ray log performed on the test/injection well

shows very high radioactivity in the phosphatic Hawthorn Group to a depth of 145 feet. The dolomites throughout the underlying Eocene sequence showed slightly higher radioactivity than the interbedded limestones. The only exceptions were in the cherty limestones (higher radioactivity) and cavernous zones between where the larger hole diameter attenuated the gamma rays.

Acoustic velocity

The acoustic velocity log measures the transit time of a compressional (sound) wave as it is emitted and received over a 1 foot interval of formation. The transit time is affected by the borehole wall, formation bedding, borehole rugosity, fractures, porosity, formation matrix, and cavities. Generally the denser (dolomitic) formations have faster transit times than less indurated (limestone and clay) formations. Attenuations (slower transit time) are apparent in cavernous zones. Acoustic logs can also be used to locate fractured zones. Fractures sometimes cause "cycle skipping", which is an attenuation of an acoustic pulse followed by a subsequent non-attenuated pulse sensed as the first arrival.

The acoustic log run on the injection well correlated with formation lithologies and borehole characteristics. The fastest transit times recorded in the well were through the dolomite sequences in the injection zone.

Temperature

Temperature logs are the continuous records of temperature of the environment immediately surrounding a sensor in a borehole. They can be used to determine inner borehole flow, temperature gradients, static water levels, corrections for resistivity measurements, and to locate cement behind casings.

The primary purpose of the temperature logs was to identify background temperatures, temperatures after injection and locate cement behind the various casings. Naturally occurring temperatures varied between about 75 degrees F at 450 feet below pad level to 83 degrees F at 1650 feet below pad level. In the test/injection well the most abrupt change in temperature was a one (1) degree increase from 81 degrees to 82 degrees at 1180 feet.

Caliper

The caliper log is a record of the average borehole diameter. It's major use is to evaluate the hole diameter in which other logs are made to correct them for borehole diameter and to estimate cement quantities for various casing sizes.

Caliper logs were conducted on all pilot holes and reamed holes. The limestone portions of the hole all showed larger diameters due to the washing out of these less indurated units during drilling. Cavernous zones were detected between 1160 feet and 1205 feet and between 2000 feet and 2100 feet below land surface. Smaller cavities were present in the injection well at 2250 feet.

Multi Shot Directional

The directional survey is used to determine borehole declination and deviation from magnetic north. Directional surveys were run on all pilot and reamed holes to be certain that the reamed holes were not deviating from the pilot holes.

Cement Bond Log (CBL)

The cement bond log gives a continuous measurement of the amplitude of sound pulses from a 3 foot transmitter-receiver spacing. The amplitude is at a maximum in unsupported pipe and at a minimum in well cemented casing. As a general rule the larger the casing diameter the less accurate the log.

CBL logs were conducted on the 20 inch injection string in the test/injection well and the 4 1/2 inch monitor casing in both the deep Floridan monitor well and shallow Floridan monitor well. The CBL on the injection string showed good bonding throughout the entire length of the log despite the large diameter casing.

Radioactive Tracer Survey (RTS)

The RTS tool is composed of three gamma ray detectors and two emitters for Iodine 131. The tool is lowered to predetermined depths and the radioactive material released and monitored by the gamma detectors.

Two radioactive tracer surveys were conducted on the injection well. The first was conducted prior to the injection test and the second after the injection test. Both of the tests showed no apparent upward migration of the potable (first test) and treated waters (second test) that were injected into the well.

7.3 WATER QUALITY

INTRODUCTION

The deep wells (greater than 1000 feet) and large diameter Floridan wells in the Brevard County area characteristically exhibit significant artesian flow that can cause drilling problems. It was anticipated that the contractor would be fighting this flow during the construction of the Rockledge well. Most drilling contractors that construct deep wells in this area use salt and sometimes bentonite muds to control this heavy flow by weighting the upper water column in these wells. Although the salting method is usually effective for construction purposes it also affects the water quality of the well. The contractor (Youngquist Brothers, Inc.) was aware of our desire to collect realistic water quality data and fabricated a `rotating wellhead` modified from oil field equipment. The rotating head effectively contained artesian flow (tested to 60 psi) during all drilling and reaming operations without the use of salt or mud. The Rockledge injection well and associated monitor wells are among the first deep wells drilled without the use of salt in Brevard County. The deep Floridan monitor well which was originally drilled as an exploratory well, had only three slugs (10 sacks each slug) of bentonite mud pumped down it throughout the course of construction.

It is often difficult to identify the representative formation water quality in different zones by the samples taken from the returning fluid during reverse circulation drilling. Return fluids are a mixture of the existing fluid within the borehole and drilling apparatus (rods, pit, etc.) combined with the new fluids contributed from the formation just opened by the drill bit. A sample of the circulation fluids was analyzed for organics and is available in the appendix. The changes in the water quality parameters are directly related to the percent contribution of the newly opened hole. The water quality data from the return fluids was, therefore, examined qualitatively to determine the effects of the existing fluid on background formation water.

The reverse air water sample data from the initial deep exploratory well, however, gave an accurate representation of subsurface water quality conditions. The exploratory well data coupled with the other hydrogeological information from all of the Rockledge wells was very effective in supporting an accurate interpretation of the base of the USDW, confining zones, monitoring points and injection zone. The accuracy of the deep exploratory/monitor well water quality interpretations are supported by the data collected after the completion and further development of the monitor wells. When the monitor wells were completely constructed and all of the reverse circulation drilling fluids had been removed the TDS in both monitoring zones stabilized to the expected values derived from the deep monitor well data.

WATER QUALITY SAMPLING

The following procedures were employed during reverse circulation drilling to establish background water quality on the site wells.

1. Water samples were collected during pilot hole drilling from the return fluid of the discharge stream at a minimum of ten (10) foot intervals and measured for temperature, pH, conductivity, TDS, and salinity starting at the base of the surface casing.

2. Additional samples were collected during pilot hole drilling at sixty foot intervals. Field analysis included chlorides in addition to the field parameters collected at ten (10) foot intervals. These samples were stored as a contingency for water quality verification and possible laboratory analysis.

3. After the deep Floridan monitor well was drilled to its' total depth of 1506 feet, point samples were collected by the geophysical logger in the open hole portion of the well. Fourteen samples were collected at 100 foot intervals from 240 feet to the total depth of the well.

   These samples were analyzed by a certified laboratory. Some of the more significant results from the lab analysis are shown on Table 7.5.

4. Two straddle packer tests were conducted in the deep Floridan monitor well. The first test withdrew formation water from 1145 feet to 1200 feet and the second packer isolated and sampled the formation fluids from 1125 feet to 1133 feet below land surface. Field parameters were recorded in addition to laboratory analysis of the samples. The results from field and laboratory analysis are listed in the appendix. The

more pertinent parameters have been recorded on Table 7.5.

5. The deep Floridan monitor well was developed at a rate of 10 gpm for 3 hours 50 minutes (3 1/2 well volumes). Once water quality stabilized a sample of the fluid in the monitor zone was analyzed for field parameters and delivered to a laboratory for analysis. A representative analysis of some water quality parameters is listed on Table 7.5.

WATER QUALITY ANALYSIS

The background water quality within the injection and monitor wells was determined by samples taken during reverse air drilling, point samples taken after the wells were drilled, straddle packer testing and also final well development. All fluid samples were analyzed for conductivity, TDS, temperature, chlorides, pH and salinity. Additionally, the point samples, straddle packer samples and final well development samples were analyzed by a certified laboratory (Bionomics Laboratory, Inc.) for the following parameters:

Turbidity	Hydrogen Sulfide	Calcium
Water Temperature	Non-carbonate hardness	Magnesium
pH	Bicarbonate	Carbon Dioxide

Color	Total Phosphorus	Carbonate
Sulfate	Total Nitrogen	Potassium
Iron	Nitrate	Chloride
Total Dissolved Solids	Organic Nitrogen	Sodium
Total Hardness	Ammonia	
Hydroxide	Conductivity	

Laboratory analysis of conductivity, TDS, Chlorides and pH for the deep Floridan monitor well and the test/injection well are listed in tables 7.5 and 7.6 respectively. A complete analysis of the samples for all of the wells is located in Appendix B.

The purpose of obtaining and analyzing water samples and establishing background water quality during well drilling is to:

1. Determine the base of the Underground Source of Drinking Water (USDW), a depth below which the original formation water exceeds a total dissolved solids concentration of 10,000 mg/l. Treated effluent can be injected into transmissive zones below the 10,000 mg/l TDS interval provided there is a suitable upper confining sequence.

2. Determine the appropriate depth of monitoring wells. This is done in conjunction with lithologic information. The deep monitor well shall be just above the confining layer in a brine aquifer. The shallow monitor well shall

be in a zone just above the base of the USDW.

3. Obtain water samples to estimate the water quality parameters of the monitoring zones prior to injection operation. The water quality parameters so established serve as basis to determine whether the monitoring zones have been intruded by injected fluids.

DEEP FLORIDAN MONITOR WELL

The deep Floridan monitor well was the initial well drilled at the Rockledge site. It was originally designed as an exploratory well to determine the subsurface hydrogeologic conditions to a depth of about 1500 feet. The water quality testing program performed on the well was extensive, because of concerns by the regulatory agencies (TAC) over deep monitor data from injection well systems in Brevard County. The drilling process introduces fluids into the wellbore and a true background water quality is often not attainable. As previously discussed, the drillers on the Rockledge wells used as few additives as absolutely necessary so that the background or natural water quality would be minimally affected. As a result, a total of 30 bags of bentonite were used throughout the entire reverse air drilling process. Salt was never used in the well and fresh water was only introduced when absolutely necessary to cut and retrieve the two cores.

In consideration of the methods employed while drilling the deep monitor well, the following observations can be made:

1. The point samples are the least reliable source of data. This could be due, in part, to the low volume of water freeflowing from the well during sampling. One can anticipate that a flowing well would bring higher TDS water from below the sample point and thus a reliable water quality trend could be established. But what probably happened is that the well was not flowing at a high enough rate and therefore fresher waters migrated into deeper saltier waters during sampling. Therefore, water quality parameters of the samples (even two samples taken at the same depth) fluctuate drastically.

2. The field data taken during reverse air drilling is the most useful source for establishing water quality trends. A brief summary of the data from the reverse air drilling:

   There is a notable increase in the conductivity and salinity of the return fluids at a depth of 1200 feet below land surface. Waters above this depth are less than 8,500 umhos/cm and 4.9 ppt, respectively.

   Between 1200 feet and 1350 feet below land surface conductivities range from 5,500 umhos/cm to 26,000 umhos/cm.

Salinity fluctuates from 3.0 ppt to 10.5 ppt.

At a depth of 1350 feet conductivities were consistently above 30,000 umhos/cm and salinity stayed above 19.7 ppt. One anomalous reading of 26,900 umhos/cm was recorded at 1470 feet which was just after fresh water was pumped down the well during a coring operation.

3. Two straddle packer tests conducted on the well isolated the base of the USDW between 1135 feet and 1200 feet bpl. Laboratory analysis indicates TDS concentrations between 1125 feet and 1135 feet of 6,384 mg/l and TDS concentrations between 1145 feet and 1200 feet are 22,158 mg/l.

4. Formation fluid taken from final development of the deep Floridan monitor well (screened from 1338 to 1388 feet below land surface) has a conductivity of 32,300 umhos/cm, TDS concentration of 38,989 mg/l and a chlorides concentration of 15,230 mg/l. The TDS exceeded the conductivity in this sample, which occasionally occurs in brine water.

5. The water level of the completed well fluctuates in the vicinity of 15.7 feet below pad level.

Table 7.5 - DEEP FLORIDAN MONITOR WELL - LABORATORY ANALYSIS OF SIGNIFICANT WATER QUALITY PARAMETERS

SPL NO.	DEPTH BLS	COND. umhos/cm	TDS mg/l	Cl mg/l	pH	COMMENTS
			POINT SAMPLES			
1	250	3,200	2,578	1,346	7.55	FLOW 25 GPM
2	300	3,400	2,580	1,208	7.44	" "
3	400	6,300	4,347	2,633	7.60	" "
4	500	7,400	5,333	2,851	7.57	" "
5	600	8,000	5,245	2,950	7.59	" "
6	700	7,900	2,647	1,871	7.72	" "
7	800	6,200	4,406	1,554	7.54	" "
8	900	6,900	4,781	2,495	7.52	" "
9	1000	6,500	4,540	1,426	7.59	" "
10	1100	8,000	5,720	2,812	7.54	" "
11	1200	5,200	3,556	1,841	7.67	" "
12	1300	7,300	5,079	2,713	7.55	" "
13	1400	13,600	9,207	5,782	7.46	" "
14	1500	8,900	5,567	3,861	7.62	" "
			STRADDLE PACKER SAMPLES			
2	1125-1135	9,200	6,384	3,420	7.18	FLOW <15 GPM
1	1145-1200	32,000	22,158	11,454	7.39	FLOW <15 GPM
			FINAL DEVELOPMENT			
1	1338-1388	32,300	38,989	15,230	7.43	

SHALLOW FLORIDAN MONITOR WELL

The shallow Floridan monitor well was drilled to a total depth of 960 feet below land surface. Reverse air drilling commenced at a depth of 250 feet. Additives were kept to a minimum and include only a few slugs of bentonite mud pumped into the well to control flow while the rotating head was removed. Salt was never added to the well. Reverse air fluid samples were collected to the total depth of the well. Water samples were also collected after the final well development and analyzed by a laboratory. Both the field analysis and the laboratory analysis of the collected samples are located in the appendix.

The major conclusions from the collected data are:

1. Field analysis of reverse air water samples from a depth of 300 feet to the total depth of the well display conductivities ranging from 2,700 umhos/cm to 7,000 umhos/cm. Salinities ranged between 1.5 ppt to 4.0 ppt.

2. Laboratory analysis of formation fluid taken from final development of the shallow Floridan monitor well (screened from 901 feet to 951 feet) have a conductivity of 3,450 umhos/cm, TDS concentration of 2,221 mg/l and a Chlorides concentration of 968 mg/l. A complete water quality analysis is located in the appendix.

3. Water levels measured inside the well fluctuate around 4.3 feet above pad level.

TEST/INJECTION WELL

The injection well was drilled by the reverse air drilling method from a depth of 450 feet to the total depth of the well (2720 feet below land surface). Construction operations in the deeper part of the well appear to have influenced water quality samples. An intermediate string of casing was cemented to a depth of 1653 feet and the final string of casing was grouted to a depth of 1955 feet below land surface. The cementing programs associated with these casing installations influenced subsequent water samples, because of the significant amount of fresh water used during those operations. The nine cores cut between a depth of 1520 feet and 2400 feet below land surface also introduced a large quantity of fresh water into the well that affected water quality. After the well was cased to 1955 feet below land surface the driller was allowed to pump excess water from monitor well development into the injection well. This was not a major concern because the water quality had already been greatly affected by the cementing program and coring operations.

The following observations can be made from data collected during the construction and testing of the well:

1. The reverse air water samples recorded a notable increase in the conductivity and salinity at a depth of 1180 feet bpl. Waters above this depth are less than 6,200 umhos/cm and 3.5 ppt, respectively.

   Between 1180 feet and 2120 feet, any interpretation of water quality is speculative because of fresh water introduced into the system by the reverse air program. The higher conductivity readings would better reflect the water quality through this interval.

   Below 2120 feet, the conductivity was consistently greater than 40,000 umhos/cm.

2. A water sample was collected for laboratory analysis after the well had been reamed to a depth of 1657 feet with a 36 1/2" hole opener. The hole was open from 460 feet to 1657 feet and the well was circulated for four (4) hours with the hole opener on bottom. Conductivity was recorded at 10,700 umhos/cm, TDS concentrations were 8,581 mg/l and Chlorides concentrations were 3,798 mg/l. A full analysis is included in the appendix.

3. Nine (9) point samples were taken in the open hole portion of the well (from 1955 feet to 2700 feet). Total disolved solids concentrations range from 29,703 mg/l to 32,747 mg/l.

4. The open hole portion of the well was reamed from 1955 feet to a total depth of 2720 feet, then circulated for six hours with the 18 1/2" drill bit on bottom. A formation fluid sample was sent for laboratory analysis. The TDS concentration was 31,492 mg/l, conductivity was 44,100 umhos/cm and chloride concentrations were 15,655 mg/l. These parameters are recorded on the table below and a full chemical analysis is available in the appendix.

TABLE 7.6 - TEST/INJECTION WELL - LABORATORY ANALYSIS OF SIGNIFICANT WATER QUALITY PARAMETERS

SPL NO.	DEPTH FT.BLS	CONDUCTIVITY umhos/cm	TDS mg/l	Cl mg/l	pH	COMMENTS
1	1,970	42,600	31,215	16,564	7.74	POINT SAMPLES
2	2,000	42,800	31,513	16,059	7.77	STATIC WELL
3	2,100	43,200	31,711	16,362	7.70	
4	2,200	44,800	31,955	15,857	7.71	
5	2,300	45,000	32,747	15,655	7.73	
6	2,400	42,700	31,589	15,655	7.82	
7	2,500	42,000	30,609	15,554	7.87	
8	2,600	40,500	29,939	14,746	7.87	
9	2,700	41,300	29,703	14,544	7.80	
11	1,955-					FINAL
11	2,720	44,100	31,492	15,655	7.90	DEVELOPMENT

7.4 INJECTION TEST

When the construction activities were complete on the injection and monitor wells an injection test was conducted to:

1. demonstrate the injectivity of the well,
2. give further verification of cement integrity in the annular space of the wells, and
3. demonstrate the effectiveness of the confining sequence.

Data collected during the injection test is also relevant in the prediction of the future behavior of the well. This information is vital to the planning process for the safe operation of the injection system.

BACKGROUND INFORMATION

Background data collection started on March 17, 1991. The primary purpose of this data collection was to determine the combined tidal and barometric pressure effects on water levels in the deep and shallow Floridan monitor wells. This background information was collected until April 18, 1991, just prior to the beginning of the injection test.

Since the barometric pressure varies randomly, and quite rapidly, it is difficult to keep an accurate record. In addition, their is usually a delayed and attenuated response of water levels to the changes in barometric pressure. On a normal fair day with no major weather changes, it is not unusual to have a pressure variation of one half of a foot of water head.

The fluctuation of water levels in the deep Floridan monitor well did not correlate with the barometric pressure. In general, water levels in the shallow well correlate better with the changes in barometric pressure, although tidal cycles are very apparent. The water levels in the deep well display clear cyclic behavior, indicative of the tidal influence.

During the background data collection, water levels in the deep Floridan monitor well varied from a high of 15.23 feet bpl to a low of 16.05 feet bpl, showing a maximum change of 0.82 feet. In a 12-hour tidal cycle, the range of change in water level was usually less than 0.40 feet, just about one half of the maximum range. It was important to have this background information so that water level fluctuations in this monitor well during the injection test could be corrected. It was clear the fluctuations of water level within 0.4 feet in the deep Floridan monitor well may be attributed to natural variations.

The range of water level readings in the shallow Floridan monitor well varied from 4.03 to 4.68 feet bpl. Note that the upper extreme occurred only in the early morning (01:00 April 18, 1991) just prior to the injection test. In most days, water levels in the shallow Floridan monitor well fluctuated within a range of 0.50 foot of water head.

Other factors, such as; water quality variation/stratification, regional confining beds and/or measurement errors could also contribute to the natural variation in readings of water level.

A pressure transducer was placed inside the test/injection well at a depth of 1940 feet bpl on the morning of April 16, 1991. The pressure transducer is susceptible to ground vibrations caused by equipment movements, and other factors. Before the test, this pressure gauge showed as much as 1 PSI (pound per square inch) of pressure change. The natural pressure change was about 0.25 psi; the daily cyclic change was about 0.12 psi (0.27 foot of water head). Just before the injection test, the prevailing pressure was recorded at 857.75 psia.

INJECTION TEST

The injection fluid was supplied by the City's wastewater treatment plant through a pipeline to a storage tank. The contractor pumped the treated effluent from the tank into the test/injection well. The pump was rated up to 10,000 gpm. A pressure gauge and a flowmeter were installed in the horizontal section of the injection pipe. A small valve (spigot) was also installed in the horizontal pipe to obtain samples of the injected fluid.

Injection started at 10:10 am on April 18, 1991. Over two million gallons of water were injected in nine (9) hours. The test was carried out in two steps: a planned 4,000 gpm injection rate for eight (8) hours followed by a planned 8,000 gpm injection rate for one (1) hour. The injection ended at 19:10 pm on April 18, 1991. The pressure gage in the injection pipe was removed one hour after the pumping was terminated. Water level readings at 15 minute intervals continued in the shallow and deep Floridan monitor wells until 18:00 pm on April 20,1991.

RESULTS

During the first 10 minutes of the injection test (step 1 - 4,000 gpm), the well head pressure rose from 9.5 psi to 15.25 psi. Then the flow rate fluctuated between 3000 gpm and 3750 gpm and wellhead pressure stabilized to 16.0 psi at 4 hours into the test. In the second step at a rate of 8,000 gpm (11.5 mgd), the wellhead pressure immediately doubled to 32 psi. The pressure then stabilized at 35 psi within 4 minutes, and stayed there through the remaining hour of the injection test. Note that the well was designed to take the peak flow of nearly 10.5 mgd at a predicted wellhead pressure of 36 psi.

An estimation of the injection zone transmissivity can be made through the use of the wellhead pressure changes and the bottom-hole pressure transducer data. The transmissivity is estimated from the changes of wellhead pressure after taking into account the friction loss in the injection pipe. The injection test data and calculations of hydraulic values is available in the appendix of this report.

In the first 8 hours, wellhead pressure changed from 9.5 psi to 16.0 psi (pressure increase of 6.5 psi = water head difference of 15 feet) at an average pumpage of 3750 gpm (5.4 mgd). The friction loss was determined from a graph depicting wellhead pressure versus flow rate. The friction loss was 10 feet. In other words, 5 feet (15-10=5) of head to push 5.4 MGD to the injection zone. Hence the transmissivity is about 1.1 MGD/FT. Using the pressure difference between injection test step one (3750 gpm) and step two (8000 gpm), however, a transmissivity of 0.4 MGD/ft is obtained.

The bottom hole pressure transducer read 857.75 PSIA at the commencement of the injection test. The gauge recorded a maximum pressure of 862.47 PSIA after about 10 minutes of injection, but settled around 862.10 PSIA in the first step of injection. The increase of about 4.35 PSI (from 857.75 to 862.10) in response to the injection rate of 3750 gpm gives an estimation of transmissivity in the injection zone of 0.54 MGD/FT. Using the data of pressure changes (from 862.10 PSIA to 870.30 PSIA) then the injection rate increased to 8000 gpm, however, a transmissivity value of 0.3 MGD/FT was obtained.

From the preceding four estimations, it is concluded that the transmissivity in the injection zone is about 0.5 MGD/FT. The low transmissivity may call for closer observation of the operation and maintenance of the injection system to prevent pressure build-up in the future. These measures include, but are not limited to; more data collection, revision of computer forecasting model, and well redevelopment and/or acidization.

The injection test commenced at the high end of water level readings in both the deep and the shallow Floridan monitor wells. The initial level in the deep Floridan monitor well was 15.48 feet below pad level (bpl). The water level in this well rose to the maximum of 15.33 feet bpl. or an increase of 0.15 of variation in 2 hours. This is a little more than the expected 0.10 ft. of variation in 2 hours. Even though the water level recovered to 15.54 feet bpl at the end of the injection test, it rose again to 15.20 feet bpl at 02:45, April 20, 1991. This peak was 0.03 ft. above the maximum background data.

At the beginning of the injection test the water level in the shallow monitor well was at 4.52 feet above pad level. It rose to 4.68 feet apl, the peak of background readings, in less than three hours after the start of the test. The pressure increase in this initial stage of the test was 0.04 ft. more than expected from the natural background variations in water level. At the end of the first step of the injection test the water level hit a low of 4.50 feet apl; then again rose to 4.61 feet apl in response to the 50 minute 8000 gpm injection in the second step of the injection test. The water levels then fluctuated in a cyclic pattern and generally followed the same pattern as they did during the background phase responding to tidal changes. The levels increased to a peak of 4.81 feet apl at 02:15, April 20, 1991. This peak was 0.13 ft. above the background maximum. Note that the peaks in the deep and shallow monitor wells were almost at the same time. The minor water level rises during and after injection are probably caused by weather and/or tidal conditions, but they may also indicate possible transmission of pressure accross the confining zones into the monitor zones.

In conclusion, the injection test showed that the well is capable of accepting the design injection rate of 10.5 MGD. However, the pressure in the well may increase quickly in response to higher injection rates and/or sediment build-up that may be attributed to the lower than expected transmissivity in the injection zone. The injection testing appeared to have a negligible affect on water levels in the monitor wells. There was, however, a 0.03 to 0.05 foot change above natural background water level in the deep Floridan monitor well during the testing. There is a possibility that this change could be attributed to the injection/recovery tests. Therefore, it is recommended that full injection tests be conducted yearly to ensure the safe operation of the system.

8.0 OPERATION AND MAINTENANCE MANUAL

8.1 QUALITY ASSURANCE/QUALITY CONTROL PLAN

QUALITY ASSURANCE

The following recommendations fulfill the requirements of Chapter 17-28 FAC for the safe operation of an injection well. In many cases additional reporting and/or testing conditions are made a part of the operational permit by the FDER. These conditions are anticipated in these recommendations, but additional requirements may be imposed by the agencies. These recommendations should be implemented to ensure compliance with the conditions of an operating permit and successful operation of the injection well.

1. Injection pressures at the well head should be monitored and recorded continuously.

   a) A 24 hour circular chart recorder should be installed in the plant laboratory.
   b) A record of the daily maximum and minimum pressures, monthly maximum and minimum pressures, and monthly average

maximum and average minimum pressure should be maintained.

2. The injection flow rate should be monitored and recorded continuously.

   a) A 24 hour circular chart recorder with a totalizer should be installed in the plant laboratory.
   b) A record of the daily maximum and minimum flows, monthly average flow, and monthly maximum and minimum flows should be collected.

3. The wellhead pressure or water levels in the deep and shallow monitor wells should be collected by a continuous recorder.

   a) The recorder should be capable of collecting water level data every four (4) hours and of equal or better quality to a Stevens Type F recorder.
   b) A notation should be made in the reported water level log denoting the intervals of time the recorders were off due to water quality sampling of the wells.

4. Every five years the injection well should be tested for mechanical integrity in accordance with FAC Rule 17-28.13. This test normally consists of; a television survey, a pressure test with a packer inflated inside the casing, a temperature survey, and a radioactive tracer survey (RTS).

5. A minimum of one monthly water sample from each of the two monitor wells and the injection water should be analyzed for:

Turbidity	Total Phosphorus
Water Temperature	Total Nitrogen
pH	Nitrate
Color	Organic Nitrogen
Sulfate	Ammonia
Iron	Conductivity
Total Dissolved Solids	Calcium
Total Hardness	Magnesium
Hydroxide	Carbon Dioxide
Hydrogen Sulfide	Carbonate
Non-carbonate Hardness	Potassium
Bicarbonate	Chloride
Sodium	Odor
Copper	Manganese
Corrosivity	Zinc
EPA Method 601, 602, and 608	BOD5
Fecal Coliform	TKN

a) The monitor wells should be equipped with pumps capable of withdrawing a minimum of 30 GPM.

b) Prior to collecting a water sample the monitor wells should be developed until at least 2 well volumes are removed. The following table estimates a safe development time for low and/or variable flow rates.

DEEP MONITOR WELL	SHALLOW MONITOR WELL
10 GPM = 2.0 HOURS	10 GPM = 1.5 HOURS
20 GPM = 1.5 HOURS	20 GPM = 1.3 HOURS
30 GPM = 1.0 HOURS	30 GPM = 1.0 HOURS

6. A specific injectivity test should be done every three (3) months. The test consists of measuring the injection flow (FLOW in GPM) at a constant rate of 3125 GPM and injection pressure (IP in PSIG) simultaneously. A specific pressure

(SP) is then calculated by subtracting the shut in or static pressure (STAT) from the injection pressure (IP). The injection flow rate is divided by the specific pressure to determine the specific injectivity (SI GPM/PSIG = FLOW / SP). An injection test similar to the injection test completed at the end of well construction should by conducted once a year in place of a specific injectivity test to more accurately determine well performance and verify hydraulic values.

7. Quality control for the reported data should be implemented.

QUALITY CONTROL

The following procedures are implemented to maintain the quality of data collection and the reliability of reports to the regulating agencies.

1. To maintain the data quality and continuity, re-calibration or over-lapping measurements and analysis should be recorded when their is a change of laboratory or measuring instruments.

2. A computer program is used to properly interpret the collected data and prform the following analyses:

   a. Establish the baseline of **mean** and **standard deviation** of the background, or the natural variability in the system and the sampling and laboratory error. These statistics are available for all parameters, such as pressure, water level, flow rate, and **each** and **combined** chemical components of water quality indicators. The initial statistics will be derived from the data obtained at this site. The statistics will be up-dated as more valid background data becomes available.

b. Test the new data to be certain that there is no difference from the baseline with at least a 90% confidence level.

c. If an adverse anomaly of parameter change is detected at over the 70% confidence level for two consecutive observation periods, a warning will be issued by the computer program flagging the users attention and giving an estimation of the available time for remedial action. The estimation of available time is based on the rate of parameter changes and the physical characteristics of the aquifer system.

METHODOLOGY FOR QA/QC

All reports to the agencies shall include the raw data for their records and possible further analyses. This QA/QC plan also implements two computer programs to monitor the safe operation of the injection well.

Projection of Injection Pressure

Increases of injection pressure at a given flow rate may indicate some changes in the well. The well owners/operators usually notice any adverse changes in this variable, and should take immediate remedial action.

Injection pressure increase may be due to:

a. increase of friction loss in the injection pipe due to increase of pipe roughness, and

b. reduction of formation porosity and transmissivity due to sediment in the injected effluent.

During the initial phase of treated waste water injection, due to (biological) material built-up on the wall of the injection pipe, an increase of friction loss may result in a slight increase in injection pressure. If there is little compilation, this pressure increase will soon decline.

If the injection effluent contains excessive amounts of suspended solids, they may settle near the bore hole when the effluent velocity can no longer carry them. The accumulation of the sediment around the bore hole may result in an increase in injection pressure. Projection of injection pressure is derived from data in the quarterly injectivity test. A simple regression equation is used to estimate the length of time or volume of total injection it would take before the injection pressure would reach 40 psi. One year of data from the injectivity tests is required prior to implementing this procedure.

Detection of Leakage

Two monitor wells were installed near the injection well to determine any possible water quality changes due to injection. The leakage would be detected by the change of water quality in the monitored zones. Water quality changes, however, can be caused by other things such as; contamination within the zones from the drilling of several wells, pollution from above, and laboratory and/or sampling errors. A computer program is provided to the City of Rockledge that is designed to specifically identify leakage between the injection and monitor zones in their well.

The following is a discussion of the concept that the program is based upon and instructions to the user for data entry.

A. Concept

Suppose, two water sources, **A** and **B**, both contain a certain element or chemical compound with concentrations **a** and **b**, respectively. If a bottle of water is made by mixing **x** fraction from **A** and (**1-x**) fraction from **B**, without any chemical reaction, the concentration, **c**, of the element in the bottle can be computed by:

$$c = ax + b(1-x)$$

Let **B** be the original formation water in the deep monitor zone, and **A** be the injected effluent in the injection zone, obviously **a** and **b** can be obtained from the water samples taken before any mixing has happened between them. Now, suppose a new sample is taken from the deep zone, and the concentration is **c**, the equation can be used to compute the fraction of intrusion, **x**, from **A** to **B**. Complications in the real world come when water contains more than one element, say 24, from **i**=1,..24. The solution of **xi** for each element may not agree with each other, some of them may be negative values. This is caused by natural variabilities in water quality concentrations, sampling differences, and variation of precision in laboratory analyses. All of the concentrations reported are just approximations with certain variances.

With the assumptions of independence between different elements and different sources, statistical methods are used to handle the sample variances, and to derive the variance, **vi**, of **xi** when the equation is solved. All data points of each water quality parameter are first normalized with respect to the mean of injection fluid. This procedure takes care of the different scales and units of each parameter. Applying the procedure of the best linear unbiased estimator to the information of **xi** and **vi**, **i**= 1 to 24, a combined intrusion fraction, **X**, and its variance, **V**, are obtained. Since a large number of random variations are additive to the variate of **X**, it is assumed to be normally distributed. The critical values of **X** at alpha (uncertainty) level of 0.05 is computed with the help of **V**. When **X** is greater than the critical level, it indicates the mixing of the two sources of water might have occurred. The computation is done for mixing between: 1) the injection effluent zone and the deep monitor zone, 2) the injection effluent zone and the shallow monitor zone, and 3) the deep monitor zone and the shallow monitor zone.

B. Data Entry

Running the computer program is very easy as soon as the data file is updated. The initial data file has already been organized. All that is required to up-date the file is to enter the new data in the exact same manner as the original data. Some important points are:

1. Every value is right justified. Enter the most

significant digits (they do not necessarily have to line up with the decimal point), and always end the digits at the exact same column.

2. Missing data is filled with a negative number made of several digits of 9.

3. Always check the correct column to enter the data. The laboratory will sometimes list the chemical components in different order.

4. When a value is entered different from the laboratory report, the "judged" valued is entered with increased significant digits. This is intended to be obviously contrary to common sense. It is designed this way so that when a certain value increases by orders of magnitude, it is not mixed up with the judged values.

5. When a below-the-detection-limit value is reported, the detection limit is entered with a 0 before the decimal point to replace the less than (>) sign. Do not use the 0 before a decimal point in other values.

6. Do not change the file name RKWQ.DAT after entering new data. The program will be looking for this data file. A back-up file called RKWQDAT.BAK. should be created.

C. Example

To begin program operation just type RKWQCHG. The program will list out suspicious data entries and the operator can either continue or correct erroneous data before rerunning the program. The program will prompt the user to supply an appropriate number of initial sample data so it may compute the reference water quality in each zone. The reference sample collection will be discontinued when the significant mixing has been determined. The results are stored in RKWQCHG.OUT and example of program output is shown below.

ANALYSIS OF PROBABLE WATER MIXING

COL. (1): PERCENT OF PROBABLE INTRUSION
COL. (2): CRITICAL PERCENT
IF COL(1) > COL(2) PROBABILITY IS SIGNIFICANT

DATE	INJECT TO DEEP (1)	INJECT TO DEEP (2)	INJECT TO SHAL (1)	INJECT TO SHAL (2)	DEEP TO SHALOW (1)	DEEP TO SHALOW (2)
32089	.219	2.169	.976	2.932	-.315	.469
33089	.353	2.160	-.874	2.924	.160	.467
41189	-.147	2.160	1.201	2.935	-.031	.466
42789	-.302	2.167	-1.072	2.934	.026	.466
5 989	-.132	2.169	-.204	2.925	.159	.466

8.2 REPORTING TO FDER

To insure agency compliance for injection under the construction or operational permits the following data should be reported to the FDER at a minimum.

1. Monthly Report

   a. Injection pressure at well-head: continuous recorder data, monthly average, daily maximum and minimum.

   b. Injection flow rate: total monthly, daily flow rate.

   c. Water quality: all samples and all parameters analyzed.

2. Quarter Report

   a. Specific injectivity test: injection pressure versus injection flow rate.

3. Five-year Report

   a. Mechanical integrity test.

4. Conditional Report

   a. When any mal-function of the well has been detected.

8.3 INJECTION UNDER CONSTRUCTION PERMIT

a. The QA/QC program presented should be adhered to with the following requirements:

   1. Water samples from the monitor wells and injected effluent should be taken on a biweekly basis and analyzed for the parameters listed in section 8.1.

   2. Monitor well pressures (water levels) should be taken with a continuous recorder capable of measuring pressures (levels) on an hourly basis. Notations of barometric pressure and tidal level should be made prior to and after water quality sampling.

8.4 PLUGGING AND ABANDONMENT PLAN

If the Rockledge injection well experiences well failure or is determined to be a threat to the drinking waters of the State, the Florida DER and/or United States EPA can order the well be plugged and abandoned. The City of Rockledge accepts the financial responsibility for the plugging and abandonment of this well in the unlikely event it is ever needed.

The purpose of a plugging and abandonment program is to effectively seal the source of upward leaking effluent from overlying aquifers. The injection string (20") in the Rockledge test/injection well is set at 1950 feet below land surface. The base of the injection string is seated at 25 feet above the cavernous zones so that packers or bridge plugs can be installed if plugging is necessary in the future. In that case a qualified contractor capable of suppressing expected well head flow/pressure, installing drilling equipment (pipe. packers, tremmie, milling tools, etc.) to at least a depth of 2100 feet below land surface, and performing logging/cementing operations as directed will have to be retained. A qualified engineering and/or hydrogeological consultant will have to be retained prior to the drilling contractor to determine the nature of well leakage and modify this plan in cooperation with the FDER and EPA to perform the plugging and abandonment operation or well rehabilitation.

POTENTIAL CAUSES OF WELL ABANDONMENT

A QA/QC plan for the well that adequately addresses the monitoring and detection of upward leaking effluent is included in this report. In order to develop a plugging and abandonment plan certain assumptions have to be made as to the circumstances causing the well to be ordered abandoned. The three most likely assumptions are:

1. casing collapse, rupture, or corrosion;

2. leakage through channels in the annular space cement and/or a lack of cement in the annular space.

3. leakage through the geological formation(s) overlying the injection zones, possibly attributed to vertical fractures, cavities, or high porosity and permeability in some rock sequences as a result of diagenesis.

Other possible, but unlikely, sources of problems that could lead to well failure and abandonment include; multiple pilot holes, loss of drilling equipment, stuck packers, loss of radioactive (source) tool, formation clogging with excessive pressure build-up, vandalism, and acts of god. Nearly all of these complications either very rarely occur or only indirectly contribute to a plug and abandonment procedure. The most common occurrence among these problems is lost tools (bits, hole openers, drill rods, etc.) that in most cases result in specialized drilling methods (fishing), extended periods of time in the wells open hole and occasionally changes in the well constructions. Lost tools and dense formations can cause an extremely serious, but fairly rare downhole problem. That is the creation of multiple drill holes (reamed not tracking pilot or second pilot hole). Unless detected early in the drilling and corrected a second hole can provide a direct conduit for effluent during the operation of a well. In the Rockledge well there is only a remote possibility that a second hole could go undetected, because of the intensive testing program required on the wells.

CASING COLLAPSE, RUPTURE, OR CORROSION

In the event of casing collapse, rupture or corrosion, which could lead to a catastrophic failure, well rehabilitation may be an option. If the type of the casing failure is correctable by milling, perforating, and sealing (squeeze) procedures a 10 inch diameter and .50 inch wall thickness steel casing could be installed within the old 20 inch casing. However, if well rehabilitation is not an option the following procedure should be followed.

I. GEOPHYSICALLY LOG WELL

1. Downhole TV survey
2. Temperature, Caliper, CBL, CET, and Fluid Resistivity

II. CONTRACT AND MOBILIZE DRILLER

III. SUPPRESS WELL FLOW

1. Weighting materials such as bentonite or salt should be added to the well to suppress the fluid level in the well casing to approximately 30 feet below pad level.

2. Remove valve from well and install rotating head or blow out presenter.

3. Continue to monitor water level in well and suppress any upward fluid movement with weighting materials.

IV. CEMENT WELL TO SURFACE

1. Mill casing as appropriate to set plug.
2. Set bridge plug or expendable packer at 1965 feet.
3. Run tremmie to 10 feet above plug.
4. Pump 100 cubic feet of neat cement and let set for 8 hours.
5. After flushing with fresh water pull back tremmie 200 feet.
6. Tag cement
   a. If no fill up
      1. Pump alternating 100 cubic feet lifts of sand/gravel and neat cement with 12% gel and lost circulation additives (such as gilsonite, cellaflake or flocele). Wait 10 hours between cement lifts and tag.
      2. After a tag is made at 1950 feet, grout with neat cement to surface (3 lifts).
   b. If fill up
      1. Grout to surface with neat cement (3 lifts).

V. CONTINUE TO COLLECT DATA FROM MONITOR WELLS AS DIRECTED BY FDER

ANNULAR LEAK

If there is a leak in the annular space of the injection well (item 2) through channeling their is a remote possibility it may be detectable on a CET log. If the channeled section is identified then a perforation and squeeze cementing operation may be effective in sealing the channeled zone. A liner (10 inch casing) could then be installed in the well for rehabilitative purposes. However, if this option is not available the following procedures should be followed.

I. GEOPHYSICALLY LOG WELL

1. Downhole TV survey
2. Temperature, caliper, CBL, CET, and Fluid Resistivity

II. CONTRACT AND MOBILIZE DRILLER

III. SUPPRESS WELL FLOW (SAME AS ITEM 1)

IV. CEMENT WELL TO SURFACE

1. Set bridge plug or expendable packer at 1965 feet.
2. Run tremmie to 10 feet above plug.

3. Pump 50 cubic feet of neat cement.

   a. If no fill up

      1. Pump alternating lifts of 50 cubic feet sand/gravel and neat cement with 12% gel and additives (gilsonite and flocele). Wait 8 hours between cement lifts and tag.

      2. After a tag is made at 1950 feet, pressure grout (seal well head) to force cement into annular space.

      3. Cement well to surface with neat cement.

   b. If fill up

      1. Grout to 1950 feet with neat cement.

      2. Pressure grout (seal well head) to force cement into annular space.

      3. Cement well to surface with neat cement.

V. CONTINUE TO COLLECT MONITOR WELL DATA AS DIRECTED BY FDER.

In the case of item 3 (formation leak) there is little that can be done to seal the system. A formation leak, such as a fracture, may occur at some distance from the injection well. Therefore, the well would not have to be rehabilitated/abandoned. The only abandonment procedure that would be effective is the removal of the existing effluent in the injection zones.

The cost of a plugging and abandoning the injection well in the cases of item 1 and 2 is estimated below:

I. Consulting services - $25,000.00

II. Geophysical Logging - $15,000.00

III. Drilling contractor - $95,000.00

IV. Cementing contractor - $30,000.00

TOTAL - $165,000.00

The cost of plugging and abandoning the well in the case of item 3 is so complicated that any estimate would be pure speculation.

ABANDONMENT OF MONITORING WELLS

It is unlikely that the monitoring wells at the site would be abandoned unless they are acting as conduits for upward leaking effluent. If they are proven to be conduits the following procedure should be administered for each well.

I. GEOPHYSICALLY LOG WELL

1. Downhole TV survey
2. Temperature, Caliper, CBL, CET, and Fluid Resistivity

II. CONTRACT AND MOBILIZE DRILLER

III. SUPPRESS WELL FLOW

1. Weighting materials such as bentonite or salt should be added to the well to suppress the fluid level in the well casing to approximately 30 feet below pad level.

2. Remove valve from well.

3. Continue to monitor water level in well and suppress any upward fluid movement with weighting materials.

IV. CEMENT WELL TO SURFACE

1. Mill casing as appropriate.
2. Run tremmie to 2 feet above screen.
4. Pump 50 cubic feet of neat cement and let set for 8 hours.
5. After flushing with fresh water pull tremmie.
6. Tag cement and grout to surface.

ESTIMATED COST

The deep monitor well would cost about 1/3 more to abandon than the shallow, because of well depth. Therefore, the individual cost of well abandonment can be derived from the estimate by multiplying by 2/3 (deep) or 1/3 (shallow).

Consulting Services	-	$5,000.00
Geophysical Logging	-	$5,000.00
Drilling Contractor	-	$10,000.00
Cementing Contractor	-	$2,000.00
TOTAL COST	-	$22,000.00

9.0 CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Test/Injection Well

A. A highly transmissive zone exists in the injection well from a depth of 1980 feet below pad level to 2100 feet below pad level. Another smaller cavernous zone was also penetrated at 2220 feet.

B. The total dissolved solids concentration of waters within the injection zone exceeds 30,000 mg/l.

C. The transmissivity of the injection zone is estimated to by greater than **500,000** gpd/ft and capable of accepting nearly 10.5 mgd of effluent at an estimated injection pressure of 35 psi and fluid velocity that does not exceed 8 ft/sec..

D. Immediately overlying the injection zones is a confining sequence, which is composed of multiple zones of relatively lower permeability. This sequence is present from 1980 feet bpl (upper portion of the Oldsmar Limestone) to 1550 feet bpl (base of Avon Park/Lake City formation).

E. Nine (9) cores totalling 52 linear feet were collected from selected beds between 1520 feet to 2420 feet bpl.

F. Vertical hydraulic conductivities, determined from lab analysis of the cores within the confining zones, ranged from 0.00014 to 0.0000000011 cm/sec.

G. The contact of waters of less than 10,000 mg/l TDS (base of USDW) with non-potable waters is at an approximate depth of 1180 feet below pad level.

Deep Floridan Monitor Well

A. The water level varies with barometric pressure and tidal changes but generally stands about 15.7 feet below pad level.

B. Two cores totalling 23 linear feet were collected from above and below the base of the USDW. The vertical permeability of the upper and lower cores respectively were 0.000000013 cm/sec and 0.0000000003 cm/sec..

C. Total dissolved solids concentration of the deep monitor well waters averaged about 32,989 mg/l.

D. Total dissolve solids concentrations may decrease slightly as the well is continually developed.

E. The water level in the well was not significantly affected by either of the two injection tests. At the most a .05 ft. change in water level may be attributable to the injection tests.

Shallow Floridan Monitor Well

A. The water level varies with barometric pressure and tidal changes but normally stands about 4.3 feet above pad level.

B. Total dissolved solids concentration of the shallow monitor zone run were consistently measured in the 2,200 mg/l range.

C. There were no measurable changes of water level in the shallow monitor zone during or after the injection test.

D. Total dissolved solids concentrations may increase as the well is continually pumped.

RECOMMENDATIONS

A. An application for an operational permit for the injection well should be submitted to the FDER concurrently with or immediatly after the TAC receives this report.

B. A TAC meeting should be scheduled to discuss the operational permit timeframe, additional conditions the agencies may require for the permit, and the use of the well for injection under the existing construction permit.

C. The QA/QC plan outlined in the operation and maintenance manual and any additional reporting required by FDER should be strictly followed.

D. The plugging and abandonment plan should be adhered to in the case of well failure.

E. All of the collected cores should be given to the Florida Geological Survey for preservation and further study.

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LITHOLOGIC DESCRIPTIONS

APPENDICES

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LITHOLOGIC LOG OF TEST/INJECTION WELL

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
LITHOLOGIC DESCRIPTIONS

DEPTH	THICKNESS

UNDIFFERENTIATED DEPOSITS AND ANASTASIA FORMATION

0 - 10	10

SANDY SOIL, olive gray (5 Y 4/1), intergranular porosity, quartz sand- (50%), very fine to fine grained, angular to subangular grains, organics (30%), shell fragments (5%), unconsolidated.

10 - 20	10

SAND, light olive gray (5 Y 5/2), intergranular porosity, very fine to medium grained, angular to subrounded, clear quartz grains, unconsolidated.

20 - 30	10

SAND, light olive gray (5 Y 5/2), intergranular porosity, very fine to medium grained, subangular to subrounded, unconsolidated.

30 - 50	20

SAND, light olive gray (5 Y 5/2), intergranular porosity, fine to medium grained, angular to subrounded, shell fragments, unconsolidated.

50 - 60	10

SAND and SHELL, light olive gray (5 Y 5/2), intergranular porosity, fine to medium grained, subrounded, abundant shell fragments (50%), unconsolidated.

TAMIAMI FORMATION

60 - 70	10

SANDY LIMESTONE, light olive gray (5 Y 6/1), intergranular porosity, fine grained, poor induration with sparry calcite cement, shell fragments.

70 - 80	10

SANDY LIMESTONE, light olive gray (5 Y 6/1), intergranular and moldic porosity, fine to medium grained sand (20%), poor to moderate induration with micrite and sparry calcite cement, phosphatic shell fragments.

80 - 90 10

LIMESTONE, light olive gray (5 Y 6/1), as above, with increase in shell content.

90 - 100 10

LIMESTONE, light olive gray (5 Y 5/2), moldic and intergranular porosity, grain type is micrite and shell, fine to medium grained, moderate induration with micrite and sparry calcite cement, large shell fragments, sand (5%).

100 - 110 10

LIMESTONE and PHOSPHATIC SILT, light olive gray (5 Y 5/2), intergranular and moldic porosity, fine to medium grained, moderate induration with micrite and sparry calcite cement, phosphatic clay (5%), some shell fragments.

HAWTHORN GROUP

110 - 120 10

CLAYEY PHOSPHATIC SILT (70%) and LIMESTONE (30%), olive gray (5 Y 3/2), very fine grained, poor induration with micrite and some sparry calcite cement, very fine shell fragments, fine grained sand (<5%).

120 - 130 10

CLAYEY PHOSPHATIC SILT and LIMESTONE, olive gray (5 Y 3/2), as above.

130 - 140 10

PHOSPHATIC SILT, olive gray (5 Y 4/1), no visible porosity, possibly low permeability, poor induration with micrite matrix, very fine to coarse grained phosphate (10%), shell fragments, mollusks, sand (trace).

140 - 146 6

PHOSPHATIC SILT, olive gray (5 Y 4/1), as above.

146 - 149 3

LIMESTONE, dark gray (N9), intergranular and moldic porosity, grain type is micrite, biogenic and crystal, good induration with micrite and sparry calcite cement, hard.

OCALA GROUP

149 - 160 11

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), moldic and intergranular porosity, grain type is micrite, biogenic and skeletal, 60% allochems, moderate to poor induration with micrite and some sparry calcite cement, abundant foraminifera including Lepidocyclina sp. and Operculinoides sp.

160 - 170 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above.

170 - 180 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) to yellowish gray (5 Y 7/2), grain type is micrite, biogenic and skeletal, 60% allochems, poor induration with micrite and sparry calcite cement, many Operculinoides sp. and Lepidocyclina sp., micritic, soft, easy drilling.

180 - 190 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above, recirculated sand and fines from up hole.

190 - 230 40

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above, poor sample.

230 - 240 10

LIMESTONE, yellowish gray (5 Y 7/2), intercrystalline and moldic porosity, 20% allochems, poor to moderate induration with micrite and sparry calcite cement, forams.

240 - 250 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and crystal, 5% allochems, poor to moderate induration with micrite and sparry calcite cement.

AVON PARK / LAKE CITY LIMESTONE

250 - 260 10

LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline and intergranular porosity, grain type is micrite, biogenic and skeletal, 15% allochems, microcrystalline to fine grained, poor to moderate induration with micrite matrix, benthic foraminifera including Dictyoconus sp.

260 - 270 10

LIMESTONE, white (N 9) to pinkish gray (5 YR 8/1), intergranular and moldic porosity, grain type is micrite and skeletal, 15% allochems, microcrystalline to fine grained, poor to moderate induration with micrite and sparry calcite cement, medium grained, slightly frosted silica sand (10%), coarse grained phosphatic sand (2%), fossil fragments.

270 - 280 10

FORAMINIFEROUS LIMESTONE, pinkish gray (5 YR 8/1), intergranular and moldic porosity, grain type is micrite, skeletal and biogenic, 35% allochems, microcrystalline to medium grained, poor to moderate induration with micrite and sparry calcite cement, silica sand cavings (10%), phosphate (2%), benthic foraminifera including Dictyoconus cookei, Coskinolina sp., and unidentifiable forams.

280 - 290 10

LIMESTONE, pinkish gray (5 YR 8/1), intergranular and moldic porosity, grain type is micrite, skeletal and biogenic, 25% allochems, microcrystalline to very fine grained, moderate induration with micrite and sparry calcite cement, abundant foraminifera including Dictyoconus sp., echinoid spines, silica sand cavings (<5%).

290 - 300 10

LIMESTONE, pinkish gray (5 YR 8/1), as above.

300 - 310 10

FORAMINIFEROUS LIMESTONE and CALCAREOUS SILT, very pale orange (10 YR 8/2) to light olive gray (5 Y 6/1), intergranular and moldic porosity, 60% allochems, grain type is micrite, skeletal and biogenic, poor induration with micrite matrix, many forams.

310 - 330 20

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal, 15% allochems, microcrystalline, moderate induration with sparry calcite cement, forams, sand cavings in sample.

430 -440 10

LIMESTONE, yellowish gray (5 Y 8/1) to very light gray (N 8), moldic and intergranular porosity, grain type is biogenic, 25% allochems, moderate induration with sparry calcite cement, forams.

440 - 460 20

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is skeletal and biogenic, 30% allochems, moderate induration with sparry calcite cement, Limestone- light gray (N 8), 7% of sample, very fine grained calcite crystals, forams, cones.

460 - 470 10

LIMESTONE, pale yellowish brown (10 YR 6/2) and DOLOMITE, intercrystalline, intergranular and moldic porosity, grain type is crystal and skeletal, moderate induration with dolomite and sparry calcite cement, dolomite- medium alteration with medium grained subhedral crystals.

470 - 490 20

LIMESTONE, yellowish gray (5 Y 7/2), intercrystalline and moldic porosity, grain type is crystal and biogenic, moderate to good induration with sparry calcite and dolomite cement.

490 - 500 10

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2), intercrystalline, intergranular and moldic porosity, grain type is crystal and skeletal, 20% allochems, microcrystalline to very fine grained subhedral crystals, moderate induration with sparry calcite cement.

500 - 510 10

DOLOMITIC LIMESTONE, medium gray (N 5) to brownish gray (5 YR 4/1), intercrystalline and intergranular porosity, moderate induration with sparry calcite and dolomite cement.

510 - 520 10

LIMESTONE, very pale orange (10 YR 8/2) to yellowish gray (5 Y 8/1), intergranular porosity, 20% allochems, grain type is micrite, intraclast and biogenic, microcrystalline, moderate induration with micrite and some sparry calcite cement, forams, calcite crystals.

330 - 350 20

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is micrite, skeletal and biogenic, 15% allochems, microcrystalline to very fine grained, moderate induration with micrite and sparry calcite cement, forams.

350 - 360 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, 45% allochems, grain type is micrite and skeletal, moderate induration with micrite and sparry calcite cement, Dictyoconus sp., abundant foraminifera.

360 - 380 20

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is micrite and biogenic, 15% allochems, microcrystalline to very fine grained, moderate induration with micrite and sparry calcite cement, fossil fragments, forams, silica sand cavings.

380 - 390 10

LIMESTONE, yellowish gray (5 Y 8/1), as above.

390 - 400 10

LIMESTONE, yellowish gray (5 Y 8/1), moldic and intergranular porosity, grain type is micrite, biogenic and skeletal, 15% allochems moderate induration with micrite and sparry calcite cement, bryozoans, cones, Limestone- light gray (N 8), 7% of sample.

400 - 420 20

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is skeletal and biogenic, 45% allochems, moderate induration with micrite and sparry calcite cement, Limestone- light gray (N 8), 10% of sample.

420 - 430 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is skeletal, biogenic and micrite, 15% allochems, moderate induration with micrite and sparry calcite cement, benthic forams including Coskinolina sp.

520 - 530 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, microcrystalline to fine grained, 10% allochems, poor to moderate induration with sparry calcite cement.

530 - 540 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, 10% allochems, fine to medium grained, moderate induration with micrite and sparry calcite cement.

540 - 550 10

LIMESTONE, pale yellowish brown (10 YR 6/2), intergranular and moldic porosity, grain type is micrite and biogenic, microcrystalline to fine grained, poor to moderate induration with micrite and sparry calcite cement, chalky, Dictyoconus americanus.

550 - 560 10

LIMESTONE, very pale orange (10 YR 8/2) to light gray (N 7), intergranular, intercrystalline and moldic porosity, grain type is micrite and skeletal, fine to medium grained, moderate induration with sparry calcite cement. Dictyoconus americanus.

560 - 570 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite, very fine grained, moderate induration with micrite and sparry calcite cement.

570 - 580 10

LIMESTONE, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intergranular and moldic porosity, 5% allochems, fine grained, moderate induration with micrite and sparry calcite cement, Dictyoconus americanus.

580 - 590 10

LIMESTONE, very pale orange (10 YR 8/2) and DOLOMITE, pale yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, moderate to good induration with sparry calcite and dolomite cement, forams.

590 - 600 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intergranular, intercrystalline and moldic porosity, low alteration, moderate induration with dolomite and sparry calcite cement.

670 - 680 10

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1) to light gray (N 7), intergranular, moldic and intercrystalline porosity, microcrystalline to fine grained, moderate induration with micrite, dolomite and sparry calcite cement, forams.

680 - 690 10

DOLOMITE, pale yellowish brown (10 YR 6/2) and LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, intergranular and moldic porosity, 30% allochems, Dolomite - low alteration, moderately indurated, Limestone - micritic, dolomitic, poor to moderate induration with micrite and sparry calcite cement, cones.

690 - 710 20

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and skeletal, 10% allochems, microcrystalline, poor to moderate induration with micrite and some sparry calcite cement, pure, clean limestone.

710 - 720 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and biogenic, 45% allochems, microcrystalline to very fine grained, moderate induration with micrite and sparry calcite cement, abundant forams, cones.

720 - 740 20

LIMESTONE, very pale orange (10 YR 8/2), intergranular, moldic and intercrystalline porosity, grain type is crystal and micrite, microcrystalline, 5% allochems, very fine subhedral dolomite crystals, moderate induration with micrite and sparry calcite cement.

740 - 760 20

LIMESTONE, yellowish gray (5 Y 7/2) to very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and skeletal, 5% allochems, moderate induration with micrite and sparry calcite cement, slightly dolomitic.

760 - 770 10

LIMESTONE, yellowish gray (5 Y 7/2) to grayish yellow (5 Y 8/4), as above.

600 - 610 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and moldic porosity, medium alteration, microcrystalline, moderate to good induration with dolomite cement.

610 - 620 10

DOLOMITE (50%), dark yellowish brown (10 YR 4/2) and LIMESTONE (50%), very light gray (N 8), intergranular, moldic and intercrystalline porosity, fine grained, moderate to good induration with dolomite and sparry calcite cement, forams.

620 - 630 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intergranular, moldic and intercrystalline porosity, low alteration, microcrystalline to fine grained crystals, moderate induration with sparry calcite and dolomite cement.

630 - 640 10

DOLOMITIC LIMESTONE, moderate yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, grain type is crystal and micrite, fine grained, moderate to good induration with sparry calcite and dolomite cement.

640 - 650 10

DOLOMITE (50%), pale yellowish brown (10 YR 6/2) and LIMESTONE (50%), yellowish gray (5 Y 8/1), intergranular and moldic porosity, 15% allochems, microcrystalline to fine grained, poor to moderate induration with micrite, sparry calcite and dolomite cement, benthic foraminifera including Dictyoconus americanus.

650 - 660 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to olive gray (5 Y 4/1), intercrystalline and moldic porosity, very fine grained subhedral crystals, low alteration, moderate induration with dolomite and sparry calcite cement.

660 -670 10

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2), intergranular, moldic and intercrystalline porosity, microcrystalline to fine grained, moderate induration with micrite, sparry calcite and dolomite cement.

770 - 790 20

LIMESTONE, yellowish gray (5 Y 7/2), intergranular porosity, grain type is micrite, 15% allochems, microcrystalline, moderate induration with micrite and sparry calcite cement, lignite veins, slightly dolomitic.

790 - 800 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is biogenic and skeletal, 50% allochems, microcrystalline to fine grained, moderate induration with micrite and sparry calcite cement.

800 - 830 30

LIMESTONE, pale yellowish brown (10 YR 6/2), intergranular and moldic porosity, grain type is skeletal and biogenic, 40% allochems, microcrystalline to very fine grained, moderate induration with sparry calcite cement.

830 - 840 10

DOLOMITE (40%), dark yellowish brown (10 YR 4/2) and LIMESTONE (60%), pale yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, grain type is crystal and skeletal, 10% allochems, moderate induration with sparry calcite and dolomite cement, dolomite - low alteration.

840 - 850 10

LIMESTONE, dark yellowish brown (10 YR 4/2), intergranular and moldic porosity, grain type is skeletal and micrite, 30% allochems, moderate induration with sparry calcite cement, slightly dolomitic.

850 - 860 10

FORAMINIFEROUS LIMESTONE, grayish orange (10 YR 7/4), intergranular and moldic porosity, grain type is skeletal, biogenic and micrite, 60% allochems, poor to moderate induration with micrite and sparry calcite cement, abundant foraminifera.

860 - 870 10

LIMESTONE, grayish orange (10 YR 7/4), intergranular and moldic porosity, grain type is skeletal, biogenic and crystal, 45% allochems, microcrystalline to fine grained, moderate induration with micrite and sparry calcite cement, slightly dolomitic.

870 - 880 10

DOLOMITE (50%), pale yellowish brown (10 YR 6.2) to dark yellowish brown (10 YR 4/2) and LIMESTONE (50%), very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, moderate to good induration with micrite and sparry calcite cement.

880 - 890 10

DOLOMITE (50%), pale yellowish brown (10 YR 6/2) and LIMESTONE (50%), very pale orange (10 YR 8/2), as above.

890 - 900 10

DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, grain type is crystal and skeletal, 50% allochems, poor to moderate induration with micrite and sparry calcite cement.

900 - 910 10

DOLOMITE (90%), yellowish gray (5 Y 8/1) and LIMESTONE (10%), very pale orange (10 YR 8/2), intercrystalline and vugular porosity, 5% allochems, moderate induration with sparry calcite and dolomite cement, hard formation.

910 - 920 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal and biogenic, 35% allochems, very fine to fine grained, moderate induration with micrite and sparry calcite cement, slightly dolomitic.

920 - 930 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and moldic porosity, low alteration, moderate to good induration with sparry calcite and dolomite cement.

930 - 940 10

LIMESTONE, yellowish gray (5 Y 8/1) and DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline, intergranular and moldic porosity, grain type is skeletal, 20% allochems, microcrystalline to very fine grained, moderate induration with sparry calcite and dolomite cement, forams, lignite veins.

940 - 950 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to moderate yellowish brown (10 YR 5/4), intercrystalline, moldic and vugular porosity, low to medium alteration, moderate induration with sparry calcite and dolomite cement, forams.

950 - 960 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, low to medium alteration, good induration with sparry calcite and dolomite cement, hard formation.

960 - 970 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium to high alteration, moderate induration with dolomite cement.

970 - 980 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), as above.

980 - 1000 20

CALCAREOUS DOLOMITE, pale yellowish brown (10 YR 6/2) to moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, microcrystalline, good induration with sparry calcite and dolomite cement, hard formation, lignite veins.

1000 - 1010 10

DOLOMITIC LIMESTONE, moderate yellowish brown (10 YR 5/4), intercrystalline and intergranular porosity, grain type is crystal, 20% allochems, microcrystalline to medium grained euhedral crystals, moderate induration with sparry calcite and dolomite cement.

1010 -1020 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, moderate to good induration with dolomite cement.

1020 -1040 20

DOLOMITIC LIMESTONE, moderate yellowish brown (10 YR 5/4), intercrystalline, intergranular and moldic porosity, 7% allochems, microcrystalline to fine grained, moderate induration with sparry calcite cement, fossil molds in sample.

1040 - 1060 20

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2), moldic, intergranular and intercrystalline porosity, grain type is crystal and skeletal, low alteration, moderate induration with sparry calcite and dolomite cement.

1060 - 1070 10

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2), as above with lignite.

1070 -1080 10

DOLOMITIC LIMESTONE, grayish orange (10 YR 7/4), intercrystalline, intergranular and moldic porosity, grain type is crystal, <5% allochems, microcrystalline to medium grained subhedral dolomite crystals, moderate induration with sparry calcite and dolomite cement, many fossil molds.

1080 -1090 10

DOLOMITIC LIMESTONE, moderate yellowish brown (10 YR 5/4), as above.

1090 - 1110 20

CALCAREOUS DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline, moldic and vugular porosity. fine to medium grained, moderate induration with sparry calcite and dolomite cement, limestone (5%).

1110 - 1120 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, moderate to good induration with dolomite cement.

1120 - 1130 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline and vugular porosity, medium alteration, good induration with sparry calcite and dolomite cement, dense, hard formation.

1130 - 1140 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline, moldic and vugular porosity, medium alteration, good induration with dolomite cement.

1140 - 1150 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline, moldic and vugular porosity, low alteration, microcrystalline to medium grained crystals, moderate induration with dolomite cement, sucrosic texture.

1150 - 1160 10

LIMESTONE, light bluish gray (5 B 7/1) to medium bluish gray (5 B 5/1), intercrystalline and moldic porosity, microcrystalline, good induration with sparry calcite cement, 5% dolomite in sample, hard formation.

1160 - 1170 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, good induration with dolomite cement, hard formation, limestone in sample, possibly cavings.

1170 - 1180 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline and moldic porosity, medium alteration, moderate to good induration with dolomite cement, hard formation.

1180 - 1190 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline, moldic and vugular porosity, medium alteration, moderate induration with dolomite cement.

1190 - 1200 10

DOLOMITE and LIMESTONE, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intercrystalline and moldic porosity, fine to medium grained, moderate to good induration with sparry calcite, micrite and dolomite cement.

1200 - 1210 10

DOLOMITE, dusky yellowish brown (10 YR 2/2) to moderate brown (5 YR 3/4), moldic and intercrystalline porosity, medium alteration, moderate induration with dolomite cement.

1210 - 1230 20

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite, skeletal and intraclast, 70% allochems, very fine grained, moderate induration with sparry calcite cement, many forams, pellets, foram tests appear to be reworked.

1330 - 1340 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, fine to medium grained subhedral crystals, moderate induration with dolomite cement, sucrosic.

1340 - 1350 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, medium alteration, microcrystalline, good induration with dolomite cement, limestone cavings in sample, hard formation.

1350 - 1360 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, moderate alteration, very fine grained crystals, good induration with dolomite cement, very dense.

1360 - 1370 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, microcrystalline, good induration with dolomite cement.

1370 - 1380 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular porosity, 40% allochems, fine to medium grained, poor to moderate induration with micrite and some sparry calcite cement, forams, some dolomite in sample.

1380 - 1390 10

DOLOMITE (50%), moderate yellowish brown (10 YR 5/4) and LIMESTONE (50%), yellowish gray (5 Y 8/1), moldic, vugular and intergranular porosity, grain type is crystal, skeletal, micrite and intraclast, 30% allochems, very fine to medium grained, moderate induration with dolomite, sparry calcite and micrite cement.

1390 - 1400 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, low to medium alteration, microcrystalline to medium grained subhedral crystals, moderate to good induration with dolomite cement.

1230 - 1240 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite, skeletal and intraclast, 80% allochems, moderate induration with micrite and sparry calcite cement.

1240 - 1250 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), moldic and intergranular porosity, grain type is skeletal and biogenic, 50% allochems, microcrystalline to medium grained, poor induration with micrite and sparry calcite cement, abundant forams.

1250 - 1270 20

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite, skeletal and biogenic, 65% allochems, microcrystalline to fine grained, poor induration with micrite matrix, unfossiliferous.

1270 - 1290 20

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite, skeletal and biogenic, 65% allochems, microcrystalline to fine grained, poor induration with micrite and sparry calcite cement.

1290 - 1300 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline porosity, medium alteration, medium grained subhedral crystals, moderate induration with dolomite cement.

1300 - 1310 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intergranular porosity, medium alteration, microcrystalline, moderate induration with dolomite cement, dense.

1310 - 1320 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline porosity, medium alteration, very fine to fine grained subhedral crystals, moderate induration with dolomite cement.

1320 - 1330 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), as above.

1400 - 1410 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), as above.

1410 - 1420 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline porosity, medium to coarse grained euhedral crystals, poor to moderate induration with dolomite cement, sucrosic.

1420 - 1430 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline and moldic porosity, microcrystalline to fine grained, good induration, dolomite cement.

1430 - 1440 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to moderate yellowish brown (10 YR 5/4), as above.

1440 - 1450 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, moderate to good induration with dolomite cement.

1450 - 1460 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline and vugular porosity, medium alteration, microcrystalline, good induration with dolomite cement.

1460 - 1470 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), as above.

1470 - 1480 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline and intracrystalline porosity, microcrystalline, good induration with dolomite cement, dense, low permeability.

1480 - 1490 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, low alteration, microcrystalline to fine grained subhedral crystals, moderate induration with dolomite cement.

1490 - 1500 10

DOLOMITE and DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2) to very pale orange (10 YR 8/2), intercrystalline, moldic and vugular porosity, microcrystalline to medium grained, good induration with dolomite and sparry calcite cement, cherty.

1500 - 1510 10

DOLOMITE, dusky yellowish brown (10 YR 2/2) and LIMESTONE, very pale orange (10 YR 8/2), intercrystalline, intergranular and moldic porosity, high alteration, poor to good induration with micrite and dolomite cement.

1510 - 1520 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline porosity, moderate induration with dolomite cement.

1520 - 1530 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline, vugular and moldic porosity, microcrystalline, medium alteration, good induration with dolomite cement, chert, limestone (10%). Core #1: 1520'-1530'.

1530 - 1540 10

DOLOMITE, pale yellowish brown (10 YR 6/2) and LIMESTONE, very pale orange (10 YR 8/2), intercrystalline and intergranular porosity, grain type is skeletal and micrite, microcrystalline with fine grained dolomite crystals, moderate induration with micrite and dolomite cement.

1540 - 1550 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and moldic porosity, as above with chert.

1550 - 1560 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium alteration, microcrystalline to medium grained subhedral crystals, moderate to good induration with dolomite cement.

1560 - 1570 10

DOLOMITE, pale yellowish brown (10 YR 6/2) and LIMESTONE, very pale orange (10 YR 8/2), intercrystalline and intergranular porosity, microcrystalline to very fine grained, poor to good induration with micrite and dolomite cement.

1570 - 1580 10

DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2), intergranular porosity, microcrystalline to very fine grained, moderate induration with micrite cement, unfossiliferous.

1580 - 1590 10

DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2), as above.

1590 - 1600 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline porosity, low to medium alteration, microcrystalline to fine grained euhedral crystals, moderate induration with dolomite cement.

1600 - 1620 20

DOLOMITE, pale yellowish brown (10 YR 6/2) and LIMESTONE, dark yellowish orange (10 YR 6/6), intercrystalline and intergranular porosity, microcrystalline to very fine grained, poor to good induration with micrite and dolomite cement.

1620 - 1640 20

DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2), intercrystalline and intergranular porosity, grain type is micrite and crystal, microcrystalline with medium grained subhedral crystals, moderate induration with micrite matrix, dolomite interbeds, chert, lignite veins, evaporites.
Core #2: 1624'-1639'.

1640 - 1650 10

DOLOMITIC LIMESTONE (90%), yellowish gray (5 Y 7/2) and DOLOMITE (10%), pale yellowish brown (10 YR 6/2), intergranular and intercrystalline porosity, very fine grained, moderate induration with micrite and sparry calcite cement.

1650 - 1660 10

LIMESTONE, yellowish gray (5 Y 7/2), intergranular and intercrystalline porosity, 10% allochems, very fine grained, moderate induration with micrite and sparry calcite cement, DOLOMITE - interbeds (less than 3" in thickness) pale yellowish brown (10 YR 6/2), high alteration, dense.

1660 - 1670 10

LIMESTONE, yellowish gray (5 Y 7/2), intergranular porosity, grain type is micrite and crystal, <5% allochems, microcrystalline to very fine grained, moderate induration with sparry calcite cement, unfossiliferous, Evaporites (<5%).

1670 - 1690 20

LIMESTONE, yellowish gray (5 Y 7/2), intergranular porosity, grain type is micrite, <5% allochems, microcrystalline, poor to moderate induration with micrite and some sparry calcite cement, unfossiliferous, chalky, DOLOMITE- interbeds, (less than 2' thick), dusky yellowish brown (10 YR 2/2), high alteration, microcrystalline.

<u>OLDSMAR LIMESTONE</u>

1690 - 1710 20

LIMESTONE, very pale orange (10 YR 8/2), intergranular and intercrystalline porosity, grain type is micrite and crystal, microcrystalline to very fine grained, chalky, micritic, DOLOMITE- interbeds, (less than 6" thick), pale yellowish brown (10 YR 6/2), intercrystalline porosity, high alteration, microcrystalline. CHERT- <5% of sample, medium dark gray (N 4), nodules.

1710 - 1720 10

DOLOMITE, pale yellowish brown (10 YR 6/2) and LIMESTONE, very pale orange (10 YR 8/2), intercrystalline, intergranular and vugular porosity, grain type is micrite and crystal, microcrystalline to very fine grained, moderate to good induration with micrite sparry calcite and dolomite cement, 40% micritic limestone (interbedded), unidentifiable foraminifera.

1720 - 1740 20

LIMESTONE, yellowish gray (5 Y 8/1) and DOLOMITE pale yellowish brown (10 YR 6/2), intergranular, moldic and intercrystalline porosity, grain type is micrite and crystal, 15% allochems, microcrystalline to very fine grained, moderate to good induration wit micrite, dolomite and sparry calcite cement, forams, 40% dolomite beds, pale yellowish brown (10 YR 6/2), high alteration, dense, CALCAREOUS CLAY- <5% of sample.

1740 - 1750 10

CRYSTALLINE LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, intergranular and moldic porosity, grain type is micrite and crystal, <5% allochems, microcrystalline to very fine grained, moderate to good induration with sparry calcite and micrite cement, micritic, dolomitic in sections.

1750 - 1770 20

CRYSTALLINE and DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline and intergranular porosity, grain type is micrite, crystal, intraclast and skeletal, 10% allochems, microcrystalline to very fine grained, moderate induration with micrite and sparry calcite cement, forams, lignite veins, CHERT- <5% of section, light gray (N 7), cryptocrystalline.
Core #3: 1755'-1770'.

1770 - 1780 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, moldic and intergranular porosity, grain type is crystal, biogenic and micrite, microcrystalline to very fine grained, moderate induration with sparry calcite and dolomite cement, foram tests including Helicostigina gyralis, molds and casts, lignite veins.

1780 - 1790 10

FORAMINIFEROUS LIMESTONE, DOLOMITIC LIMESTONE and CALCAREOUS CLAY, yellowish gray (5 Y 8/1), intercrystalline, intergranular and moldic porosity, grain type is micrite, crystal and skeletal, 5% - 70% allochems, microcrystalline to medium grained, poor to good induration with micrite, sparry calcite and dolomite cement, calcareous clay (<10%), lignite veins.

1790 - 1800 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic, intercrystalline and intergranular porosity, 50% allochems, grain type is biogenic, crystal, intraclast and micrite, microcrystalline to medium grained, moderate induration with sparry calcite and dolomite cement, coarse grained subhedral dolomite crystals, lignite veins, biosparite. Core #4: 1790'-1805'.

1800 - 1810 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, 10% allochems, very fine to medium grained, poor to moderate induration with micrite and sparry calcite cement.

1810 - 1820 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and intercrystalline porosity, 5% allochems, microcrystalline to very fine grained, moderate induration with sparry calcite cement.

1820 - 1830 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and intercrystalline porosity, microcrystalline to very fine grained, moderate to good induration with sparry calcite and dolomite cement.

1830 - 1840 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is biogenic, 55% allochems, microcrystalline to medium grained, moderate induration with sparry calcite cement, forams, molds. Core #5: 1835'-1846'.

1840 - 1860 20

LIMESTONE, yellowish gray (5 Y 8/1), as above, lignite veins in section.

1860 - 1870 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and biogenic, <10% allochems, microcrystalline to very fine grained, poor to moderate induration with micrite cement, chalky, forams.

1870 - 1880 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and biogenic, 60% allochems, microcrystalline to very fine grained, poor to moderate induration with micrite cement, chalky, abundant forams.

1880 - 1890 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and biogenic, 40% allochems, microcrystalline to medium grained, poor to moderate induration with micrite cement, chalky, forams.

1890 - 1900 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and biogenic, 30% allochems, microcrystalline to medium grained, poor to moderate induration with micrite cement, chalky, forams. Core #6: 1893'-1907'.

1900 - 1910 10

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, 15% allochems, microcrystalline to fine grained, moderate induration

with sparry calcite, dolomite and micrite cement.
Core #7: 1908'-1926'.

1910 - 1930 20

LIMESTONE, yellowish gray (5 Y 8/1) to pinkish gray (5 YR 8/1), intergranular, intercrystalline and moldic porosity, grain type is crystal, micrite and biogenic, moderate induration with sparry calcite, micrite and dolomite cement.

1930 - 1940 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, microcrystalline, medium to high alteration, good induration with dolomite cement.

1940 - 1950 10

DOLOMITE, dark yellowish brown (10 YR 4/2) and LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, moldic and intergranular porosity, grain type is micrite, crystal and biogenic, 5% allochems, microcrystalline to very fine grained, limestone is micritic.

1950 - 1960 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, medium to high alteration, good induration with dolomite cement.

1960 - 1970 10

LIMESTONE, very pale orange (10 YR 8/2) to yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is micrite and skeletal, 5% allochems, poor induration with micrite cement, chalky.

1970 - 1980 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2) and LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline and intergranular porosity, grain type is micrite and crystal, poor to good induration with micrite, sparry calcite and dolomite cement.

1980 - 1990 10

LIMESTONE and DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1), intergranular and intercrystalline porosity, grain type is micrite and crystal, microcrystalline to fine grained, moderate induration.

1990 -2014 24

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium to high alteration, moderate to good induration with micrite and dolomite cement.

2014 - 2020 6

DOLOMITE (70%), dark yellowish brown (10 YR 4/2) to pale yellowish brown (10 YR 6/2) and LIMESTONE (30%), very pale orange (10 YR 8/2), intercrystalline and moldic porosity, microcrystalline to fine grained, good induration with micrite and dolomite cement.

2020 - 2030 10

DOLOMITE (50%), pale yellowish brown (10 YR 6/2) and LIMESTONE (50%), very pale orange (10 YR 8/2), dolomite - intercrystalline porosity, medium alteration, microcrystalline, good induration with sparry calcite and dolomite cement, limestone - intergranular and moldic porosity, grain type is biogenic, skeletal and micrite, 10% allochems, medium grained, moderate induration with micrite and sparry calcite cement.

2030 - 2040 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to pale yellowish brown (10 YR 6/2), intercrystalline and moldic porosity, medium alteration, microcrystalline to fine grained, moderate induration with sparry calcite and dolomite cement.

2040 - 2050 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline porosity, high alteration, microcrystalline, good induration with dolomite cement.

2050 - 2060 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), as above.

2060 - 2070 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, high alteration microcrystalline to fine grained euhedral crystals, good induration with dolomite cement, tight.

2070 - 2080 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), as above.

2080 - 2090 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, high alteration, microcrystalline with fine grained euhedral crystals lining vugs, moderate induration with dolomite cement.

2090 - 2100 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline and moldic porosity, moderate to high alteration, microcrystalline, good induration with dolomite cement.

2100 - 2110 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, medium alteration, microcrystalline to fine grained euhedral crystals, moderate induration with dolomite cement.

2110 - 2120 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), as above.

2120 - 2130 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and moldic porosity, high alteration, microcrystalline with some medium grained euhedral crystals, good induration with dolomite cement.

2130 - 2140 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, high alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement.

2140 - 2150 10

DOLOMITE, duksky yellowish brown (10 YR 2/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement.

2150 - 2160 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), medium alteration, microcrystalline, moderate induration with dolomite cement.

2160 - 2170 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline and moldic porosity, medium alteration, microcrystalline to fine grained subhedral crystals, moderate to good indurartion with dolomite cement.

2170 - 2180 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), medium alteration, microcrystalline to fine grained euhedral crystals, moderate induration with dolomite cement.

2180 - 2190 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), as above.

2190 - 2200 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to moderate brown (5 YR 4/4), medium alteration, microcrystalline to very fine grained crystals, moderate induration with dolomite cement.

2200 - 2210 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, microcrystalline, good induration with dolomite cement.

2210 - 2220 10

DOLOMITE, dark yellowish brown (10 yr 4/2) to dusky yellowish brown (10 yr 2/2), intercrystalline porosity, high alteration, microcrystalline, good induration with dolomite cement.

2220 - 2230 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, high alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement.

2230 - 2240 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, medium to high alteration, microcrystalline to fine grained euhedral crystals, good induration with dolomite cement.

2240 - 2250 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), as above.

2250 - 2260 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, high alteration, very fine grained euhedral crystals, good induration with dolomite cement.

2260 - 2270 10

DOLOMITE, medium dark gray (N 4), intercrystalline and vugular porosity, high alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement.

2270 - 2280 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, medium alteration, microcrystalline, good induration with dolomite cement.

2280 - 2290 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate to good induration with sparry calcite and dolomite cement.

2290 - 2300 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate to good induration with dolomite cement.

2300 - 2310 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline porosity, high alteration, microcrystalline to fine grained subhedral crystals, good induration with dolomite cement.

2310 - 2320 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline porosity, high alteration, microcrystalline, good induration with dolomite cement.

2320 - 2330 10

DOLOMITE, dusky yellowish brown (10 YR 2/2), as above, lignite in sample.

2330 - 2340 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement.

2340 - 2350 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium alteration, microcrystalline, moderate induration with dolomite cement.

2350 - 2360 10

DOLOMITE, pale yellowish brown (10 YR 6/2), as above.

2360 - 2370 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement.

2370 - 2380 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium alteration, microcrystalline to vey fine grained subhedral crystals, moderate induration with dolomite cement.

2380 - 2390 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement.

2390 - 2400 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), as above.

2400 - 2410 10

DOLOMITE, pale yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement, lignite veins.

2410 - 2420 10

DOLOMITE, light olive gray (5 Y 5/2), intercrystalline and vugular porosity, low alteration, fine grained subhedral crystals, moderate induration with dolomite cement.

2420 - 2430 10

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, low alteration, microcrystalline to fine grained crystals, moderate induration with dolomite cement.

2430 - 2440 10

DOLOMITE, olive gray (5 Y 3/2), intercrystalline porosity, high alteration, very fine grained euhedral crystals, good induration with dolomite cement.

2440 - 2450 10

DOLOMITE, dusky yellowish brown (10 YR 2/2) to light olive gray (5 Y 5/2), intercrystalline and vugular porosity, medium to high alteration, microcrystalline, good induration with dolomite cement.

2450 - 2460 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium alteration, very fine to fine grained euhedral crystals, moderate alteration with dolomite cement.

2460 - 2470 10

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement.

2470 - 2480 10

DOLOMITE, light olive gray (5 Y 6/1), as above.

2480 - 2490 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement.

2490 - 2500 10

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, moderate induration with dolomite cement.

2500 - 2510 10

DOLOMITE, light olive gray (5 Y 6/1), as above.

2510 - 2520 10

DOLOMITE, medium light gray (N 6), intercrystalline porosity, medium alteration, microcrystalline, moderate induration with dolomite cement.

2520 - 2530 10

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline porosity, high alteration, microcrystalline to very fine grained crystals, good induration with dolomite cement.

2530 - 2540 10

DOLOMITE, light olive gray (5 Y 6/1) to medium dark gray (N 4), intercrystalline porosity, medium to high alteration, microcrystalline, moderate to good induration with dolomite cement.

2540 - 2550 10

DOLOMITE, light gray (N 7), intercrystalline porosity, high alteration, microcrystalline to fine grained euhedral crystals, good induration with dolomite cement.

2550 - 2560 10

DOLOMITIC LIMESTONE, light gray (N 7), intergranular, intercrystalline and moldic porosity, 15% allochems, grain type is crystal and micrite, microcrystalline to fine grained, moderate induration with micrite and dolomite cement.

2560 - 2570 10

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and moldic porosity, microcrystalline to coarse grained crystals, moderate induration with micrite and dolomite cement.

2570 - 2580 10

DOLOMITE, yellowish gray (5 Y 8/1), intercrystalline and moldic porosity, medium alteration, microcrystalline to coarse grained subhedral crystals, moderate induration with dolomite cement.

2580 - 2590 10

DOLOMITE, light olive gray (5 Y 6/1), as above.

2590 - 2600 10

LIMESTONE (70%), medium light gray (N 6) and DOLOMITE (30%), pale yellowish brown (10 YR 6/2), intercrystalline, intergranular and moldic porosity, grain type is crystal and micrite, fine to medium grained, moderate induration with micrite and dolomite cement.

2600 - 2610 10

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1), intergranular and intercrystalline porosity, grain type is micrite and crystal, microcrystalline to fine grained, poor induration with micrite and dolomite cement.

2610 - 2620 10

LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline and intergranular porosity, grain type is micrite, and crystal, 30% allochems, microcrystalline to fine grained, moderate induration with micrite and dolomite cement.

2620 - 2630 10

LIMESTONE (50%), yellowish gray (5 Y 8/1) and DOLOMITIC LIMESTONE (50%), light olive gray (5 Y 6/1), moldic, intergranular and intercrystalline porosity, 30% allochems, very fine to fine grained, moderate induration with micrite and dolomite cement.

2630 - 2640 10

LIMESTONE (50%), yellowish gray (5 Y 8/1) and DOLOMITE (50%), olive gray (5 Y 4/1), Limestone- as above, Dolomite- intercrystalline porosity, very fine grained euhedral crystals, good induration with dolomite cement.

2640 - 2650 10

LIMESTONE, light gray (N 7) to medium light gray (N 6), intergranular and moldic porosity, grain type is micrite and crystal, microcrystalline to fine grained, poor induration with micrite and sparry calcite cement.

2650 - 2660 10

DOLOMITE (80%), light gray (N7) and LIMESTONE (20%), very pale orange (10 YR 8/2), Dolomite- intercrystalline porosity, high alteration, microcrystalline, good induration with dolomite cement, Limestone- intergranular and moldic porosity, grain type is micrite and crystal, 20% allochems, microcrystalline to fine grained, poor induration with micrite and sparry calcite cement.

2660 - 2670 10

LIMESTONE (60%), very pale orange (10 YR 8/2) and DOLOMITE (40%), light gray (N 7), Limestone- intergranular and moldic porosity, grain type is micrite and crystal, 35% allochems, very fine to fine grained, moderate induration with micrite, sparry calcite and dolomite cement, Dolomite- intercrystalline porosity, high alteration, microcrystalline, moderate induration with sparry calcite and dolomite cement.

2670 - 2680 10

LIMESTONE (40%), medium light gray (N 8), DOLOMITE (30%), pale yellowish brown (10 YR 6/2) and GYPSUM (30%), very light gray (N 8), Limestone- intergranular and moldic porosity, grain type is micrite and crystal, microcrystalline to very fine grained, good induration with micrite and sparry calcite cement, Dolomite- intercrystalline porosity, low alteration, very fine grained euhedral crystals, moderate induration with dolomite cement, Gypsum- crystalline to fibrous prismatic crystals.

2680 - 2690 10

DOLOMITE (40%), pale yellowish brown (10 YR 6/2) and LIMESTONE (40%), medium light gray (N 6) and GYPSUM (20%), very light gray (N 8), intergranular, intercrystalline and moldic porosity, Dolomite - low alteration, medium grained subhedral crystals, poor induration wikth dolomite cement, Limestone- grain type is micrite and crystal, microcrystalline, moderate induration with micrite and dolomite cement, Gypsum- as above, lignite veins.

2690 - 2700 10

LIMESTONE (70%), medium light gray (N 6) and DOLOMITE (30%), pale yellowish brown (10 YR 6/2), Limestone- intergranular, intercrystalline and moldic porosity, grain type is micrite, crystal, 50% allochems, microcrystalline to very fine grained, moderate induration with micrite and dolomite cement, Dolomite- low alteration, fine grained subhedral crystals, moderate induration with dolomite cement.

2700 - 2710 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and moldic porosity, low alteration, very fine to fine grained subhedral crystals, moderate induration with dolomite cement, lignite veins.

2710 - 2720 10

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline porosity, medium alteration, microcrystalline to very fine grained subhedral crystals, moderate induration with dolomite cement.

LITHOLOGIC LOG OF DEEP FLORIDAN MONITOR WELL

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
LITHOLOGIC DESCRIPTIONS

UNDIFFERENTIATED DEPOSITS AND ANASTASIA FORMATION

DEPTH	THICKNESS
0 - 10	10

SANDY SOIL, olive gray (5 Y 4/1), intergranular porosity, quartz sand- (50%), very fine to fine grained, angular to subangular grains, organics (30%), shell fragments (5%), unconsolidated.

10 - 20 10

SAND, light olive gray (5 Y 5/2), intergranular porosity, very fine to medium grained, angular to subrounded, clear quartz grains, unconsolidated.

20 - 30 10

SAND, light olive gray (5 Y 5/2) intergranular porosity. very fine to medium grained, angular to subrounded, clear quartz grains, phosphate (trace), shell (trace).

30 - 40 10

SAND, light olive gray (5 Y 5/2), as above, with shell fragments.

40 - 50 10

SAND AND SHELL, sand, light olive gray (5 Y 5/2), intergranular porosity, very fine to fine shell fragments (30%), unconsolidated.

50 - 60 10

LIMESTONE, light olive gray (5 Y 6/1), intergranular and moldic porosity, poor to moderate induration with sparry calcite and micrite cement, cemented shell fragments, coral, echinoid spines, etc.

TAMIAMI FORMATION

60 - 70 10

SANDY LIMESTONE, light olive gray (5 Y 6/1), intergranular and moldic porosity, poor to good induration, quartz sand (40%), subrounded, cemented, fine to coarse grained, phosphatic, shell fragments as noted above.

70 - 80 10

SANDY LIMESTONE, light olive gray (5 Y 6/1), as above.

80 - 90 10

SANDY LIMESTONE and CLAY, yellowish gray (5 Y 7/2) to light olive gray (5 Y 5/2), poor to moderate induration, shell fragments, limestone fragments, phosphatic, clay (5%).

90 - 100 10

PHOSPHATIC LIMESTONE and CLAY, light olive gray (5 Y 5/2), poor induration, marl, large shell fragments, very fine phosphatic sand (7%), fossil molds, clay (10%), sand (10%), shell fragments.

100 - 110 10

PHOSPHATIC LIMESTONE and CLAY, light olive gray (5 Y 5/2), as above, poorly indurated.

HAWTHORN GROUP

110 - 120 10

CLAYEY PHOSPHATIC SILT, pale olive (10 Y 6/2) to light olive gray (5 Y 5/2), poorly indurated, limestone fragments, very fine grained phosphatic sand, fine shell fragments.

120 - 130 10

CLAYEY PHOSPHATIC SILT, pale olive (10 Y 6/2) to light olive gray (5 Y 5/2), increase in limestone.

130 - 140 10

LIMESTONE and SILTY CLAY, light olive gray (5 Y 5/2), poor to moderate induration, very fine to coarse grained phosphate (15%), shell fragments, shell molds and casts, quartz sand (trace).

OCALA GROUP

140 - 150 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) to yellowish gray (5 Y 7/2), moldic, intergranular and intercrystalline porosity, 30% allochems, poor to moderate induration with micrite and sparry calcite cement, benthonic foraminifera including Lepidocyclina sp. and Operculinoides sp., phosphate, large quantities of cement in sample.

150 - 160 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) to yellowish gray (5 Y 7/2), moldic and intergranular porosity, 55% allochems, moderate induration with micrite and some sparry calcite cement, abundant larger foraminifera, Operculinoides sp. and Lepidocyclina sp., grainy, coral formation, micritic, echinoid spines.

160 - 170 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic porosity, moderate induration with micrite and sparry calcite cement, abundant forams including Gypsina globula, echinoid spines, shell fragments.

170 - 180

LIMESTONE, yellowish gray (5 Y 7/2) to very light gray (N8), as above.

180 - 190 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic porosity, possibly moderate to good permeability, 60% allochems, moderate induration with sparry calcite cement, soft formation.

190 - 200 10

LIMESTONE, yellowish gray (5 Y 7/2), intergranular and moldic porosity, 50% allochems, poor to moderate induration with sparry calcite and micrite cement.

200 -210 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2) to light gray (N7), intergranular and moldic porosity, 60% allochems, poor to moderate induration with micrite and sparry calcite cement, abundant forams, shell fragments.

210 -220 10

FORAMINIFEROUS LIMESTONE and CALCAREOUS CLAY (20% of sample), yellowish gray (5 Y 7/2) to light gray (N7), intergranular and moldic porosity, 45% allochems, moderate induration with sparry calcite cement, forams, echinoids.

220 - 230 10

LIMESTONE, yellowish gray (5 Y 7/2), intercrystalline and moldic porosity, 35% allochems, moderate induration with sparry calcite cement, many Ocala forams.

230 - 240 10

LIMESTONE, yellowish gray (5 Y 7/2), as above.

240 - 250 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular porosity, grain type is micrite, 5% allochems, moderate induration with micrite and some sparry calcite cement, unfossiliferous.

AVON PARK / LAKE CITY LIMESTONE

250 - 260 10

LIMESTONE and DOLOMITIC LIMESTONE (40% of sample), very pale orange (10 YR 8/2), intergranular porosity, grain type is micrite, 5% allochems, moderate induration with micrite and some sparry calcite cement, dolomitic.

260 - 270 10

LIMESTONE AND DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and crystal, microcrystalline to fine grained, moderate induration with micrite and sparry calcite cement, sample mixed with cement.

270 -280 10

LIMESTONE AND DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2), as above.

280 - 290 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and biogenic, 10% allochems, microcrystalline, well indurated with micrite and sparry calcite cement, cement cavings in sample.

290 - 300 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is biogenic and micrite, 15% allochems, microcrystalline, moderately indurated with micrite and sparry calcite cement.

300 - 310 10

LIMESTONE, white (N9) to very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is crystal and biogenic, 15% allochems, microcrystalline, well indurated with sparry calcite cement, forams including Dictyoconus cookei.

310 - 320 10

LIMESTONE, very pale orange (10 YR 8/2) to very light gray (N8), intergranular and moldic porosity, grain type is micrite and biogenic, 15% allochems, microcrystalline, good induration with micrite and sparry calcite cement, forams.

320 - 330 10

LIMESTONE and DOLOMITIC LIMESTONE, pinkish gray (5 Y 8/1), moldic porosity, 15% allochems, microcrystalline with fine grained subhedral dolomite crystals, good induration with sparry calcite and dolomite cement.

330 - 340 10

LIMESTONE, very light gray (N8), intergranular porosity, grain type is micrite, 10% allochems, microcrystalline, moderate induration with micrite and sparry calcite cement, benthic foraminifera including Dictyoconus sp.

340 - 350 10

LIMESTONE, white (N9) to light gray (N7), intergranular and moldic porosity, grain type is micrite and biogenic, 20% allochems, microcrystalline to fine grained, moderate induration with sparry calcite cement.

350 - 360 10

LIMESTONE, very light gray (N8), intergranular porosity, grain type is micrite, 15% allochems, microcrystalline, well indurated with sparry calcite cement.

360 - 370 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 8/1), moldic and intergranular porosity, grain type is skeletal, micrite and biogenic, 45% allochems, microcrystalline to medium grained, moderate induration with micrite and some sparry calcite cement, benthic forams including Dictyoconus sp., Limestone- light gray (N7), 10% of sample.

370 - 390 20

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1) to light gray (N7), moldic, intergranular and intercrystalline porosity, grain type is skeletal, biogenic and crystalline, microcrystalline to medium grained, moderate to good induration with micrite and sparry calcite cement, forams include Coskinolina sp..

390 - 400 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 8/1), moldic and intergranular porosity, grain type is biogenic and micrite, fine to medium grained, 45% allochems, moderate induration with micrite and sparry calcite cement, many forams, gray dolomitic Limestone- light gray (N7) 7% of sample.

400 - 410 10

LIMESTONE, yellowish gray (5 Y 8/1), to very light gray (N8), moldic and intergranular porosity, grain type is biogenic, micrite and skeletal, moderate induration with micrite and sparry calcite cement, benthic forams.

410 - 420 10

LIMESTONE, yellowish gray (5 Y 8/1), to very light gray (N8), moldic, intergranular and intercrystalline porosity, grain type is biogenic and skeletal, moderate induration with micrite and sparry calcite cement. benthic forams, cones, slightly dolomitic.

420 - 430 10

LIMESTONE, yellowish gray (5 Y 8/1) to very light gray (N8), as above.

430 - 440 10

LIMESTONE and CALCAREOUS CLAY, yellowish gray (5 Y 8/1) to very light gray (N8), moldic and intergranular porosity, grain type is micrite, biogenic and skeletal, moderate induration with micrite and sparry calcite cement, forams, slightly dolomitic.

440 - 450 10

LIMESTONE (70%) and DOLOMITE (30%), very pale orange (10 YR 8/2) to light gray (N7) to pale yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, poor to moderate induration with micrite, dolomite and sparry calcite cement, very few fossils.

450 - 460 10

DOLOMITE (70%) and LIMESTONE (30%), very pale orange (10 YR 8/2) to light gray (N7) to pale yellowish brown (10 YR 6/2). dolomite as above, limestone is crystalline with some micrite and sparry calcite cement.

460 -480 20

DOLOMITE (70%) and LIMESTONE (30%), very pale orange (10 YR 8/2) to light gray (N7) to pale yellowish brown (10 YR 6/2), as above.

480 - 490 10

LIMESTONE, very pale orange (10 YR 8/2) to yellowish gray (5 Y 8/1), intercrystalline, interganular and moldic porosity, grain type is skeletal and crystal, 10% allochems, moderate induration with micrite and sparry calcite cement, slightly recrystallized, slightly dolomitic.

490 - 500 10

FOSSILIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, grain type is skeletal, micrite and biogenic, 35% allochems, slightly recrystallized, moderate induration with sparry calcite, dolomite and micrite cement, many cones including Dictyoconus americanus.

500 - 510 10

DOLOMITE and RECRYSTALLIZED LIMESTONE, yellowish gray (5 Y 7/2) to moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, high to low alteration, good induration with dolomite and sparry calcite cement.

510 - 530 20

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, grain type is skeletal, micrite and biogenic, 30% allochems, moderate induration with micrite and sparry calcite cement, many cones.

530 - 550 20

LIMESTONE, yellowish gray (5 Y 8/1) to white (N9), intergranular and moldic porosity, grain type is biogenic and micrite, slightly recrystallized, poor to moderate induration with micrite and sparry calcite cement.

550 - 560 10

LIMESTONE, yellowish gray (5 Y 8/1) to white (N9), intergranular and moldic porosity, grain type is biogenic and micrite, 20% allochems, microcrystalline to medium grained, moderate induration with micrite and some sparry calcite cement, benthic forams including Dictyoconus sp., echinoids, dolomite cavings.

560 - 570 10

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2) intergranular, intercrystalline and moldic porosity, grain type is micrite and biogenic, microcrystalline, moderate induration with micrite sparry calcite and dolomite cement, forams, bryozoans.

570 - 580 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, moderate to good induration with dolomite cement.

580 -590 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) and medium light gray (N 6), intercrystalline and vugular porosity, medium alteration, moderate induration with dolomite and sparry calcite cement, limestone cavings in sample, cones.

590 - 600 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) and medium light gray (N 6), intercrystalline and vugular porosity, very fine euhedral crystals, moderate induration with dolomite cement, limestone cavings in sample.

600 - 610 10

DOLOMITE (70%) and LIMESTONE (30%), yellowish gray (5 Y 8/1), Dolomite- as above, Limestone- intergranular and moldic porosity, moderate to poor induration with micrite and sparry calcite cement, forams including Coskinolina sp.

610 - 620 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) and LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, poor induration with micrite and dolomite cement, Dictyoconus americanus, cones.

620 - 640 20

DOLOMITE, moderate yellowish brown (10 YR 5/4), vugular porosity, very fine subhedral crystals, low to medium alteration, moderate to good induration with dolomite cement.

640 - 650 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is biogenic and micrite, 20% allochems, moderate induration with sparry calcite cement, forams.

650 - 660 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), vugular and intercrystalline porosity, medium to high alteration, good induration with dolomite cement, hard formation.

660 - 680 20

DOLOMITE, moderate yellowish brown (10 YR 5/4), and LIMESTONE yellowish gray (5 Y 8/1) to very light gray (N 8), intergranular, intercrystalline and moldic porosity, poor to moderate induration with micrite, dolomite and sparry calcite cement, cones, limestone and dolomite grade into each other, not bedded.

680 - 690 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) and LIMESTONE, yellowish gray (5 Y 8/1), as above.

690 - 700 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 8/1), moldic, intergranular and intercrystalline porosity, grain type is biogenic, micrite and skeletal, poor to moderate induration with micrite and sparry calcite cement, many cones in sample.

700 - 710 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), moldic, intercrystalline and vugular porosity, microcrystalline to fine grained subhedral dolomite crystals, medium alteration, moderate induration with dolomite cement, large fossil casts in dolomite.

710 - 720 10

FORAMINIFEROUS LIMESTONE (60%) yellowish gray (5 Y 8/1) and DOLOMITE (40%) light gray (N7) to medium gray (N5), intercrystalline, moldic and intergranular porosity, grain type is crystal, biogenic and micrite, 60% allochems, poor to moderate induration with micrite and sparry calcite cement, many cones in sample, does not appear to be caving in from up hole.

710 - 720 10

DOLOMITE, light gray (N 7) to medium gray (N 5) and LIMESTONE, yellowish gray (5 Y 8/1) to very light gray (N 8), as above with increase in dolomite as described in section 690 - 700, large <u>Dictyoconus americanus</u> in sample.

720 - 730 10

LIMESTONE and DOLOMITE, very pale orange (10 YR 8/2) to moderate yellowish brown (10 YR 5/4), moldic, intergranular and intercrystalline porosity, poor to good induration, limestone and dolomite do not appear to be separate beds, but grade in and out of each other.

730 - 740 10

LIMESTONE and DOLOMITE, very pale orange (10 YR 8/2) to moderate yellowish brown (10 YR 5/4), as above, Dictyoconus cookei and Dictyoconus americanus in sample.

740 - 750 10

LIMESTONE (70%) and DOLOMITE (30%), yellowish gray (5 Y 7/2) to dark yellowish brown (10 YR 4/2), vugular, moldic, intergranular and intercrystalline porosity, moderate induration with micrite, sparry calcite and dolomite cement, forams, lignite veins in sample.

750 - 760 10

LIMESTONE (70%) and DOLOMITE (30%), yellowish gray (5 YR 7/2) to dark yellowish brown (10 YR 4/2), as above, with lignite.

760 - 770 10

FOSSILIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), intercrystalline and moldic porosity, moderate induration with sparry calcite cement, bryozoans, forams, cones, mollusks.

770 - 780 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), intergranular, intercrystalline and moldic porosity, grain type is skeletal, biogenic, micrite and crystal, 80% allochems, moderate induration with sparry calcite and dolomite cement, abundant forams.

780 - 790 10

LIMESTONE, yellowish gray (5 Y 7/2), as above, and DOLOMITE (20% of sample.

790 - 794 4

DOLOMITE, dark yellowish brown (10 YR 8/2), no visible porosity, microcrystalline, bedded, tight, hard, lignite in sample.

794 - 800 6

FORAMINIFEROUS LIMESTONE (80%), yellowish gray (5 Y 7/2) and DOLOMITE (20%), dark yellowish brown (10 YR 4/2), intergranular, intercrystalline and moldic porosity, grain type is skeletal, biogenic, crystal and micrite, 75% allochems, moderate induration with micrite, sparry calcite and dolomite cement, many cones, benthic foraminifera.

800 - 810 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, grain type is micrite skeletal and biogenic, 60% allochems, slightly dolomitic, slightly recrystallized, moderate induration with sparry calcite and dolomite cement, Dictyoconus cookei and Dictyoconus americanus.

810 - 820 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above, slightly dolomitic, with lignite veins.

820 - 830 10

LIMESTONE, very pale orange (10 YR 8/2), intercrystalline, intergranular and moldic porosity, grain type is micrite and biogenic, 50% allochems, moderate induration with micrite and sparry calcite cement, lignite, slightly dolomitic, many broken cones in sample.

830 - 850 20

DOLOMITIC LIMESTONE, dark yellowish brown (10 YR 4/2), intercrystalline, moldic and vugular porosity, moderate induration with dolomite and sparry calcite cement, cones, lignite.

850 - 860

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal, 30% allochems, moderate induration with sparry calcite cement, micritic.

860 - 870 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity medium to high alteration, microcrystalline to very fine grained crystals, moderate to good induration with dolomite cement.

870 - 890 20

DOLOMITE (50%) as above, and LIMESTONE (50%), very pale orange (10 YR 8/2) to yellowish gray (5 Y 7/2), moldic, intergranular and intercrystalline porosity, grain type is micrite and skeletal, 15% allochems, microcrystalline to very fine grained, poor to moderate induration with micrite matrix, chalky, foraminifera, bryozoans in sample.

890 - 900 10

LIMESTONE and DOLOMITE, as above, limestone, yellowish gray (5 Y 7/2), recrystallized, moldic and intercrystalline porosity, sparry calcite cement, cones. dolomite, light gray (N 7) to moderate yellowish brown (10 YR 5/4), tight, high alteration, not hard, not dense.

900 - 910 10

DOLOMITE, moderate yellowish brown (10 YR 5/4).

910 - 920 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to pale brown (5 YR 5/2), intercrystalline porosity, medium to high alteration, good induration with dolomite and sparry calcite cement.

920 - 930 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline, moldic, and vugular porosity, fine to medium grained subhedral crystals, recrystallized limestone and cones (20% of sample).

930 - 950 20

DOLOMITE, pale yellowish brown (10 YR 6/2), as above, with dusky yellowish brown (10 YR 2/2) dolomite, tight, dense and hard, no visible porosity.

950 - 960 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, good induration with dolomite and sparry calcite cement, limestone (10%).

960 - 970 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, medium to high induration, moderate to good induration dolomite and sparry calcite cement.

970 - 980 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), as above.

980 - 990 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, medium to high alteration, microcrystalline, good induration with dolomite and sparry calcite cement.

990 - 1000 10

DOLOMITE, grayish orange (10 YR 7/4) to pale yellowish brown (10 YR 6/2), intergranular and pin point vugular porosity, low to medium alteration, good induration with dolomite cement, limestone (10%).

1000 - 1003 3

LIMESTONE, moderate yellowish brown (10 YR 5/4), intercrystalline and intergranular porosity, grain type is micrite and crystal, slightly recrystallized to micritic, soft, easy drilling.

1003 - 1020 17

DOLOMITE, moderate yellowish brown (10 YR 5/4), intergranular and pin point vugular porosity, good induration with dolomite cement, hard formation.

1020 - 1030 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline porosity, medium alteration, microcrystalline to medium grained euhedral crystals, moderate induration with dolomite cement, sucrosic.

1030 - 1040 10

DOLOMITE, grayish orange (10 YR 7/4), no visible porosity, microcrystalline, good induration with dolomite cement, dense, tight, limestone (5%).

1040 - 1050 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline, moldic and pin point vugular porosity, medium alteration, moderate to good induration with dolomite cement.

1050 - 1060 10

DOLOMITE, pale yellowish brown (10 YR 6/2), as above, possibly low permeability, with limestone (10% in sample).

1060 - 1070 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium to high alteration, sucrosic in spots, good induration with dolomite cement, hard drilling, dense.

1070 - 1080 10

DOLOMITE, pale yellowish brown (10 YR 6/2), as above with limestone (5%).

1080 - 1090 10

DOLOMITE, grayish orange (10 YR 7/4) to medium light gray (N 6), vugular and intercrystalline porosity, high alteration, medium grained subhedral crystals, good induration with dolomite cement.

1090 - 1100 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, medium to high alteration, sucrosic in spots, good induration with dolomite cement, dense, limestone (10%) light gray (N7).

1100 - 1120 20

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, possibly low permeability, high alteration, good induration with dolomite cement, limestone (5%).

1120 - 1130 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline porosity, possibly low permeability, tight, hard, high alteration, good induration with dolomite cement.

1130 - 1140 10

DOLOMITE, moderate yellowish brown (10 YR 5/2), intercrystalline and vugular porosity, medium alteration, good induration with dolomite cement. Core #1: 1131'-1146'.

1140 - 1150 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, low alteration, fine to medium grained crystals, moderate induration with dolomite cement, sucrosic.

1150 - 1160 10

LIMESTONE, light bluish gray (5 B 7/1) to medium bluish gray (5 B 5/1), intercrystalline and moldic porosity, microcrystalline, good induration with sparry calcite cement. 5% dolomite in sample, hard formation.

1160 - 1170 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, medium alteration, good induration with dolomite cement, some limestone in sample.

1170 - 1190 20

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline and moldic porosity, medium alteration, moderate to good induration with dolomite cement, hard formation.

1190 - 1200 10

DOLOMITE and LIMESTONE, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intercrystalline and moldic porosity, fine to medium grained, moderate to good induration with sparry calcite, micrite and dolomite cement.

1200 - 1210 10

DOLOMITE and LIMESTONE, pale yellowish brown (10 YR 6/2) to very pale orange (10 YR 8/2), intergranular, intercrystalline and vugular porosity, medium alteration, good induration with sparry calcite and dolomite cement.

1210 - 1220 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) to moderate yellowish brown (10 YR 5/4), intergranular and moldic porosity, grain type is biogenic, skeletal and micrite, 60% allochems, microcrystalline, poor induration with micrite matrix.

1220 - 1240 20

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intergranular and moldic porosity, 80% allochems, poor to moderate induration with micrite and some sparry calcite cement, abundant forams, including Amphistigina sp., cones, forams are rounded.

1240 - 1250 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above.

1250 - 1260 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), moldic and intergranular porosity, grain type is skeletal and micrite, 60% allochems, moderate induration with micrite cement.

1260 - 1270 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above.

1270 - 1280 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal and micrite, 50% allochems, poor to moderate induration with micrite cement.

1280 - 1290 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), as above.

1290 - 1310 20

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline porosity, medium alteration, microcrystalline to medium grained subhedral crystals, moderate induration with dolomite cement, slightly sucrosic.

1310 - 1320 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, very fine to fine grained subhedral crystals, moderate induration with dolomite cement.

1320 - 1340 20

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, medium alteration, fine grained subhedral crystals, moderate induration with dolomite cement.

1340 - 1350 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), as above.

1350 - 1360 10

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, high alteration, microcrystalline, good induration with dolomite cement, hard, dense, tight.

1360 - 1373 13

LIMESTONE, very pale orange (10 YR 8/2), intergranular porosity, grain type is micrite and skeletal, fine grained, moderate induration with micrite and sparry calcite cement, forams, some dolomite in sample.

1373 - 1380 7

DOLOMITE, intercrystalline and vugular porosity, possibly good permeability, medium to high alteration, very fine to fine grained subhedral crystals, moderate induration with dolomite cement.

1380 - 1400 20

DOLOMITE, moderate yellowish brown (10 YR 5/4) to dark yellowish brown (10 YR 4/2), intercrystalline porosity, possibly good permeability, medium to coarse grained euhedral crystals, medium alteration, sucrosic.

1400 - 1410 10

DOLOMITE, pale yellowish brown (10 YR 5/4), intercrystalline porosity, medium alteration, fine grained, moderate induration with dolomite cement.

1410 - 1420 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intergranular and intercrystalline porosity, medium alteration, poor to moderate induration with dolomite cement.

1420 - 1430 10

DOLOMITE, pale yellowish brown (10 YR 5/4), to moderate yellowish brown (10 YR 6/2), medium alteration, medium to coarse euhedral crystals, moderate induration with dolomite cement, sucrosic, possibly good permeability.

1430 - 1440 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to moderate yellowish brown (10 YR 5/4), intercrystalline porosity, medium to high alteration, moderate induration, large crystal faces.

1440 - 1460 20

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and intracrystalline porosity, medium alteration, moderate induration with dolomite cement, sucrosic in spots, some coarse grained euhedral crystals in sample.

1460 - 1470 10

DOLOMITE, dusky yellowish brown (10 YR 2/2) to moderate yellowish brown (10 YR 5/4), intercrystalline and intracrystalline porosity, possibly low permeability, high alteration, microcrystalline, good induration with dolomite cement, tight, dense. Core #2: 1463'-1473'.

1470 - 1480 10

DOLOMITE, dusky yellowish brown (10 YR 2/2) to moderate yellowish brown (10 YR 5/4), as above with limestone (10%).

1480 - 1490 10

DOLOMITE, light olive brown (5 Y 5/6), intercrystalline porosity, medium to coarse grained subhedral crystals, moderate induration with dolomite cement, sucrosic.

1490 - 1500 10

DOLOMITE, light olive brown (5 Y 5/6), intercrystalline porosity, microcrystalline to fine grained crystals, moderate to good induration with dolomite cement.

LITHOLOGIC LOG OF SHALLOW FLORIDAN MONITOR WELL

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
LITHOLOGIC DESCRIPTIONS

UNDIFFERENTIATED DEPOSITS AND ANASTASIA FORMATION

DEPTH	THICKNESS
0 - 10	10

SANDY SOIL, olive gray (5 Y 4/1), intergranular porosity, quartz sand- (50%), very fine to fine grained, angular to subangular grains, organics (30%), shell fragments (5%), unconsolidated.

10 - 20 10

SAND, light olive gray (5 Y 5/2), intergranular porosity, clear to slightly frosted, very fine to medium grained, angular to subrounded, unconsolidated.

20 - 30 10

SAND, light olive gray (5 Y 5/2), intergranular porosity, very fine to medium grained, subangular to subrounded, unconsolidated.

30 - 50 20

SAND, light olive gray (5 Y 5/2), intergranular porosity, fine to medium grained, angular to subrounded, shell fragments, unconsolidated.

50 - 60 10

SAND and SHELL, light olive gray (5 Y 5/2), intergranular porosity, fine to medium grained, subrounded, abundant shell fragments (50%), unconsolidated.

60 - 70 10

SAND, light olive gray (5 Y 5/2), as above with less shell fragments (15%).

TAMIAMI FORMATION

70 - 80 10

LIMESTONE, light gray (N 7) to very light gray (N 8), intergranular and moldic porosity, 15% allochems, microcrystalline to fine grained, moderate induration with micrite and sparry calcite cement, shell fragments (15%).

80 - 90 10

LIMESTONE, light olive gray (5 Y 5/2), intergranular porosity, microcrystalline to fine grained, well indurated with micrite and sparry calcite cement, quartz sand (5%), shell fragments (15%).

90 - 110 20

LIMESTONE, light olive gray (5 Y 5/2), as above.

110 - 120 10

PHOSPHATIC LIMESTONE, light olive gray (5 Y 5/2) to grayish olive (10 Y 4/2), intergranular and moldic porosity, microcrystalline to fine grained, moderate induration with micrite and sparry calcite cement, quartz sand (<5%), shell fragments (5%).

HAWTHORN GROUP

120 - 130 10

LIMESTONE, light olive gray (5 Y 5/2) and PHOSPHATIC CLAYEY SILT, olive gray (5 Y 3/2), intergranular and moldic porosity, poor to moderate induration, phosphatic silt (35%), shell fragments (5%), impure.

130 - 140 10

LIMESTONE and PHOSPHATIC SILT, light olive gray (5 Y 6/1), poorly indurated, fine phosphatic sand (5%), shell fragments (15%).

OCALA GROUP

140 - 150 10

LIMESTONE, light olive gray (5 Y 5/2), intergranular and moldic porosity, 45% allochems, fine to medium grained, moderate induration with micrite and sparry calcite cement, phosphate (10%), many benthic foraminifera including *Lepidocyclina* sp. and *Operculinoides* sp.

150 - 160 10

FORAMINIFEROUS LIMESTONE, moldic and intergranular porosity, grain type is biogenic and skeletal, 50% allochems, poor to moderate induration with micrite and sparry calcite cement, many forams including *Operculinoides* sp. and *Lepidocyclina* sp., echinoid spines, coral.

160 - 180 20

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic porosity, grain type is biogenic and skeletal, 30% allochems, moderate induration with micrite and sparry calcite cement, abundant forams including Gypsina globula sp., echinoid spines, shell fragments.

180 - 190 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic porosity, 60% allochems, grain type is biogenic, microcrystalline to fine grained, moderate induration with sparry calcite cement, many large forams.

190 - 200 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), intergranular and moldic porosity, grain type is micrite and biogenic, 55% allochems, poor to moderate induration with micrite and sparry calcite cement, abundant forams.

200 -220 20

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2) to light gray (N7), as above.

220 - 230 10

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), intergranular and moldic porosity, grain type is crystal and biogenic, 35% allochems, microcrystalline, moderate induration with sparry calcite cement.

230 - 240 10

LIMESTONE, yellowish gray (5 Y 7/2), intercrystalline, intergranular and moldic porosity, grain type is crystal, skeletal and biogenic, 20% allochems, moderate induration with micrite and sparry calcite cement.

240 - 250 10

LIMESTONE, very pale orange (10 Y 8/2), intergranular porosity, grain type is micrite and biogenic, 5% allochems, poor to moderate induration with micrite and some sparry calcite cement, unfossiliferous.

AVON PARK / LAKE CITY LIMESTONE

250 - 270 20

LIMESTONE, very pale orange (10 YR 8/2), intercrystalline and intergranular porosity, grain type is micrite, 15% allochems, moderate induration with micrite and sparry calcite cement, Dictyoconus cookei.

270 - 280 10

LIMESTONE, very pale orange (10 YR 8/2), intercrystalline, intergranular and moldic porosity, 10% allochems, grain type is crystal and micrite, moderate induration with micrite and sparry calcite cement, cement cavings in sample.

280 - 290 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite, moderate to good induration with micrite and sparry calcite cement, cement cavings in sample.

290 - 300 10

LIMESTONE, very pale orange (10 YR 8/2), as above.

300 - 310 10

LIMESTONE, white (N 9) to light gray (N 6), intergranular and moldic porosity, grain type is micrite, moderate induration with micrite cement, pure clean limestone, cement cavings in sample.

310 - 320 10

LIMESTONE, very pale orange (10 YR 8/2) to very light gray (N 8), intergranular porosity, 15% allochems, fine grained, moderate induration with micrite and some sparry calcite cement.

320 - 330 10

LIMESTONE and RECRYSTALLIZED LIMESTONE, light gray (N 7) to pinkish gray (5 YR 8/1), intergranular, intercrystalline and moldic porosity, grain type is micrite, biogenic and skeletal, 20% allochems, microcrystalline to fine grained, moderate induration with micrite and sparry calcite cement, mollusks, forams.

330 - 350 20

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) and light gray (N 7), moldic and intergranular porosity, grain type is micritic and skeletal, 40% allochems, fine to medium grained, moderate induration with micrite and sparry calcite cement, foraminifera including Dictyoconus sp., mollusks, echinoids.

350 - 370 20

LIMESTONE, very light gray (N 8), intergranular and moldic porosity, grain type is micrite, skeletal and biogenic, 15% allochems, very fine to fine grained, moderate induration with micrite and sparry calcite cement, mollusk fragments, foraminifera including Dictyoconus sp.

370 - 380 10

FORAMINIFEROUS LIMESTONE, medium light gray (N 4), moldic and intergranular porosity, grain type is micrite and skeletal, 25% allochems, microcrystalline to fine grained, moderate to good induration with micrite and sparry calcite cement, foraminifera, fossil fragments.

380 - 390 10

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2) to very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, microcrystalline to fine grained, moderate to good induration with dolomite, micrite and sparry calcite cement, Limestone- medium light gray (N 4), microcrystalline, no visible porosity (10% of sample).

390 - 400 10

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and moldic porosity, grain type is biogenic and micrite, microcrystalline to fine grained, 20% allochems moderate induration with micrite and sparry calcite cement.

400 - 410 10

LIMESTONE, yellowish gray (5 Y 8/1) to light gray (N 7), moldic and intergranular porosity, grain type is micrite and skeletal, 40% allochems, microcrystalline to fine grained, poor to moderate induration with micrite and sparry calcite cement, foraminiferous, Dictyoconus cookei, Coskinolina sp.

410 - 420 10

LIMESTONE, yellowish gray (5 Y 8/1) to light gray (N 7), as above.

420 - 430 10

LIMESTONE, yellowish gray (5 Y 8/1) to medium gray (N 6), intergranular and moldic porosity, grain type is biogenic, skeletal and micrite, 10% allochems, microcrystalline, poor to moderate induration with micrite and some sparry calcite cement, foraminiferous, Dictyoconus cookei, Coskinolina sp.

430 - 440 10

RECRYSTALLIZED LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, intergranular and moldic porosity, grain type is micrite, skeletal and micrite, moderate induration with sparry calcite and micrite cement.

440 - 450 10

DOLOMITE (70%), pale yellowish brown (10 YR 6/2) and LIMESTONE (30%), very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, medium alteration moderate to good induration with sparry calcite and dolomite cement.

450 - 460 10

DOLOMITE, pale yellowish brown (10 YR 6/2), and LIMESTONE (20%), vugular, intergranular, intercrystalline and moldic porosity, microcrystalline to fine grained, moderate induration with micrite, sparry calcite and dolomite cement, dolomite and limestone grade into each other, not bedded.

460 - 470 10

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, low to medium alteration, microcrystalline to very fine grained, moderate to good induration with dolomite cement, limestone cavings (10%).

470 - 480 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and skeletal, microcrystalline to very fine grained, moderate induration with micrite and some sparry calcite cement, unidentifiable forams, slightly crystalline.

480 - 490 10

RECRYSTALLIZED LIMESTONE, very light gray (N 7), intergranular and intercrystalline porosity, grain type is micrite and crystal, 10% allochems, very fine to fine grained, poor to moderate induration with micrite, sparry calcite and dolomite cement, unfossiliferous.

490 - 500 10

RECRYSTALLIZED LIMESTONE, very pale orange (10 YR 8/2) and

DOLOMITE, dark yellowish brown (10 YR 4/2), intergranular, intercrystalline and moldic porosity, grain type is micrite, skeletal and crystal, 5% allochems, moderate induration with micrite sparry calcite and dolomite cement, Dictyoconus cookei.

500 - 510 10

DOLOMITE, medium light gray (N 6), to dark yellowish brown (10 YR 4/2), intercrystalline, moldic and vugular porosity, medium alteration, cryptocrystalline to very fine grained subhedral crystals, good induration with dolomite and micrite cement.

510 - 520 10

LIMESTONE, very pale orange (10 YR 8/2), moldic, intergranular and intercrystalline porosity, grain type is skeletal, biogenic and micrite, 40% allochems, very fine to medium grained, moderate induration with micrite, sparry calcite and dolomite cement, foraminiferous, Dictyoconus americanus in sample.

520 - 530 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, grain type is skeletal, crystal and micrite, 20% allochems, microcrystalline to very fine grained, moderate induration with micrite, sparry calcite and dolomite cement, foraminifera.

530 - 540 10

LIMESTONE, yellowish gray (5 Y 8/1) to very pale orange (10 YR 8/2), as above.

540 - 550 10

LIMESTONE, very pale orange (10 YR 8/2), intergranular, intercrystalline and moldic porosity, grain type is micrite, skeletal and crystal, 10% allochems, microcrystalline to medium grained, moderate induration with micrite and sparry calcite cement, slightly recrystallized.

550 - 560 10

DOLOMITE, medium light gray (N 6) to olive gray (5 Y 4/1), intercrystalline porosity, medium alteration, cryptocrystalline to microcrystalline, unfossiliferous, moderate induration with dolomite and sparry calcite cement.

560 - 580 20

LIMESTONE, very pale orange (10 YR 8/2), intercrystalline, intergranular and moldic porosity, grain type is micrite, skeletal and crystal, 30% allochems, microcrystalline to very fine grained, moderate induration with sparry calcite, micrite and dolomite cement.

580 - 590 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), Intercrystalline and pin point vugular porosity, very fine grained, subhedral crystals, medium to high alteration, good induration with dolomite, sparry calcite and micrite cement.

590 - 600 10

DOLOMITE, moderate yellowish brown (10 YR 5/4) and medium light gray (N 6), vugular and intercrystalline porosity, very fine grained subhedral and euhedral crystals, medium alteration, moderate induration with dolomite and sparry calcite cement.

600 - 620 20

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline and intergranular porosity, grain type is crystal and biogenic, very fine grained, moderate to good induration with sparry calcite and dolomite cement.

620 - 630 10

DOLOMITE, moderate yellowish brown (10 YR 5/4), moldic, vugular and intercrystalline porosity, very fine grained subhedral crystals, medium alteration, moderate induration with dolomite and sparry calcite cement, fossil molds.

630 - 650 20

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, intergranular and moldic porosity, grain type is crystal and skeletal, very fine grained, moderate induration with sparry calcite and dolomite cement, foraminifera in sample.

650 - 660 10

DOLOMITIC LIMESTONE, very pale orange (10 YR 8/2) and DOLOMITE, medium gray (N 6), intergranular, intercrystalline and moldic porosity, very fine to medium grained, moderate induration with sparry calcite and dolomite cement, unfossiliferous.

660 - 670 10

DOLOMITIC LIMESTONE, medium light gray (N 6) to very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal and crystal, very fine grained, moderate induration with sparry calcite and dolomite cement, benthic foraminifera.

670 - 680 10

LIMESTONE, very pale orange (10 YR 8/2) and DOLOMITE, dark yellowish orange (10 YR 6/6)

680 - 690 10

LIMESTONE, very pale orange (10 YR 8/2) to moderate yellowish brown (10 YR 5/4), intergranular and moldic porosity, grain type is micrite and skeletal, 30% allochems very fine to medium grained.

690 - 700 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) and DOLOMITIC LIMESTONE, moderate yellowish brown (10 YR 5/4), intercrystalline, intergranular and moldic porosity, grain type is micrite, skeletal and crystal, 40 % allochems, moderate induration with micrite, sparry calcite and dolomite cement, *Dictyoconus* sp., mollusks.

700 - 710 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and skeletal, 40% allochems, poor induration with micrite and some sparry calcite cement, calcareous silt in sample, forams, fossils.

710 - 730 20

FORAMINIFEROUS LIMESTONE, pale yellowish brown (10 YR 6/2), intercrystalline and intergranular porosity, grain type is micrite, skeletal and crystal, 60% allochems, microcrystalline to very fine grained, moderate induration with sparry calcite and dolomite cement, echinoids, *Dictyoconus americanus* and *Dictyoconus cookei*.

730 - 740 10

DOLOMITE (20%), pale yellowish brown (10 YR 6/2) and LIMESTONE (80%), medium light gray (N 6), intergranular, intercrystalline and moldic porosity, microcrystalline to medium grained, 35% allochems moderate to good induration with micrite, sparry calcite and dolomite cement, many forams, fossil fragments.

740 - 760 20

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is micrite and skeletal, 50% allochems, moderate induration with micrite and sparry calcite cement, cones, fossil fragments.

760 - 770 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intergranular and moldic porosity, fine to medium grained, 80% allochems, poor to moderate induration with micrite and sparry calcite cement, abundant cones, Amphistigina sp. and other forams.

770 - 780 10

FOSSILIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal, biogenic and crystal, 60% allochems, very fine to medium grained, moderate induration with micrite and sparry calcite cement, slightly recrystallized, many fossil fragments, bryozoans, mollusks, cones.

780 - 790 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), intercrystalline and moldic porosity, microcrystalline to very fine grained subhedral crystals, medium alteration, moderate induration with dolomite and sparry calcite cement, fossil fragments.

790 - 800 10

DOLOMITE, pale yellowish brown (10 YR 6/2) to dusky yellowish brown (10 YR 2/2), as above.

800 - 810 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal and biogenic, 80% allochems, very fine to medium grained, poor to moderate induration with micrite and some sparry calcite cement, abundant forams including Dictyoconus sp., Amphistigina sp., Coskinolina sp., fossil fragments.

810 - 830 20

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), (70%), and DOLOMITE, pale yellowish brown (10 YR 6/2), (30%), intergranular, intercrystalline and moldic porosity, grain type is crystal and skeletal, 35% allochems, moderate induration with sparry calcite and dolomite cement.

830 - 840 10

DOLOMITE, pale yellowish brown (10 YR 6/2) and FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intercrystalline, intergranular and moldic porosity, grain type is micrite, skeletal and crystal, 40% allochems, moderate induration with sparry calcite and dolomite cement, bedded.

840 - 850 10

DOLOMITIC LIMESTONE, pale yellowish brown (10 YR 6/2), intercrystalline, intergranular and moldic porosity, grain type is crystal and skeletal, 40% allochems, moderate induration with sparry calcite and dolomite cement, foraminiferous.

850 - 870 20

DOLOMITE, dark yellowish brown (10 YR 4/2), intergranular, vugular and moldic porosity, microcrystalline to very fine grained crystals, medium alteration, moderate to good induration with dolomite and some sparry calcite cement.

870 - 880 10

DOLOMITE (50%) and LIMESTONE (50%), very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intergranular, intercrystalline and moldic porosity, grain type is skeletal and crystal, 20% allochems, moderate induration with sparry calcite and dolomite cement, benthic foraminifera.

880 - 890 10

DOLOMITE (50%) and LIMESTONE (50%), very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), as above.

890 - 900 10

FORAMINIFEROUS LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, grain type is skeletal, biogenic and micrite, 50% allochems, very fine grained, moderate induration with micrite, sparry calcite and dolomite cement, slightly recrystallized, abundant foraminifera.

900 - 910 10

DOLOMITE and LIMESTONE, brownish gray (5 YR 4/1) to olive gray (5 Y 4/1), intergranular, intercrystalline, moldic porosity, medium alteration, poor to moderate induration with sparry calcite and dolomite cement, limestone, as above.

910 - 920 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline, vugular and moldic porosity, microcrystalline to medium grained crystals, medium to high alteration, moderate to good induration with dolomite cement, echinoid spines, fossil fragments.

920 - 930 10

DOLOMITIC LIMESTONE and DOLOMITE (20%) very pale orange (10 YR 8/2) to pale yellowish brown (10 YR 6/2), intergranular and moldic porosity, grain type is skeletal and crystal, 40% allochems, very fine to medium grained, moderate induration with sparry calcite and dolomite cement.

930 - 940 10

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline porosity, medium to high alteration, moderate induration with dolomite cement, unfossiliferous.

940 - 950 10

DOLOMITE, dark yellowish brown (10 YR 4/2), moldic and intercrystalline porosity, very fine to medium grained euhedral crystals, sucrosic, medium alteration, moderate induration with dolomite cement.

950 - 959 9

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline and moldic porosity, microcrystalline to fine grained subhedral crystals, moderate induration with dolomite and sparry calcite cement, recrystallized limestone in sample (10%).

APPENDIX B

WATER QUALITY ANALYSIS

FIELD ANALYSIS OF WATER SAMPLES

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
WATER QUALITY DURING REVERSE AIR DRILLNG

SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal ppt	pH
1	1930	121390	450	2650	2000	1520	82	NA	1.0	11.89
	2313	121390	460	2800	1800	1540			1.0	
	0045	121490	470	3150	2000	1750			1.1	12.08
	0230	121490	480	2680	1700	1460		22.9	1.0	12.05
	0355	121490	490	2770	1900	1550		23.5	1.0	12.11
	0440	121490	500	2780	2000	1510		23.6	1.0	12.03
2	0720	121490	510	2420	1900	1310	90	21.5	1.0	11.94
	0843	121490	520	2590	2000	1370		22.7	1.1	11.74
	0905	121490	530	3020	2200	1620		21.6	1.2	11.60
	0924	121490	540	2570	2000	1360		22.8	1.0	11.54
	1044	121490	550	2640	2000	1410		22.8	1.0	11.75
	1110	121490	560	2680	1950	1440		22.2	1.1	11.75
3	1127	121490	570	2660	2050	1430	120	23.4	1.2	11.72
	1240	121490	580	2690	2000	1450		23.6	1.2	11.74
	1300	121490	590	2680	2050	1450		23.0	1.2	11.67
	1325	121490	600	2620	2000	1410		22.6	1.1	11.61
	1440	121490	610	2600	2000	1400		23.2	1.0	11.51
	1510	121490	620	2400	1850	1300		23.5	1.0	11.33
4	1540	121490	630	2500	1800	1320	450	23.9	1.0	11.15
	1713	121490	640	2570	1850	1380		23.5	1.0	10.93
	1743	121490	650	2640	1800	1410		24.0	1.0	10.71
	1753	121490	660	2690	1810	1440		23.5	1.0	10.63
	1847	121490	670	2690	1770	1450		23.9	1.0	10.21
	1910	121490	680	2700	1770	1460		23.6	1.0	10.11
5	1923	121490	690	2710	1775	1490	680	22.7	.75	9.91
	2022	121490	700	2670	1720	1450		22.9	.90	9.30
	2043	121490	710	2740	1850	1450		23.5	1.0	9.38
	2110	121490	720	2850	1800	1500		23.3	1.0	9.15
	2238	121490	730	2820	1820	1470		23.9	.95	8.75
	2305	121490	740	2710	1700	1420		23.3	1.0	8.48
6	2322	121490	750	2670	1700	1420	702	23.3	1.0	8.49
	0035	121590	760	2390	1600	1280		22.5	.80	8.28
	0100	121590	770	HACH	1600	HACH		23.4	.80	8.20
	0133	121590	780	meter	1550	meter		23.4	.80	8.16
	0252	121590	790	stopped	1500	stopped		23.7	.80	8.15
	0327	121590	800	working	1480	working		23.5	.80	8.84
7	0355	121590	810		1450		618	23.1	.80	8.25
	0510	121590	820		1450			23.4	.80	8.26
	0540	121590	830		1420			23.0	.90	8.30
	0612	121590	840		1400			22.8	.70	8.50
	0800	121590	850		1350			22.9	.70	8.31
	0820	121590	860		1400			23.0	.80	8.35
8	0903	121590	870		1450		481	23.6	.80	8.34

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
WATER QUALITY DURING REVERSE AIR DRILLNG

SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	CONDUCTIVITY umhos/cm YSI	TDS mg/l	CL mg/l	TEMP C	Sal ppt	pH
	1010	121590	880		1400			24.1	.80	8.29
	1025	121590	890		1420			24.0	.80	8.40
	1037	121590	900		1500			24.3	.80	8.37
	1217	121590	910		1650			24.8	.80	8.29
	1239	121590	920		1650			24.4	.90	8.27
9	1302	121590	930		1620		575	24.6	.90	8.59
	1437	121590	940		1700			24.7	.80	8.40
	1455	121590	950		1680			24.7	.80	9.21
	1538	121590	960		1850			25.0	1.0	8.79
	1643	121590	970		1900			24.8	1.0	8.54
	1735	121590	980		1950			24.6	1.0	8.49
10	1818	121590	990		2050		760	24.8	1.0	8.33
	2124	121290	1000		2600			24.3	1.25	8.31
	2155	121590	1010		2450			23.4	1.25	8.13
	2317	121590	1020		2600			24.1	1.5	8.00
	0042	121690	1030		2400			23.1	1.25	8.01
	0137	121690	1040		2500			22.0	1.5	7.97
11	0203	121690	1050		2500		990	22.3	1.5	8.04
	0323	121690	1060		2700			22.4	1.5	8.01
	0425	121690	1070		2700			23.0	1.25	7.92
	0527	121690	1080		2900			23.8	1.5	7.94
	0730	121690	1090		2900			24.0	1.8	7.99
	0805	121690	1100		2990			24.3	1.8	7.98
12	0833	121690	1110		3050		1245	24.5	1.8	7.92
	0945	121690	1120		3150			25.2	1.8	7.94
	1035	121690	1130		3600			25.7	2.1	7.91
	1125	121690	1140		3650			25.9	2.0	7.93
	1340	121690	1150		4000			26.1	2.2	7.92
	1440	121690	1160		4500			26.0	2.5	7.89
13	1535	121690	1170		6200		2280	26.7	3.5	7.83
	1730	121690	1180		10000			26.2	5.6	7.75
	1810	121690	1190		12800			26.2	7.5	7.77
	1837	121690	1200		13500			26.3	8.0	7.76
	2002	121690	1210		13500			24.7	7.5	7.73
	2015	121690	1220		14000			24.6	8.0	7.67
14	2030	121690	1230		14500		6558	24.9	8.0	7.63
	2155	121690	1240		15000			24.8	9.0	7.67
	2245	121690	1250		16000			24.9	9.5	7.63
	2325	121690	1260		15000			24.2	8.0	7.63
	0055	121790	1270		14500			23.4	8.0	7.64
	0138	121790	1280		14500			24.0	8.0	7.64
15	0205	121790	1290		15000		8020	24.3	9.0	7.62
	0301	121790	1300		14750			22.2	9.0	7.68
	0407	121790	1310		16000			22.0	9.0	7.64
	0503	121790	1320		18000			24.1	10.0	7.61
	0638	121790	1330		18250			24.1	10.0	7.62
	0750	121790	1340		19200			24.8	12.0	7.59

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SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal ppt	pH
16	0938	121790	1350		22000		10994	26.1	14.1	7.58
	1245	121790	1360		24000			26.4	15.2	7.73
	1343	121790	1370		23500			26.2	14.5	7.73
	1408	121790	1380		23200			25.9	14.5	7.58
	1530	121790	1390		23200			26.3	14.5	7.70
	1603	121790	1400		22900			26.1	14.6	7.86
17	1628	121790	1410		24500		11939	26.3	15.9	7.76
	1745	121790	1420		23200			26.1	14.7	7.72
	1810	121790	1430		23800			26.3	14.8	7.73
	0310	121890	1440		23100			25.4	14.5	7.62
	0610	121890	1450		23100			25.5	15.7	7.57
	0825	121890	1460		24000			25.9	15.2	7.56
18	1054	121890	1470		26500		13258	27.5	16.3	7.54
	1415	121890	1480		27500			27.6	16.3	7.54
	1525	121890	1490		28200			27.7	18.0	7.49
	1614	121890	1500		28200			27.6	18.5	7.48
	1807	121890	1510		28000			27.2	18.2	7.48
	1832	121890	1520		28100		core#1	27.6	18.2	7.48
19	1710	121990	1530		29500		11522	26.8	19.3	7.54
	2023	121990	1540		29100			26.2	18.0	7.52
	2112	121990	1550		29100			26.3	17.9	7.50
	2154	121990	1560		28700			26.6	17.0	7.49
	2247	121990	1570		28100			26.9	16.5	7.54
	2320	121990	1580		28100			26.8	17.0	7.47
20	0010	122090	1590		28100		11760	26.4	17.0	7.51
	0133	122090	1600		28000			26.0	16.8	7.50
	0223	122090	1610		27200			25.8	16.1	7.51
	0350	122090	1620		27200		core#2	26.1	16.9	7.50
	0420	122190	1630		23100			25.6	14.0	7.52
	0450	122190	1640		25500			25.8	15.5	7.51
21	0513	122190	1650		25500		21980	26.2	15.5	7.62
	1808	012891	1660		11000			25.2	6.5	11.65
	1940	012891	1670		11500			28.7	6.5	11.56
	2022	012891	1680		10000			28.3	6.0	11.45
	2152	012891	1690		10500			28.3	6.0	11.45
	2223	012891	1700		12000			28.2	7.0	11.47
22	2300	012891	1710		11800		3680	29.1	6.9	11.52
	0125	012991	1720		10200			28.1	6.0	11.43
	0255	012991	1730		10800			28.7	6.2	11.43
	0402	012991	1740		11000			28.3	6.5	11.44
	0615	012991	1750		10800			27.9	6.2	11.43
	1355	013091	1760		1550		core#3	27.1	0.8	11.01

ROCKLEDGE CLASS I INJECTION WELL PROJECT
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SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal ppt	pH
23	1540	013091	1770		1480		252	27.2	0.8	10.61
	1556	013091	1780		4130			27.1	2.2	11.02
	1622	013091	1790		4020			27.6	2.2	10.55
	1720	013191	1800		9500		core#4	27.5	5.1	10.08
	1810	013191	1810		7100			25.2	4.0	10.02
	1900	013191	1820		10300			26.1	5.7	9.48
24	2000	013191	1830		8800		2479	26.6	5.0	9.56
	1445	020191	1840		14500		core#5	24.1	8.0	8.76
	1505	020191	1850		14400			24.6	8.0	8.58
	1534	020191	1860		10000			22.0	6.0	8.01
	1650	020191	1870		13500			22.4	7.4	8.47
	1718	020191	1880		12000			23.3	6.5	8.56
25	1758	020191	1890		12200		3368	23.0	6.8	8.70
	1228	020291	1900		14000		core#6	25.8	8.0	8.50
	1322	020291	1910		12900		core#7	26.2	7.1	8.40
	1233	020391	1920		15000			27.3	8.5	7.95
	1345	020391	1930		16000			26.6	9.0	8.18
	1455	020391	1940		18700			26.7	10.5	8.11
26	1633	020391	1950		20000		6262	26.6	11.2	8.07
	1845	020391	1960		20200			25.3	11.5	8.00
	1950	020391	1970		20000			23.6	11.4	8.16
	2135	020391	1980		19900			24.2	11.0	8.12
	2310	020391	1990		20000			24.5	12.3	8.12
	0055	020491	2000		19000			23.8	12.0	8.58
27	0225	020491	2010		19800		5548	24.5	12.0	8.73
	0540	022391	2020		22700			27.8	12.8	12.09
	0819	022391	2030		23000			28.7	13.0	11.99
	1128	022391	2040		22500			27.8	12.9	11.99
	1538	022391	2050		22200			27.7	12.9	11.98
	1645	022391	2060		22000			27.1	12.6	11.95
28	2030	022391	2070		19300			25.0	11.0	11.99
	0002	022491	2080		20000			24.3	11.3	11.49
	0815	022491	2090		29800			25.8	17.3	9.14
	1355	022491	2100		36000		core#8	27.1	21.5	8.77
	0042	022691	2110		38000			26.0	23.5	7.86
	0607	022691	2120		42000			25.1	26.0	7.75
29	0835	022691	2130		41200		7200	25.2	25.0	8.32
	1120	022691	2140		43900			26.8	27.0	8.28
	1243	022691	2150		45000			26.9	27.9	7.85
	1427	022691	2160		45500			26.4	28.2	7.70
	1718	022691	2170		46500			26.9	29.0	7.67
	1950	022691	2180		42000			22.0	26.0	7.75
30	2020	022691	2190		42100		17780	21.8	26.0	7.57
	0211	022791	2200		42700			22.8	26.4	7.55
	0858	022791	2210		44800			25.8	28.0	7.57
	1148	022791	2220		46000			26.0	32.2	7.44

ROCKLEDGE CLASS I INJECTION WELL PROJECT
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SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	CONDUCTIVITY umhos/cm YSI	TDS mg/l	CL mg/l	TEMP C	Sal ppt	pH
	1435	022791	2240		46500			27.4	32.9	7.41
31	1712	022791	2250		45800		16900	26.6	32.5	7.40
	0655	030191	2260		46000			27.5	32.5	7.37
	0900	030191	2270		47000			28.0	33.0	7.43
	1100	030191	2280		48000			29.2	34.0	7.42
	1325	030191	2290		47500			29.0	33.5	7.45
	1513	030191	2300		48500			28.7	34.0	7.39
32	1647	030191	2310		47000		14840	28.0	33.5	7.42
	2022	030191	2320		45200			26.7	31.8	7.30
	2215	030191	2330		44800			26.2	31.7	7.51
	0005	030291	2340		42800			23.7	29.9	7.53
	0340	030291	2350		45900			28.1	32.4	7.44
	0504	030291	2360		44200			26.4	31.2	7.39
33	0558	030291	2370		44500		18940	26.7	31.3	7.38
	0817	030291	2380		47200			28.9	33.8	7.39
	0945	030291	2390		47200			28.8	34.0	7.35
	1120	030291	2400		47900		core#9	29.1	34.0	7.30
	1740	030391	2410		44600			25.2	31.5	7.41
	1825	030391	2420		44200			25.6	31.3	7.42
34	2100	030391	2430		43100		16720	23.6	30.1	7.27
	2225	030391	2440		43200			24.3	30.3	7.34
	2322	030391	2450		43200			24.6	30.3	7.37
	0004	030491	2460		43500			24.8	29.9	7.40
	0132	030491	2470		43900			25.6	30.0	7.39
	0210	030491	2480		42200			23.6	28.9	7.41
35	0302	030491	2490		42600		18500	24.0	29.0	7.47
	0448	030491	2500		42000			24.2	28.5	7.55
	0620	030491	2510		43500			25.9	29.7	7.53
	0733	030491	2520		44500			25.9	30.5	7.50
	1005	030491	2530		44000			25.9	30.0	7.54
	1200	030491	2540		43800			25.5	30.0	7.51
36	1312	030491	2550		44000		20740	25.9	30.1	7.53
	1510	030491	2560		44000			25.5	30.0	7.54
	1605	030491	2570		44000			25.4	30.1	7.55
	1645	030491	2580		43900			25.4	30.0	7.56
	1820	030491	2590		43200			24.7	29.5	7.76
	1855	030491	2600		44000			25.9	30.0	7.74
37	1922	030491	2610		41100		14600	22.6	28.0	7.59
	2038	030491	2620		42100			23.9	28.9	7.54
	2119	030491	2630		41200			22.9	28.1	7.64
	2217	030491	2640		42900			24.6	29.1	7.94
	2352	030491	2650		39900			20.3	27.0	8.05
	0108	030591	2660		38900			19.8	26.0	7.91
38	0230	030591	2670		41000		14900	21.3	27.9	8.00
	0620	030591	2680		44000			24.1	30.0	7.65
	0846	030591	2690		45200			25.7	31.0	7.67
	0918	030591	2700		45500			25.9	31.1	7.67

1055	030591	2710	45200			25.9	31.1	7.62
1153	030591	2720	45900	TOTAL DEPTH		26.2	31.8	7.63
2245	031691	After 6 hrs circulation	39800		15060	23.3	27.9	7.55

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
WATER QUALITY DURING REVERSE AIR DRILLING

SPL NO.	DPTH BLS	DATE M/D/Y	TIME	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal	pH
1	250	110390	2150	-----	495	---	8	26.2	2.8	12.22
	260	110390	2255	5450	5200	---	48	26.0	3.1	12.23
	270	110490	0055	5480	5500	---	54	25.9	3.1	12.24
	280	110490	0150	5080	5100	---	160	26.4	2.9	12.15
	290	110490	0215	5300	5100	---	278	26.0	2.9	12.17
	300	110490	0255	4750	4780	1640	300	25.2	2.7	12.07
2	310	110490	0410	4230	4340	1360	---	25.8	2.5	11.96
	320	110490	0425	3880	3860	1650	---	25.5	2.1	11.85
	330	110490	0510	3390	3390	1470	---	24.9	2.0	11.66
	340	110490	0605	2790	2620	1340	---	24.9	1.5	10.63
	350	110490	0635	2790	2760	---	670	25.0	1.6	10.67
	360	110490	0705	2540	2530	---	---	24.5	1.4	9.47
3	370	110490	0830	2850	2710	---	---	24.4	1.5	8.21
	380	110490	0855	2770	2750	1390		24.5	1.5	8.15
	390	110490	0910	2850	2880			24.5	1.6	8.09
	400	110490	0940	2850	2870	1420	748	24.0	1.8	8.09
	410	110490	1038	2820	2900	1390		21.5	1.8	8.26
	420	110490	1047	2930	2950	1480		24.5	1.8	8.29
4	428	110490	1100	2940	2950	1500	809	22.5	1.85	8.46
	430	110490	2200	2730	2650	1370		24.2	1.5	10.34
	440	110490	2225	2730	2640	1370		24.7	1.5	10.39
	450	110490	2330	2540	2410	1327		24.0	1.2	10.27
	461	110590	0010	2360	2300	1180	590	24.1	1.1	9.94
	470	110590	0200	2050	1980	1030		23.2	1.0	10.03
	480	110590	0250	2000	1900	1010		23.0	0.9	10.41
5	490	110590	0310	2000	1980	1060	454	23.4	1.0	10.41
	500	110590	0340	2100	2090	1060		23.0	1.0	9.30
	510	110590	0535	2590	2430	1300		23.0	1.3	9.46
	520	110590	0605	2610	2530	1310		22.2	1.5	9.53
	530	110590	0640	2700	2690	1360		23.0	1.5	8.52
	540	110590	0710	2780	2700	1400		22.5	1.5	8.46
	550	110590	0725	2880	2600	1440		23.0	1.5	8.31
6	556	110590	0757	2900	2750	1450	772	23.1	1.6	8.19
	560	110590	0837	2930	2710	1470		23.7	1.7	8.17
	570	110590	0854	3070	2990	1500		24.4	1.7	8.13
	580	110590	0923	2960	2900	1510		24.1	1.7	7.87
	590	110590	1037	2930	2910	1530		24.3	1.7	8.41
	600	110590	1112	3010	2900	1520		25.0	1.8	8.26
	610	110590	1150	3000	2990	1510		25.0	1.8	8.33
7	616	110590	1240	2940	2900	1480	780	24.5	1.8	9.18
	620	110590	1318	2890	2820	1450		24.5	1.8	9.23
	630	110590	1343	2970	2870	1490		24.4	1.8	8.76
	640	110590	1428	2880	2830	1470		24.6	1.8	8.99
	650	110590	1513	2960	2900	1480		24.4	1.8	8.48
	660	110590	1600	2910	2850	1460		24.2	1.8	8.45
	670	110590	1632	2980	2900	1490		24.8	1.8	8.37

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
WATER QUALITY DURING REVERSE AIR DRILLING

SPL NO.	DPTH BLS	DATE M/D/Y	TIME	CONDUCTIVITY umhos/cm		TDS mg/l	CL mg/l	TEMP C	Sal	pH
8	680	110590	1728	2970	2900	1490	787	24.3	1.8	8.12
	690	110590	1803	3030	2900	1510		23.9	1.5	8.05
	700	110590	1830	3080	3050	1540		24.0	1.8	8.01
	710	110590	1850	2980	3050	1490		24.0	1.8	8.00
	720	110590	1950	3070	3040	1590		24.0	1.8	8.01
	730	110590	2025	3180	3090	1590		24.0	1.8	7.97
	740	110590	2050	3210	3030	1610		23.2	1.8	7.97
9	743	110590	2110	3190	3110	1600	842	24.1	1.9	7.97
	750	110590	2145	3110	3090	1610		23.5	1.9	7.88
	760	110590	2215	3170	3010	1610		23.0	1.8	7.94
	770	110590	2235	3170	2990	1650		22.0	1.8	7.93
	780	110590	2325	3220	3090	1680		23.5	1.9	7.87
	790	110590	2355	3140	3140	1620		23.6	2.0	7.89
	800	110690	0045	3120	3090	1610		23.1	1.9	7.97
10	804	110690	0110	3220	3200	1650	857	24.4	2.0	7.97
	810	110690	0310	3220	3170	1700		23.4	2.0	7.87
	820	110690	0335	2940	2910	1520		23.5	1.9	8.01
	830	110690	0400	3130	3050	1620		23.5	1.9	7.90
	840	110690	0500	3280	3060	1780		23.2	1.9	7.90
	850	110690	0535	3110	3050	1600		23.3	1.9	7.92
	860	110690	0600	3050	3020	1540		23.1	1.9	7.89
11	866	110690	0640	3220	3200	1620	846	24.5	2.0	7.91
	870	110690	0713	3180	3000	1610		22.8	1.9	7.99
	880	110690	0734	3050	2990	1620		23.1	1.9	7.89
	890	110690	0803	3250	3000	1660		23.5	1.9	7.99
	900	110690	0823	3100	3000	1620		23.5	1.8	7.89
	910	110690	1039	3040	3050	1590		24.7	1.9	8.03
	920	110690	1103	3120	3050	1600		24.8	1.9	7.97
12	930	110690	1129	3380	3100	1620	798	24.7	1.9	8.04
	940	110690	1300	3490	3160	1760		25.5	1.9	7.98
	950	110690	1315	3370	3150	1780		25.5	1.9	8.17
	960	110690	1356	3330	3150	1720		25.6	1.8	8.25
	970	110690	1528	3370	3150	1710		25.0	1.9	8.29
	980	110690	1610	3380	3170	1710		24.7	1.8	8.23
13	992	110690	1659	3340	3050	1660	815	24.6	1.6	8.25
	1000	110690	1815	3400	3050	1740		24.2	1.8	8.22
	1010	110690	1840	3410	3120	1750		24.3	1.8	8.35
	1020	110690	2025	3370	3120	1660		24.5	1.9	8.07
	1030	110690	2130	3430	3250	1690		24.8	2.0	8.20
	1040	110690	2215	3480	3280	1720		25.0	2.0	8.15
	1050	110690	2330	3660	3480	1820		25.0	2.0	8.08
14	1053	110690	2350	3650	3650	1810	989	25.8	2.0	8.08
	1060	110790	0040	3590	3400	1780		25.2	2.0	8.17
	1070	110790	0205	3500	3450	1750		25.2	2.0	8.12

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
WATER QUALITY DURING REVERSE AIR DRILLING

SPL NO.	DPTH BLS	DATE M/D/Y	TIME	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal	pH
	1080	110790	0250	3500	3500	1730		26.0	2.0	8.07
	1090	110790	0445	3670	3670	1820		25.9	2.0	8.09
	1100	110790	0540	3870	3780	1930		25.9	2.1	8.02
15	1110	110790	0645	4060	4000	2020	995	26.1	2.2	7.93
	1120	110790	0838	4280	4100	2140		25.6	2.3	8.15
	1131	110790	0921	4160	4160	3980		25.6	2.2	8.13
	1131	110790	1100	5270	5000			core	#1	
	1131	110790	1220	5440	5100	2730		26.3	3.0	
	1140	110890	0630	2810	2750	1370		24.8	1.5	8.24
	1150	110890	0720	3650	3610	1790		25.2	2.0	8.00
	1160	110890	0854	5330	5000	2650		24.8	2.9	8.12
16	1170	110890	0955	5780	6200	2790	1808	25.9	3.5	8.00
	1180	110890	1058	8000	8500	3830		26.2	4.9	8.07
	1190	110890	1341	6080	6000	3040		25.5	3.5	8.15
	1200	110890	1459	13700	13200	13200		25.4	7.8	7.86
	1210	110890	1612	17300	17000	8660		25.9	9.8	7.76
	1220	110890	1655	18200	17500	9040		25.0	10.0	7.66
17	1230	110890	1712	11200	11000	5620		24.9	6.4	7.63
	1240	110890	1735	9230	9000	4750		24.9	5.0	7.80
	1250	110890	1830	11650	11800	5840		24.9	6.7	7.74
	1260	110890	1853	10540	10700	5720		24.2	6.2	7.74
	1270	110890	1900	9870	9500	5370		24.4	5.5	7.76
	1280	110890	2120	14800	13900	8600		24.9	8.1	7.73
18	1290	110890	2200	4860	5500	2840	1575	25.0	3.0	7.91
	1300	110990	0235	13900	14000	6930		25.2	7.2	7.80
	1310	110990	0610		26000	13650		25.7	15.5	7.70
	1320	110990	0835	17640	17500	9210		25.0	10.2	7.93
	1330	110990	1005	17800	18000	9250		25.7	10.5	7.78
	1340	110990	1340	17200	17000	8600		25.8	10.0	7.86
19	1350	110990	1537	>20k	32200	17000		25.3	19.7	7.57
	1360	111090	0231	meter	34700	19800		24.8	21.9	7.57
	1370	111090	0504	off	39600	>20k		26.0	26.0	7.52
	1380	111090	0610	scale	37100	meter		24.1	23.8	7.59
	1390	111090	0633	>20k	34900	off		24.3	22.3	7.67
	1400	111090	0745	>20k	31000	scale		24.0	19.8	7.66
20	1410	111090	0820	>20k	36000	>20k		23.7	22.9	7.64
	1420	111090	0845	>20k	32100	>20k		23.7	20.4	7.75
	1430	111090	0925	>20k	32100	>20k		24.0	20.2	7.64
	1440	111090	1125	>20k	31000	>20k		23.1	20.0	7.67
	1450	111090	1240	>20k	32200	>20k		24.4	20.3	7.68
	1460	111090	1412	>20k	32000	>20k		24.0	20.1	7.59
21	1470	111090	1615	>20k	26900	>20k		core	#2	
	1480	111090	1820	>20k	37700	>20k		23.2	24.0	7.54
	1490	111090	2115	>20k	40300	>20k		23.5	26.8	7.49
	1500	111190	0030	>20k	37300	>20k		21.3	24.5	7.62

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
WATER QUALITY OF STRADDLE PACKER SAMPLES

DATE M/D/Y	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal
STRADDLE PACKER #1 WATER QUALITY						
PACKER INTERVAL: 1145'-1200'						
111590		31000	---	<10,000	27.2	18.5
STRADDLE PACKER #2 WATER QUALITY						
PACKER INTERVAL: 1125'-1133'						
111690		10000	---	---	26.5	5.8

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
WATER QUALITY OF POINT SAMPLES
FIELD PARAMETERS
WELL IS FREE FLOWING 25 GPM

SPL NO.	DPTH BLS	DATE M/D/Y	TIME	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	TEMP C	pH	
1	250	111390	1240	4050	---	2030	25.6	7.57	lab
2	300	111390	1311	4040	---	2020	25.9	7.47	lab
3	400	111390	1338	7140	---	3570	25.5	7.60	lab
4	500	111390	1358	7900	---	3950	25.2	7.57	lab
5	600	111390	1421	4660	---	2330	25.5	7.60	lab
6	700	111390	1441	5400	---	2700	25.4	7.57	lab
7	800	111390	1501	8680	---	4340	25.3	7.53	lab
8	900	111390	1528	10000	---	5200	24.6	7.52	lab
9	1000	111390	1553	9390	---	4690	24.5	7.49	lab
10	1100	111390	1614	9810	---	4900	24.4	7.53	lab
				12260	---	6130	23.8	7.52	
11	1200	111390	1637	6900	---	3460	23.5	7.65	lab
				19610	---	9800	24.1	7.37	
12	1300	111390	1700	----	21700	13000	24.0	7.32	lab
				11470	---	5750	23.4	7.44	
13	1400	111390	1727	16080	---	8050	23.9	7.42	lab
				----	21200	11140	23.5	7.29	
14	1500	111390	1802	14540	---	7270	23.4	7.38	lab
				12070	---	6380	22.9	7.43	

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
WATER QUALITY DURING DEVELOPMENT

SPL NO.	DPTH BLS	DATE M/D/Y	TIME	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	Sal	pH
1	1388	022491	1210		15000		3700	25.5	8.5	11.74
2	1388	022491	1225		18000			25.0	10.0	9.86
3	1388	022491	1240		40000			24.3	24.0	8.89
4	1388	022491	1255		40000			25.6	24.0	8.85
5	1388	022491	1310		39600		7590	25.9	23.5	8.41
6	1388	022491	1410		42000		5040	26.2	25.2	8.36
7	1388	022491	1510		42200		7520	26.5	25.2	8.24
8	1388	022491	1610		42200		6900	26.5	25.2	8.26
9	1388	022491	1710		42500			26.5	25.2	8.11
10	1388	022491	1810		42200			26.4	25.2	8.05
11	1388	022491	1910		41000			25.5	24.3	7.98
12	1388	022491	2010		41000			25.5	25.0	7.96
13	1388	022491	2110		41200			25.8	25.8	7.92
14	1388	022491	2210		41200			25.8	25.2	7.89
15	1388	022491	2310		41000			25.2	25.2	7.89
16	1388	022591	0010		42000		11908	24.7	26.0	7.79
17	1388	022591	0110		41800			26.2	26.0	7.85
18	1388	022591	0210		41000			25.6	25.3	7.83
19	1388	022591	0310		40800			25.9	25.0	7.77
20	1388	022591	0410		41000			25.6	25.3	7.80
21	1388	022591	0510		41000			25.7	25.0	7.74
22	1388	022591	0610		40100		7400	24.8	25.0	7.78
23	1388	022791	1005		39500			24.1	27.2	7.81
24	1388	022791	1105		39000			25.2	27.0	7.94
25	1388	022791	1205		40200			25.2	28.0	7.94
26	1388	022791	1305		40200		16820	25.1	28.0	7.78
27	1388	022791	1355		39500			24.9	27.5	7.81
28	1388	030191	0925		39500			24.8	27.5	7.79
29	1388	030191	1030		40800			26.3	28.5	7.84

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
WATER QUALITY DURING REVERSE AIR DRILLING

SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	YSI	TDS mg/l	CL mg/l	TEMP C	SAL ppt	pH
1	0900	010191	250		4000		719	24.2	2.5	11.92
	0920	010191	260		8500			23.8	5.0	12.50
	0940	010191	270		8200			24.7	5.0	12.40
	1115	010191	280		7200			24.3	4.5	12.40
	1132	010191	290		7200			24.3	4.3	12.38
	1155	010191	300		4500			25.0	2.8	12.35
2	1315	010191	310		6800		280	24.8	4.0	12.24
	1328	010191	320		6800			24.5	4.0	12.25
	1338	010191	330		7000			24.5	4.0	12.24
	1413	010191	340		6000			24.9	3.7	12.16
	1420	010191	350		5500			25.3	3.7	12.20
	1426	010191	360		5900			24.6	3.5	12.18
3	1448	010191	370		5000		858	24.9	3.2	12.17
	1455	010191	380		3500			24.0	2.1	11.76
	1504	010191	390		4500			24.7	2.8	11.92
	1550	010191	400		4700			24.1	2.1	11.74
	1600	010191	410		4000			23.8	2.3	11.75
	1610	010191	420		3900			23.7	2.3	11.87
4	1640	010191	430		4200		574	23.8	2.5	11.91
	1645	010191	440		4000			23.5	2.4	11.92
	1702	010191	450		3800			23.7	2.1	11.79
	1749	010191	460		4200			23.9	2.7	11.92
	1815	010191	470		4200			23.3	2.7	11.95
	1900	010191	480		4100			22.7	2.5	11.91
5	1930	010191	490		4100		560	22.6	2.6	11.90
	2000	010191	500		3900			22.6	2.3	11.84
	2055	010191	510		3300			24.0	2.0	11.50
	2105	010191	520		3300			23.1	1.9	11.51
	2150	010191	530		3400			23.4	2.0	11.54
	2200	010191	540		3400			23.1	2.0	11.55
6	2210	010191	550		3300		680	23.6	2.0	11.46
	2312	010191	560		3400			23.4	2.0	11.44
	2320	010191	570		3400			23.3	1.8	11.15
	2330	010191	580		4000			23.5	2.2	11.78
	0034	010291	590		3500			23.1	2.0	11.55
	0118	010291	600		3600			23.5	2.0	11.61
7	0143	010291	610		3400		658	23.7	1.9	11.44
	0240	010291	620		2950			22.9	1.7	10.74
	0308	010291	630		3100			23.5	1.9	10.87
	0332	010291	640		3120			23.7	1.9	10.98
	0449	010291	650		2900			23.6	1.9	10.40
	0456	010291	660		3280			23.5	2.0	11.32
8	0503	010291	670		3000		616	23.5	1.9	10.90

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
WATER QUALITY DURING REVERSE AIR DRILLING

SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	CONDUCTIVITY umhos/cm YSI	TDS mg/l	CL mg/l	TEMP C	SAL ppt	pH
	0550	010291	680		2900			23.4	1.9	10.80
	0558	010291	690		2850			23.4	1.9	10.77
	0620	010291	700		2800			23.7	1.8	10.11
	0655	010291	710		2800			23.7	1.6	9.98
	0708	010291	720		2800			23.5	1.7	9.98
9	0725	010291	730		2800		762	23.7	1.5	9.77
	0747	010291	740		2900			24.0	1.7	9.02
	0818	010291	750		2750			23.8	1.6	8.61
	0823	010291	760		2720			23.7	1.6	8.94
	0830	010291	770		2800			23.9	1.7	9.10
	0930	010291	780		2600			24.1	1.6	8.97
10	0954	010291	790		2800		760	24.4	1.5	9.09
	1000	010291	800		2820			24.0	1.5	10.05
	1030	010291	810		2800			24.4	1.5	8.63
	1040	010291	820		2800			24.3	1.5	8.84
	1053	010291	830		2800			24.5	1.5	9.87
	1120	010291	840		2820			24.5	1.5	8.70
11	1133	010291	850		2750		622	24.5	1.5	9.32
	1145	010291	860		2850			24.4	1.5	8.83
	1217	010291	870		2730			24.6	1.5	8.73
	1233	010291	880		2800			24.2	1.5	8.84
	1245	010291	890		2700			24.6	1.5	9.42
12	1325	010291	900		2880		752	24.8	1.8	8.95
	1350	010291	910		2900			25.1	1.8	8.73
	1403	010291	920		2820			25.1	1.8	9.02
	1435	010291	930		2880			25.2	1.8	9.10
	1546	010291	940		2900			25.2	1.8	8.73
	1620	010291	950		2900			25.1	1.8	9.90
13	1645	010291	960		2900		620	24.5	1.7	9.70

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
WATER QUALITY DURING DEVELOPMENT

SPL NO.	TIME	DATE M/D/Y	DEPTH BLS	CONDUCTIVITY umhos/cm HACH	CONDUCTIVITY umhos/cm YSI	TDS mg/l	CL mg/l	TEMP C	SAL ppt	pH
1	0820	022591	950		2750			25.2	1.5	8.35
2	0835	022591	950		3600			24.8	2.0	8.25
3	0850	022591	950		3100			25.4	1.8	8.44
4	0905	022591	950		3400			25.1	2.0	8.31
5	0920	022591	950		3400			25.0	2.0	8.23
6	1020	022591	950		3500			25.7	2.0	7.97
7	1120	022591	950		3500			26.0	2.0	7.83
8	1220	022591	950		3500			25.8	2.0	7.82
9	1320	022591	950		3550			26.2	2.0	7.78
10	1420	022591	950		3550			26.4	2.0	7.78
11	1520	022591	950		3550			26.6	2.0	7.78
12	1620	022591	950		3600			26.4	2.0	7.80
13	1720	022591	950		3600		550	26.7	2.0	7.81
14	1820	022591	950		3550			26.5	2.0	7.80
15	1920	022591	950		3600			26.3	2.0	7.79
16	2020	022591	950		3520			26.4	2.0	7.78
17	2120	022591	950		3510			26.1	2.0	7.75
18	2220	022591	950		3480			25.7	2.0	7.77
19	2320	022591	950		3450			25.3	2.0	7.76
20	0020	022691	950		3400			24.8	2.0	7.75
21	0120	022691	950		3490			25.7	1.9	7.82
22	0220	022691	950		3420			25.5	1.9	7.79
23	0330	022691	950		3490			25.1	2.0	7.76
24	0420	022691	950		3470			25.6	2.0	7.72
25	0520	022691	950		3490			24.7	2.0	7.71
26	0620	022691	950		3490		480	25.8	2.0	7.69
27	0720	022691	950		3500			25.4	2.0	7.76
28	1220	022691	950		3590			25.4	2.0	7.75
29	1320	022691	950		3600			25.4	2.0	7.71
30	1420	022691	950		3580			25.4	2.0	7.70
31	1520	022691	950		3580			25.2	2.0	7.70
32	0445	022791	950		3600			23.7	2.0	7.71
33	0545	022791	950		3400			23.4	1.9	7.74
34	0645	022791	950		3300			23.4	2.0	7.70
35	0745	022791	950		3520			24.2	2.0	7.67
36	0845	022791	950		3490			25.0	2.0	7.70
37	0930	022791	950		3200			21.3	2.0	7.71
38	0730	030191	950		3450			24.8	2.0	7.66
39	0830	030191	950		3490		865	25.4	2.1	7.62
40	0920	030191	950		3500			25.6	2.1	7.67

ROCKLEDGE CLASS I INJECTION WELL PROJECT
WATER TABLE MONITOR WELLS
WATER QUALITY

Surficial Monitor Wells water quality:

October 17, 1990 Bionomics

Well	Turbidity (NTU)	Conductivity (umhos/cm)	Chlorides (mg/l)	pH
MW #1 (NE)	5.5	2,000	356	5.73
MW #2 (NW)	3.0	730	68	5.87
MW #3 (SW)	5.5	2,000	350	5.39
MW #4 (SE)	66	840	131	5.48

October 18, 1990 Bionomics

Well	Turbidity (NTU)	Conductivity (umhos/cm)	Chlorides (mg/l)	pH
MW #1	19	1,000	134	5.85
MW #2	3.0	720	94	6.00
MW #3	17	1,900	348	5.34
MW #4	16	900	156	5.42

October 19, 1990 Bionomics

Well	Turbidity (NTU)	Conductivity (umhos/cm)	Chlorides (mg/l)	pH
MW #1	23	900	132	5.70
MW #2	3.0	710	88	5.95
MW #3	13	2,000	348	5.41
MW #4	38	870	154	5.55

October 26, 1990 Bionomics

Well	Turbidity (NTU)	Conductivity (umhos/cm)	Chlorides (mg/l)	pH
MW #1 (NE)	8.2	800	120	5.68
MW #2 (NW)	3.0	770	96	6.01
MW #3 (SW)	9.2	2,000	345	5.45
MW #4 (SE)	23	840	142	6.00

October 31, 1990 Bionomics

Well	Turbidity (NTU)	Conductivity (umhos/cm)	Chlorides (mg/l)	pH
MW #1 (NE)	26	890	125	6.02
MW #2 (NW)	1.9	720	112	5.85
MW #3 (SW)	9.8	1,800	320	5.55
MW #4 (SE)	20	720	112	5.85

ROCKLEDGE CLASS I INJECTION WELL PROJECT
WATER TABLE MONITOR WELLS
WATER QUALITY

November 8, 1990 YSI Meter

Well	Turbidity (NTU)	Conductivity (umhos/cm)	Chlorides (mg/l)	pH
MW #1 (NE)	8.7	1,110	160	6.34
MW #2 (NW)	1.8	870	128	5.86
MW #3 (SW)	3.2	2,168	368	5.75
MW #4 (SE)	140	850	140	6.27

November 22, 1990 Hach Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	1,100	100	5.81	550
MW #2 (NW)	1,360	120	5.85	690
MW #3 (SW)	1,980	270	5.31	1030
MW #4 (SE)	630	45	5.76	320

November 30, 1990 Hach Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	1,000	100	5.70	500
MW #2 (NW)	1,080	100	5.76	540
MW #3 (SW)	2,100	230	5.44	1050
MW #4 (SE)	710	137	5.53	360

December 6, 1990 Hach Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	1,010	129	5.76	510
MW #2 (NW)	1,090	126	5.89	550
MW #3 (SW)	2,170	331	5.65	1080
MW #4 (SE)	880	115	5.79	440

December 13, 1990 Hach Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	1,060	149	5.71	530
MW #2 (NW)	1,080	116	6.15	540
MW #3 (SW)	2,200	351	5.58	1120
MW #4 (SE)	880	151	5.90	440

ROCKLEDGE CLASS I INJECTION WELL PROJECT
WATER TABLE MONITOR WELLS
WATER QUALITY

December 20, 1990 YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	900	140	5.65	460
MW #2 (NW)	980	121	6.21	480
MW #3 (SW)	1,800	320	5.31	900
MW #4 (SE)	650	147	5.76	320

December 27, 1990 YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	980	140	6.05	470
MW #2 (NW)	930	111	6.00	450
MW #3 (SW)	1,810	317	5.52	900
MW #4 (SE)	750	105	5.82	370

January 4, 1991 YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	1,000	160	6.50	490
MW #2 (NW)	1,020	130	6.81	520
MW #3 (SW)	2,200	306	6.20	1,090
MW #4 (SE)	760	150	6.24	400

January 10, 1991 YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	980	142	6.08	500
MW #2 (NW)	1,090	114	5.96	530
MW #3 (SW)	2,000	258	5.45	990
MW #4 (SE)	890	124	5.91	440

January 17, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	820	120	6.17	460
MW #2 (NW)	1,000	124	6.65	500
MW #3 (SW)	1,650	278	5.74	820
MW #4 (SE)	900	142	6.14	440

ROCKLEDGE CLASS I INJECTION WELL PROJECT
WATER TABLE MONITOR WELLS
WATER QUALITY

January 25, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	850	132	6.07	425
MW #2 (NW)	1,100	121	6.70	550
MW #3 (SW)	1,510	270	5.95	750
MW #4 (SE)	880	152	5.98	440

February 1, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	920	128	5.89	460
MW #2 (NW)	1,300	114	6.66	650
MW #3 (SW)	1,400	295	6.10	700
MW #4 (SE)	900	172	6.24	450

February 7, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	870	111	6.17	435
MW #2 (NW)	950	119	5.98	475
MW #3 (SW)	1,380	219	5.57	690
MW #4 (SE)	1,000	137	5.83	500

February 15, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	820	115	6.29	410
MW #2 (NW)	810	121	5.87	405
MW #3 (SW)	1,300	205	5.76	650
MW #4 (SE)	980	140	6.20	475

February 21, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	820	118	5.46	410
MW #2 (NW)	830	113	5.36	415
MW #3 (SW)	1,470	214	5.17	735
MW #4 (SE)	970	146	5.43	465

ROCKLEDGE CLASS I INJECTION WELL PROJECT
WATER TABLE MONITOR WELLS
WATER QUALITY

February 28, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	820	118	6.16	410
MW #2 (NW)	850	122	6.18	425
MW #3 (SW)	1,490	208	5.70	735
MW #4 (SE)	1,020	145	5.88	460

March 7, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	800	100	6.18	400
MW #2 (NW)	850	116	6.01	440
MW #3 (SW)	1,430	203	5.80	720
MW #4 (SE)	1,000	145	5.26	520

March 14, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	800	95	6.15	375
MW #2 (NW)	800	103	6.02	400
MW #3 (SW)	1,480	210	5.70	700
MW #4 (SE)	930	143	5.97	510

March 21, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	800	100	5.97	400
MW #2 (NW)	870	104	6.40	430
MW #3 (SW)	2,280	476	6.23	900
MW #4 (SE)	1,220	184	5.78	570

March 28, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	800	100	5.97	400
MW #2 (NW)	870	104	6.40	430
MW #3 (SW)	2,280	476	6.23	900
MW #4 (SE)	1,220	184	5.78	570

ROCKLEDGE CLASS I INJECTION WELL PROJECT
WATER TABLE MONITOR WELLS
WATER QUALITY

April 4, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	800	102	8.93	400
MW #2 (NW)	870	104	9.18	420
MW #3 (SW)	2,280	476	8.59	930
MW #4 (SE)	1,220	184	8.25	600

April 11, 1991, YSI Meter

Well	Conductivity (umhos/cm)	Chlorides (mg/l)	pH	TDS (mg/l)
MW #1 (NE)	800	100	9.12	230
MW #2 (NW)	850	108	9.43	300
MW #3 (SW)	2,850	848	8.73	1530
MW #4 (SE)	1,070	174	8.62	600

LABORATORY ANALYSIS OF WATER SAMPLES

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

February 6, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 1/21/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	91534
MARKS	WELL: 1,657'
DATE SAMPLED	1/17/91
TIME SAMPLED	0100

pH, lab	7.99
Alkalinity as CaCO3, mg/l	124
Bicarbonates as CaCO3, mg/l	124
Carbonates as CO3, mg/l	< 1
Carbon Dioxide as CO2, mg/l	< 1
Hydroxide as CaCO3, mg/l	< 1
Hardness, total as CaCO3, mg/l	1,354
Non-carbonate Hardness, as CaCO3, mg/l	1,230
Biochemical Oxygen Demand, 5 day, mg/l	2.5
Chlorides as Cl, mg/l	3,798
Color, Pt/CO units	< 5
Ammonia Nitrogen as N, mg/l	0.48
Organic Nitrogen as N mg/l	0.16
Nitrate Nitrogen as N, mg/l	0.06
Nitrite Nitrogen as N, mg/l	< 0.02
Total Phosphorus as P, mg/l	0.11
Turbidity, N.T.U.	110
Sulfides as S, mg/l	0.24
Sulfates as SO4, mg/l	474
Total Dissolved Solids, mg/l	8,581
Conductivity, umhos/cm	10,700

Signed ______________________
Mark Kromis, Chemist

SAMPLE TAKEN AT END OF DEVELOPMENT-
38" NOMINAL OPEN HOLE FROM 460' TO 1655'

TEST/INJECTION WELL

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

February 6, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 1/21/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	91534
MARKS	WELL: 1,657'
DATE SAMPLED	1/17/91
TIME SAMPLED	0100

TOTAL METALS: mg/l

Calcium as Ca	219
Iron as Fe	0.20
Magnesium as Mg	196
Potassium as K	56.0
Sodium as Na	2,210

Signed ______________
Mark Kromis, Chemist

SAMPLE TAKEN AT END OF DEVELOPMENT-
38" NOMINAL OPEN HOLE FROM 460' TO 1655'

TEST/INJECTION WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

April 11, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 3/18/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	912498	912499
MARKS	1,970'	2,000'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1015	1030
pH, lab	7.74	7.77
Alkalinity as CaCO3, mg/l	341	231
Bicarbonates as CaCO3, mg/l	341	231
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	6,724	7,486
Non-carbonate Hardness, as CaCO3, mg/l	6,383	7,255
Biochemical Oxygen Demand, 5 day, mg/l	3.9	4.0
Chlorides as Cl, mg/l	16,564	16,059
Color, Pt/CO units	10	10
Ammonia Nitrogen as N, mg/l	0.10	0.04
Organic Nitrogen as N mg/l	2.39	1.67
Nitrate Nitrogen as N, mg/l	< 0.40	< 0.40
Nitrite Nitrogen as N, mg/l	0.04	0.05
Total Phosphorus as P, mg/l	< 0.50	< 0.50
Turbidity, N.T.U.	2,600	2,600
Sulfides as S, mg/l	< 0.10	< 0.10
Sulfates as SO4, mg/l	2,650	2,680
Total Dissolved Solids, mg/l	31,215	31,513
Conductivity, umhos/cm	42,600	42,800

POINT SAMPLES-

TEST/INJECTION WELL

LABORATORY REPORT

LAB I.D. NO.	912498	912499
MARKS	1,970'	2,000'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1015	1030
TOTAL METALS: mg/l		
Calcium as Ca	1,090	1,250
Iron as Fe	11.4	15.9
Magnesium as Mg	972	1,060
Potassium as K	232	241
Sodium as Na	7,560	7,780

Signed ______________________
Mark Kromis, Chemist

POINT SAMPLES-
TEST/INJECTION WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

April 11, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 3/18/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	912500	912501
MARKS	2,100'	2,200'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1045	1100
pH, lab	7.70	7.71
Alkalinity as CaCO3, mg/l	198	176
Bicarbonates as CaCO3, mg/l	198	176
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	6,195	6,048
Non-carbonate Hardness, as CaCO3, mg/l	5,997	5,872
Biochemical Oxygen Demand, 5 day, mg/l	2.5	3.0
Chlorides as Cl, mg/l	16,362	15,857
Color, Pt/CO units	10	5
Ammonia Nitrogen as N, mg/l	0.12	0.08
Organic Nitrogen as N mg/l	3.07	1.79
Nitrate Nitrogen as N, mg/l	< 0.40	< 0.40
Nitrite Nitrogen as N, mg/l	0.05	0.04
Total Phosphorus as P, mg/l	< 0.50	< 0.50
Turbidity, N.T.U.	1,300	1,200
Sulfides as S, mg/l	< 0.10	< 0.10
Sulfates as SO4, mg/l	2,680	2,500
Total Dissolved Solids, mg/l	31,711	31,955
Conductivity, umhos/cm	43,200	44,800

POINT SAMPLES-

TEST/INJECTION WELL

LABORATORY REPORT

LAB I.D. NO.	912500	912501
MARKS	2,100'	2,200'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1045	1100
TOTAL METALS: mg/l		
Calcium as Ca	1,010	979
Iron as Fe	11.2	10.1
Magnesium as Mg	892	875
Potassium as K	205	206
Sodium as Na	6,730	6,890

Signed ______________________
Mark Kromis, Chemist

POINT SAMPLES-

TEST/INJECTION WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

April 11, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 3/18/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	912502	912503
MARKS	2,300'	2,400'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1115	1130
pH, lab	7.73	7.82
Alkalinity as CaCO3, mg/l	231	187
Bicarbonates as CaCO3, mg/l	231	187
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	5,239	5,489
Non-carbonate Hardness, as CaCO3, mg/l	5,008	5,302
Biochemical Oxygen Demand, 5 day, mg/l	2.8	3.6
Chlorides as Cl, mg/l	15,655	15,655
Color, Pt/CO units	5	5
Ammonia Nitrogen as N, mg/l	0.19	0.11
Organic Nitrogen as N mg/l	2.11	2.15
Nitrate Nitrogen as N, mg/l	< 0.40	< 0.40
Nitrite Nitrogen as N, mg/l	0.04	0.05
Total Phosphorus as P, mg/l	< 0.50	< 0.50
Turbidity, N.T.U.	1,200	1,300
Sulfides as S, mg/l	< 0.10	< 0.10
Sulfates as SO4, mg/l	2,500	2,300
Total Dissolved Solids, mg/l	32,747	31,589
Conductivity, umhos/cm	45,000	42,700

POINT SAMPLES-
TEST/INJECTION WELL

HYDRO DESIGNS
April 11, 1991
Page Two

LABORATORY REPORT

LAB I.D. NO.	912502	912503
MARKS	2,300'	2,400'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1115	1130
TOTAL METALS: mg/l		
Calcium as Ca	731	841
Iron as Fe	3.57	5.88
Magnesium as Mg	829	823
Potassium as K	230	211
Sodium as Na	7,290	7,070

Signed ______________________
Mark Kromis, Chemist

POINT SAMPLES-
TEST/INJECTION WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

April 11, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 3/18/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	912504	912505
MARKS	2,500'	2,600'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1145	1200
pH, lab	7.87	7.87
Alkalinity as CaCO3, mg/l	165	165
Bicarbonates as CaCO3, mg/l	165	165
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	5,027	5,501
Non-carbonate Hardness, as CaCO3, mg/l	4,862	5,336
Biochemical Oxygen Demand, 5 day, mg/l	4.0	7.6
Chlorides as Cl, mg/l	15,554	14,746
Color, Pt/CO units	10	10
Ammonia Nitrogen as N, mg/l	0.10	0.07
Organic Nitrogen as N mg/l	2.02	2.75
Nitrate Nitrogen as N, mg/l	< 0.40	< 0.40
Nitrite Nitrogen as N, mg/l	0.04	0.05
Total Phosphorus as P, mg/l	< 0.50	< 0.50
Turbidity, N.T.U.	950	1,400
Sulfides as S, mg/l	< 0.10	< 0.10
Sulfates as SO4, mg/l	2,665	2,320
Total Dissolved Solids, mg/l	30,609	29,939
Conductivity, umhos/cm	42,000	40,500

POINT SAMPLES-

TEST/INJECTION WELL

HYDRO DESIGNS
April 11, 1991
Page Two

LABORATORY REPORT

LAB I.D. NO.	912504	912505
MARKS	2,500'	2,600'
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1145	1200

TOTAL METALS: mg/l

Calcium as Ca	755	872
Iron as Fe	5.06	7.79
Magnesium as Mg	763	807
Potassium as K	206	204
Sodium as Na	6,940	6,750

Signed ____________________________
Mark Kromis, Chemist

POINT SAMPLES-

TEST/INJECTION WELL

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

April 11, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 3/18/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	912506	912507
MARKS	2,700'	TEST INJECTION WELL
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1215	---
pH, lab	7.80	7.90
Alkalinity as $CaCO_3$, mg/l	253	132
Bicarbonates as $CaCO_3$, mg/l	253	132
Carbonates as CO_3, mg/l	< 1	< 1
Carbon Dioxide as CO_2, mg/l	< 1	< 1
Hydroxide as $CaCO_3$, mg/l	< 1	< 1
Hardness, total as $CaCO_3$, mg/l	6,668	5,234
Non-carbonate Hardness, as $CaCO_3$, mg/l	6,415	5,102
Biochemical Oxygen Demand, 5 day, mg/l	8.0	1.0
Chlorides as Cl, mg/l	14,544	15,655
Color, Pt/CO units	5	10
Ammonia Nitrogen as N, mg/l	0.14	0.06
Organic Nitrogen as N mg/l	2.51	3.02
Nitrate Nitrogen as N, mg/l	< 0.40	< 0.40
Nitrite Nitrogen as N, mg/l	0.05	0.05
Total Phosphorus as P, mg/l	< 0.50	< 0.50
Turbidity, N.T.U.	1,400	70
Sulfides as S, mg/l	< 0.10	< 0.10
Sulfates as SO_4, mg/l	2,350	2,680
Total Dissolved Solids, mg/l	29,703	31,492
Conductivity, umhos/cm	41,300	44,100

POINT SAMPLES-

TEST/INJECTION WELL

SAMPLE TAKEN AT END OF
FINAL WELL DEVELOPMENT-

TEST/INJECTION WELL

LABORATORY REPORT

LAB I.D. NO.	912506	912507
MARKS	2,700'	TEST INJECTION WELL
DATE SAMPLED	3/17/91	3/17/91
TIME SAMPLED	1215	---
TOTAL METALS: mg/l		
Calcium as Ca	1,120	767
Iron as Fe	10.6	1.50
Magnesium as Mg	940	806
Potassium as K	241	260
Sodium as Na	7,020	8,120

Signed ______________________
Mark Kromis, Chemist

POINT SAMPLES-

TEST/INJECTION WELL

SAMPLE TAKEN AT END OF FINAL WELL DEVELOPMENT-

TEST/INJECTION WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

February 14, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 2/1/91, Submitted By Client For Analysis.
YOUNGQUEST BROTHERS

LABORATORY REPORT

LAB I.D. NO.	91981
MARKS	CIRCULATION TANK T/1 WELL
DATE SAMPLED	2/1/91
TIME SAMPLED	1505
Ammonia Nitrogen as N, mg/l	0.52
Total Kjeldahl Nitrogen as N, mg/l	1.22

Signed ______________________
Mark Kromis, Chemist

CIRCULATION TANK SAMPLE-
TEST/INJECTION WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010503	9010504
MARKS	# 1 250'	# 2 300'
TIME SAMPLED	1240	1311
pH, lab	7.55	7.44
Alkalinity as CaCO3, mg/l	112	113
Bicarbonates as CaCO3, mg/l	112	113
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	568	554
Non-carbonate Hardness, as CaCO3, mg/l	456	441
Biochemical Oxygen Demand, 5 day, mg/l	3.0	2.2
Chlorides as Cl, mg/l	1,346	1,208
Color, Pt/CO units	5	5
Ammonia Nitrogen as N, mg/l	0.67	0.64
Organic Nitrogen as N mg/l	0.06	0.28
Nitrate Nitrogen as N, mg/l	0.11	0.11
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	17	20
Sulfides as S, mg/l	0.91	1.18
Sulfates as SO4, mg/l	224	187
Total Dissolved Solids, mg/l	2,578	2,580
Conductivity, umhos/cm	3,200	3,400

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010503	9010504
MARKS	# 1 250'	# 2 300'
TIME SAMPLED	1240	1311
TOTAL METALS: mg/l		
Calcium as Ca	120	117
Iron as Fe	0.59	0.44
Magnesium as Mg	65.1	63.5
Potassium as K	14.0	12.0
Sodium as Na	417	403

Signed [signature]
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010505	9010506
MARKS	#3 400'	#4 500'
TIME SAMPLED	1338	1358
pH, lab	7.60	7.57
Alkalinity as CaCO3, mg/l	128	131
Bicarbonates as CaCO3, mg/l	128	131
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, Total as CaCO3, mg/l	769	465
Non-carbonate Hardness, as CaCO3, mg/l	641	334
Biochemical Oxygen Demand, 5 day, mg/l	1.6	5.0
Chlorides as Cl, mg/l	2,633	2,851
Color, Pt/CO units	7	10
Ammonia Nitrogen as N, mg/l	0.58	0.63
Organic Nitrogen as N mg/l	0.44	0.24
Nitrate Nitrogen as N, mg/l	0.08	0.08
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	36	39
Sulfides as S, mg/l	0.52	0.26
Sulfates as SO4, mg/l	309	380
Total Dissolved Solids, mg/l	4,347	5,333
Conductivity, umhos/cm	6,300	7,400

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010505	9010506
MARKS	#3 400'	#4 500'
TIME SAMPLED	1338	1358
TOTAL METALS: mg/l		
Calcium as Ca	144	164
Iron as Fe	0.42	0.53
Magnesium as Mg	99.5	13.5
Potassium as K	29.0	38.0
Sodium as Na	822	1,100

Signed [signature]
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010507	9010508
MARKS	# 5 600'	# 6 700'
TIME SAMPLED	1421	1441
pH, lab	7.59	7.72
Alkalinity as CaCO3, mg/l	126	113
Bicarbonates as CaCO3, mg/l	126	113
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	886	557
Non-carbonate Hardness, as CaCO3, mg/l	760	444
Biochemical Oxygen Demand, 5 day, mg/l	1.1	1.7
Chlorides as Cl, mg/l	2,950	1,871
Color, Pt/CO units	5	5
Ammonia Nitrogen as N, mg/l	0.61	0.55
Organic Nitrogen as N mg/l	0.35	0.17
Nitrate Nitrogen as N, mg/l	0.05	0.08
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	29	34
Sulfides as S, mg/l	0.33	1.15
Sulfates as SO4, mg/l	343	229
Total Dissolved Solids, mg/l	5,245	2,647
Conductivity, umhos/cm	8,000	7,900

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010507	9010508
MARKS	# 5 600'	# 6 700'
TIME SAMPLED	1421	1441
TOTAL METALS: mg/l		
Calcium as Ca	147	122
Iron as Fe	0.41	0.55
Magnesium as Mg	126	61.4
Potassium as K	37.0	15.7
Sodium as Na	1,030	489

Signed Mark Kromis
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

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December 3, 1990

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1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010509	9010510
MARKS	# 7 800'	# 8 900'
TIME SAMPLED	1501	1528
pH, lab	7.54	7.52
Alkalinity as CaCO3, mg/l	128	129
Bicarbonates as CaCO3, mg/l	128	129
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	959	1,404
Non-carbonate Hardness, as CaCO3, mg/l	831	1,275
Biochemical Oxygen Demand, 5 day, mg/l	1.2	1.4
Chlorides as Cl, mg/l	1,554	2,495
Color, Pt/CO units	5	6
Ammonia Nitrogen as N, mg/l	0.59	0.60
Organic Nitrogen as N mg/l	0.27	0.25
Nitrate Nitrogen as N, mg/l	0.06	0.04
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	50	44
Sulfides as S, mg/l	0.53	0.55
Sulfates as SO4, mg/l	302	369
Total Dissolved Solids, mg/l	4,406	4,781
Conductivity, umhos/cm	6,200	6,900

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

LABORATORY REPORT

LAB I.D. NO.	9010509	9010510
MARKS	# 7 800'	# 8 900'
TIME SAMPLED	1501	1528
TOTAL METALS: mg/l		
Calcium as Ca	163	216
Iron as Fe	1.57	0.68
Magnesium as Mg	134	210
Potassium as K	39.0	62.5
Sodium as Na	1,180	1,860

Signed ______________________
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
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December 3, 1990

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1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010511	9010512
MARKS	# 9 1,000'	# 10 1,100'
TIME SAMPLED	1553	1614
pH, lab	7.59	7.54
Alkalinity as CaCO3, mg/l	128	127
Bicarbonates as CaCO3, mg/l	128	127
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	1,317	947
Non-carbonate Hardness, as CaCO3, mg/l	1,189	820
Biochemical Oxygen Demand, 5 day, mg/l	1.1	1.3
Chlorides as Cl, mg/l	1,426	2,812
Color, Pt/CO units	6	8
Ammonia Nitrogen as N, mg/l	0.61	0.62
Organic Nitrogen as N mg/l	0.09	0.13
Nitrate Nitrogen as N, mg/l	0.04	0.04
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	48	30
Sulfides as S, mg/l	0.43	0.59
Sulfates as SO4, mg/l	328	411
Total Dissolved Solids, mg/l	4,540	5,720
Conductivity, umhos/cm	6,500	8,000

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010511	9010512
MARKS	# 9 1,000'	# 10 1,100'
TIME SAMPLED	1553	1614
TOTAL METALS: mg/l		
Calcium as Ca	208	228
Iron as Fe	0.83	0.52
Magnesium as Mg	194	230
Potassium as K	58.0	67.5
Sodium as Na	1,710	2,040

Signed Mark Kromis
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010513	9010514
MARKS	# 11 1,200'	# 12 1,300'
TIME SAMPLED	1637	1700
pH, lab	7.67	7.55
Alkalinity as CaCO3, mg/l	124	130
Bicarbonates as CaCO3, mg/l	124	130
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	896	1,459
Non-carbonate Hardness, as CaCO3, mg/l	772	1,329
Biochemical Oxygen Demand, 5 day, mg/l	1.3	2.6
Chlorides as Cl, mg/l	1,841	2,713
Color, Pt/CO units	7	5
Ammonia Nitrogen as N, mg/l	0.57	0.46
Organic Nitrogen as N mg/l	0.27	0.34
Nitrate Nitrogen as N, mg/l	0.05	< 0.02
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	30	35
Sulfides as S, mg/l	0.58	0.53
Sulfates as SO4, mg/l	284	317
Total Dissolved Solids, mg/l	3,556	5,079
Conductivity, umhos/cm	5,200	7,300

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010513	9010514
MARKS	# 11 1,200'	# 12 1,300'
TIME SAMPLED	1637	1700
TOTAL METALS: mg/l		
Calcium as Ca	161	223
Iron as Fe	0.57	1.01
Magnesium as Mg	120	219
Potassium as K	33.0	61.0
Sodium as Na	983	1,820

Signed [signature]
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010515	9010516
MARKS	# 13 1,400'	# 14 1,500'
TIME SAMPLED	1727	1802
pH, lab	7.46	7.62
Alkalinity as CaCO3, mg/l	134	130
Bicarbonates as CaCO3, mg/l	134	130
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	1,486	1,653
Non-carbonate Hardness, as CaCO3, mg/l	1,352	1,523
Biochemical Oxygen Demand, 5 day, mg/l	1.3	1.0
Chlorides as Cl, mg/l	5,782	3,861
Color, Pt/CO units	6	7
Ammonia Nitrogen as N, mg/l	0.62	0.57
Organic Nitrogen as N mg/l	0.22	0.43
Nitrate Nitrogen as N, mg/l	0.04	0.04
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	< 0.050	< 0.050
Turbidity, N.T.U.	31	32
Sulfides as S, mg/l	0.44	0.45
Sulfates as SO4, mg/l	733	494
Total Dissolved Solids, mg/l	9,207	5,567
Conductivity, umhos/cm	13,600	8,900

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010515	9010516
MARKS	# 13 1,400'	# 14 1,500'
TIME SAMPLED	1727	1802
TOTAL METALS: mg/l		
Calcium as Ca	293	235
Iron as Fe	0.42	0.56
Magnesium as Mg	361	259
Potassium as K	121	77.5
Sodium as Na	3,240	2,160

Signed Mark Kromis
Mark Kromis, Chemist

POINT SAMPLES-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/16/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010536
MARKS	1,125'-1,135' DEEP WELL
pH, lab	7.18
Alkalinity as CaCO3, mg/l	116
Bicarbonates as CaCO3, mg/l	116
Carbonates as CO3, mg/l	< 1
Carbon Dioxide as CO2, mg/l	< 1
Hydroxide as CaCO3, mg/l	< 1
Hardness, total as CaCO3, mg/l	1,062
Non-carbonate Hardness, as CaCO3, mg/l	946
Biochemical Oxygen Demand, 5 day, mg/l	1.1
Chlorides as Cl, mg/l	3,420
Color, Pt/CO units	10
Ammonia Nitrogen as N, mg/l	0.64
Organic Nitrogen as N mg/l	0.35
Nitrate Nitrogen as N, mg/l	0.04
Nitrite Nitrogen as N, mg/l	< 0.02
Total Phosphorus as P, mg/l	< 0.050
Turbidity, N.T.U.	21
Sulfides as S, mg/l	0.29
Sulfates as SO4, mg/l	463
Total Dissolved Solids, mg/l	6,384
Conductivity, umhos/cm	9,200

STRADDLE PACKER SAMPLE-

DEEP FLORIDAN
MONITOR WELL

HYDRO DESIGNS
December 3, 1990
Page Two

LABORATORY REPORT

LAB I.D. NO.	9010536
MARKS	1,125'-1,135' DEEP WELL

TOTAL METALS: mg/l

Calcium as Ca	183
Iron as Fe	2.75
Magnesium as Mg	147
Potassium as K	37.5
Sodium as Na	1,260

Signed ______________________
Mark Kromis, Chemist

STRADDLE PACKER SAMPLE-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

December 3, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 11/15/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	9010517
MARKS	# 15 STRADDLE PACKER
TIME SAMPLED	0720 1145'-1,200'
pH, lab	7.39
Alkalinity as CaCO3, mg/l	135
Bicarbonates as CaCO3, mg/l	135
Carbonates as CO3, mg/l	< 1
Carbon Dioxide as CO2, mg/l	< 1
Hydroxide as CaCO3, mg/l	< 1
Hardness, total as CaCO3, mg/l	3,832
Non-carbonate Hardness, as CaCO3, mg/l	3,697
Biochemical Oxygen Demand, 5 day, mg/l	0.6
Chlorides as Cl, mg/l	11,454
Color, Pt/CO units	10
Ammonia Nitrogen as N, mg/l	0.85
Organic Nitrogen as N mg/l	0.09
Nitrate Nitrogen as N, mg/l	0.02
Nitrite Nitrogen as N, mg/l	< 0.02
Total Phosphorus as P, mg/l	< 0.050
Turbidity, N.T.U.	37
Sulfides as S, mg/l	0.12
Sulfates as SO4, mg/l	1,820
Total Dissolved Solids, mg/l	22,158
Conductivity, umhos/cm	32,000

STRADDLE PACKER SAMPLE-

DEEP FLORIDAN
MONITOR WELL

LABORATORY REPORT

LAB I.D. NO.	9010517
MARKS	# 15 STRADDLE PACKER
TIME SAMPLED	0720 1145'-1,200'

TOTAL METALS: mg/l

Calcium as Ca	479
Iron as Fe	3.01
Magnesium as Mg	640
Potassium as K	193
Sodium as Na	5,710

Signed [signature]
Mark Kromis, Chemist

STRADDLE PACKER SAMPLE-

DEEP FLORIDAN
MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

March 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 2/27/91, Sampled by Bionomics Laboratory.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS	911863 SHALLOW FLORIDIAN MW	911864 DEEP FLORIDIAN MW
Alkalinity as CaCO3, mg/l	121	109
Bicarbonates as CaCO3, mg/l	121	109
Carbonates as CO3, mg/l	< 1	< 1
Carbon Dioxide as CO2, mg/l	< 1	< 1
Hydroxide as CaCO3, mg/l	< 1	< 1
Hardness, total as CaCO3, mg/l	576	4,595
Non-carbonate Hardness, as CaCO3, mg/l	455	4,486
Biochemical Oxygen Demand, 5 day, mg/l	1.2	1.2
Chlorides as Cl, mg/l	968	15,230
Color, Pt/CO units	10	15
Ammonia Nitrogen as N, mg/l	0.53	0.72
Organic Nitrogen as N mg/l	0.62	2.52
Nitrate Nitrogen as N, mg/l	< 0.02	< 0.02
Nitrite Nitrogen as N, mg/l	< 0.02	< 0.02
Total Phosphorus as P, mg/l	0.074	0.24
Turbidity, N.T.U.	27	32
Sulfates as SO4, mg/l	125	2,346
Total Dissolved Solids, mg/l	2,221	38,989

Signed ____________
Mark Kromis, Chemist

SAMPLES TAKEN AT END
OF FINAL DEVELOPMENT-

SHALLOW FLORIDAN MONITOR WELL

AND DEEP FLORIDAN MONITOR WELL

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

March 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 2/27/91, Sampled by Bionomics Laboratory.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO.	911863	911864
MARKS	SHALLOW FLORIDIAN MW	DEEP FLORIDIAN MW
TOTAL METALS: mg/l		
Calcium as Ca	107	615
Iron as Fe	1.64	6.33
Magnesium as Mg	74.9	743
Potassium as K	7.23	227
Sodium as Na	388	14,400

Signed ________________
Mark Kromis, Chemist

SAMPLES TAKEN AT END
OF FINAL DEVELOPMENT-

SHALLOW FLORIDAN MONITOR WELL

AND DEEP FLORIDAN MONITOR WELL

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

March 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 2/27/91, Sampled by Bionomics Laboratory.
ROCKLEDGE I.W. PROJECT

FIELD DATA REPORT

LAB I.D. NO. MARKS	911863 SHALLOW FLORIDIAN MW	911864 DEEP FLORIDIAN MW
Date Sampled	2/27/91	2/27/91
Time Sampled	0942	1351
pH, Field	7.32	7.43
Temperature, °C	20.9	25.9
Conductivity, umhos/cm	3,450	32,300
Well depth, top of casing, ft.	951	1,388
Water depth, top of casing, ft.	2.33	16.92

Signed ____________________
Mark Kromis, Chemist

SAMPLES TAKEN AT END
OF FINAL DEVELOPMENT-

SHALLOW FLORIDAN MONITOR WELL

AND DEEP FLORIDAN MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

March 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 3/1/91, Sampled by Bionomics Laboratory.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS	911953 SHALLOW FLORIDIAN MW	911954 DEEP FLORIDIAN MW
FIELD DATA:		
Date Sampled	3/1/91	3/1/91
Time Sampled	0907	1033
pH, Field	7.10	7.71
Temperature, °C	26.0	27.1
Conductivity, umhos/cm	3,510	33,800
Well depth, ft.	951	1,388
LABORATORY DATA:		
Hydrogen Sulfide as S, mg/l	1.12	< 0.10

Signed ______________________
Mark Kromis, Chemist

SAMPLES TAKEN AT END
OF FINAL DEVELOPMENT-

SHALLOW FLORIDAN MONITOR WELL

DEEP FLORIDAN MONITOR WELL

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

June 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 4/19/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	913811
MARKS	WELL HEAD
DATE SAMPLED	4/18/91
TIME SAMPLED	1137
pH, lab	7.34
Alkalinity as CaCO3, mg/l	65
Bicarbonates as CaCO3, mg/l	65
Carbonates as CO3, mg/l	< 1
Carbon Dioxide as CO2, mg/l	< 1
Hydroxide as CaCO3, mg/l	< 1
Hardness, total as CaCO3, mg/l	131
Non-carbonate Hardness, as CaCO3, mg/l	66
Biochemical Oxygen Demand, 5 day, mg/l	14
Chlorides as Cl, mg/l	10
Color, Pt/Co units	40
Ammonia Nitrogen as N, mg/l	5.62
Organic Nitrogen as N mg/l	2.08
Nitrate Nitrogen as N, mg/l	5.92
Nitrite Nitrogen as N, mg/l	0.38

EFFLUENT SAMPLED AT BEGINNING OF INJECTION TEST

LABORATORY REPORT

LAB I.D. NO.	913811
MARKS	WELL HEAD
DATE SAMPLED	4/18/91
Total Phosphorus as P, mg/l	4.20
Turbidity, N.T.U.	4.5
Sulfides as S, mg/l	< 0.10
Sulfates as SO4, mg/l	112
Total Dissolved Solids, mg/l	729
Conductivity, umhos/cm	1,100
TOTAL METALS: mg/l	
Calcium as Ca	34.1
Iron as Fe	0.22
Magnesium as Mg	11.1
Potassium as K	10.8
Sodium as Na	173

EFFLUENT SAMPLED AT BEGINNING
OF INJECTION TEST

HYDRO DESIGNS
June 20, 1991
Page Three

LABORATORY REPORT

LAB I.D. NO.	913811
MARKS	WELL HEAD
DATE SAMPLED	4/18/91

EPA METHOD 601/602	Storet No.	UNITS: ug/l	Q
Benzene	34030	1.0	U
Bromodichloromethane	32101	0.49	J
Bromoform	32104	1.0	U
Bromomethane	34413	1.0	U
Carbon Tetrachloride	32102	1.0	U
Chlorobenzene	34301	1.0	U
Chloroethane	34311	1.0	U
2-Chl'Eth'Vinylether	34576	1.0	U
Chloroform	32106	2.5	
Chloromethane	34418	1.0	U
Dibromochloromethane	34306	1.0	U
1,2,-Dichlorobenzene	34571	1.0	U
1,3,-Dichlorobenzene	34566	1.0	U
1,4,-Dichlorobenzene	34536	1.0	U
Dichl'Difluo'Methane	34668	1.0	U
1,1-Dichloroethane	34496	1.0	U
1,2-Dichloroethane	34531	1.0	U
1,1-Dichloroethene	34501	1.0	U
T-1,2-Dichloroethene	34546	1.0	U
1,2-Dichloropropane	34541	1.0	U
cis-1,3-Dich'Propene	34704	1.0	U
T-1,3-Dichl'Propene	34699	1.0	U
Ethylbenzene	34371	1.0	U
Methylene Chloride	34423	1.0	U
1,1,2,2,-Te'Ch'Ethane	34516	1.0	U
Tetrachloroethene	34475	1.0	U
Toluene	34010	1.0	U
1,1,1-Trichl'Ethane	34506	1.0	U
1,1,2-Trichl'Ethane	34511	1.0	U
Trichloroethene	39180	1.0	U
Trichl'Flouromethane	34488	1.0	U
Total Xylenes	81551	3.0	U
Vinyl Chloride	39175	1.0	U

(Q): Qualifiers:
- B: Found in associated blank as well as sample
- J: Estimated Value, less than calibration limit
- O: Estimated Value, greater than calibration limit
- U: Analyzed for but not detected (BDL)

EFFLUENT SAMPLED AT BEGINNING
OF INJECTION TEST

HYDRO DESIGNS
June 20, 1991
Page Four

LABORATORY REPORT

LAB I.D. NO.	913811
MARKS	WELL HEAD
DATE SAMPLED	4/18/91

ORGANOCHLORINE PESTICIDES EPA METHOD 8080	UNITS: ug/l	Q
Aldrin	0.04	U
a-BHC	0.03	U
b-BHC	0.06	U
d-BHC	0.09	U
g-BHC (Lindane)	0.04	U
Chlordane	0.14	U
4,4'-DDD	0.11	U
4,4'-DDE	0.04	U
4,4'-DDT	0.12	U
Dieldrin	0.02	U
Endosulfan I	0.14	U
Endosulfan II	0.04	U
Endosulfan Sulfate	0.66	U
Endrin	0.06	U
Endrin aldehyde	0.23	U
Heptachlor	0.03	U
Heptachlor epoxide	0.83	U
Methoxychlor	1.8	U
Toxaphene	2.4	U

(Q): Qualifiers:
- B: Found in associated blank as well as sample
- J: Estimated Value, less than calibration limit
- O: Estimated Value, greater than calibration limit
- U: Analyzed for but not detected (BDL)

Signed ____________________
Mark Kromis, Chemist

EFFLUENT SAMPLED AT BEGINNING
OF INJECTION TEST

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

June 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 4/19/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	913812
MARKS	WELL HEAD
DATE SAMPLED	4/18/91
TIME SAMPLED	1545
pH, lab	7.37
Alkalinity as CaCO3, mg/l	68
Bicarbonates as CaCO3, mg/l	68
Carbonates as CO3, mg/l	< 1
Carbon Dioxide as CO2, mg/l	< 1
Hydroxide as CaCO3, mg/l	< 1
Hardness, total as CaCO3, mg/l	133
Non-carbonate Hardness, as CaCO3, mg/l	65
Biochemical Oxygen Demand, 5 day, mg/l	3.4
Chlorides as Cl, mg/l	386
Color, Pt/Co units	40
Ammonia Nitrogen as N, mg/l	5.96
Organic Nitrogen as N mg/l	1.54
Nitrate Nitrogen as N, mg/l	5.54
Nitrite Nitrogen as N, mg/l	0.45

EFFLUENT SAMPLED IN MIDDLE
OF INJECTION TEST

LABORATORY REPORT

LAB I.D. NO.	913812
MARKS	WELL HEAD
DATE SAMPLED	4/18/91
Total Phosphorus as P, mg/l	3.60
Turbidity, N.T.U.	4.5
Sulfides as S, mg/l	< 0.10
Sulfates as SO4, mg/l	117
Total Dissolved Solids, mg/l	729
Conductivity, umhos/cm	1,100
TOTAL METALS: mg/l	
Calcium as Ca	35.0
Iron as Fe	0.19
Magnesium as Mg	11.1
Potassium as K	11.2
Sodium as Na	180

EFFLUENT SAMPLED IN MIDDLE
OF INJECTION TEST

LABORATORY REPORT

LAB I.D. NO.	913812
MARKS	WELL HEAD
DATE SAMPLED	4/18/91

EPA METHOD 601/602	Storet No.	UNITS: ug/l	Q
Benzene	34030	1.0	U
Bromodichloromethane	32101	0.43	J
Bromoform	32104	1.0	U
Bromomethane	34413	1.0	U
Carbon Tetrachloride	32102	1.0	U
Chlorobenzene	34301	1.0	U
Chloroethane	34311	1.0	U
2-Chl'Eth'Vinylether	34576	1.0	U
Chloroform	32106	2.6	
Chloromethane	34418	1.0	U
Dibromochloromethane	34306	1.0	U
1,2,-Dichlorobenzene	34571	1.0	U
1,3,-Dichlorobenzene	34566	1.0	U
1,4,-Dichlorobenzene	34536	1.0	U
Dichl'Difluo'Methane	34668	1.0	U
1,1-Dichloroethane	34496	1.0	U
1,2-Dichloroethane	34531	1.0	U
1,1-Dichloroethene	34501	1.0	U
T-1,2-Dichloroethene	34546	1.0	U
1,2-Dichloropropane	34541	1.0	U
cis-1,3-Dich'Propene	34704	1.0	U
T-1,3-Dichl'Propene	34699	1.0	U
Ethylbenzene	34371	1.0	U
Methylene Chloride	34423	1.0	U
1,1,2,2,-Te'Ch'Ethane	34516	1.0	U
Tetrachloroethene	34475	1.0	U
Toluene	34010	1.0	U
1,1,1-Trichl'Ethane	34506	1.0	U
1,1,2-Trichl'Ethane	34511	1.0	U
Trichloroethene	39180	1.0	U
Trichl'Flouromethane	34488	1.0	U
Total Xylenes	81551	3.0	U
Vinyl Chloride	39175	1.0	U

(Q): Qualifiers:
- B: Found in associated blank as well as sample
- J: Estimated Value, less than calibration limit
- O: Estimated Value, greater than calibration limit
- U: Analyzed for but not detected (BDL)

EFFLUENT SAMPLED IN MIDDLE
OF INJECTION TEST

HYDRO DESIGNS
June 20, 1991
Page Four

LABORATORY REPORT

LAB I.D. NO.	913812
MARKS	WELL HEAD
DATE SAMPLED	4/18/91

ORGANOCHLORINE PESTICIDES EPA METHOD 8080	UNITS: ug/l	Q
Aldrin	0.04	U
a-BHC	0.03	U
b-BHC	0.06	U
d-BHC	0.09	U
g-BHC (Lindane)	0.04	U
Chlordane	0.14	U
4,4'-DDD	0.11	U
4,4'-DDE	0.04	U
4,4'-DDT	0.12	U
Dieldrin	0.02	U
Endosulfan I	0.14	U
Endosulfan II	0.04	U
Endosulfan Sulfate	0.66	U
Endrin	0.06	U
Endrin aldehyde	0.23	U
Heptachlor	0.03	U
Heptachlor epoxide	0.83	U
Methoxychlor	1.8	U
Toxaphene	2.4	U

(Q): Qualifiers:
- B: Found in associated blank as well as sample
- J: Estimated Value, less than calibration limit
- O: Estimated Value, greater than calibration limit
- U: Analyzed for but not detected (BDL)

Signed ____________________
Mark Kromis, Chemist

EFFLUENT SAMPLED IN MIDDLE
OF INJECTION TEST

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

June 20, 1991

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 246
Juno Beach, Florida 33408

ATT: Michael S. Knapp

RE: Sample(s) Received 4/19/91, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT # HD88020202

LABORATORY REPORT

LAB I.D. NO.	913813
MARKS	WELL HEAD
DATE SAMPLED	4/18/91
TIME SAMPLED	--- 1805
pH, lab	7.39
Alkalinity as CaCO3, mg/l	68
Bicarbonates as CaCO3, mg/l	68
Carbonates as CO3, mg/l	< 1
Carbon Dioxide as CO2, mg/l	< 1
Hydroxide as CaCO3, mg/l	< 1
Hardness, total as CaCO3, mg/l	135
Non-carbonate Hardness, as CaCO3, mg/l	67
Biochemical Oxygen Demand, 5 day, mg/l	4.0
Chlorides as Cl, mg/l	192
Color, Pt/Co units	30
Ammonia Nitrogen as N, mg/l	6.88
Organic Nitrogen as N mg/l	2.82
Nitrate Nitrogen as N, mg/l	5.27
Nitrite Nitrogen as N, mg/l	0.47

EFFLUENT SAMPLED AT END
OF INJECTION TEST

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

October 23, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATTN: Michael S. Knapp

RE: Sample(s) Received 10/19/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS DATE SAMPLED	909644 SMW1 10/17/90	909645 SMW1 10/18/90	909646 SMW1 10/19/90
pH, lab	5.73	5.85	5.70
Chloride as Cl, mg/l	356	134	132
Conductivity, uhmos/cm	2,000	1,000	900
Turbidity, N.T.U.	5.5	19	23

Signed [signature]
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

October 23, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATTN: Michael S. Knapp

RE: Sample(s) Received 10/19/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS DATE SAMPLED	909647 SMW2 10/17/90	909648 SMW2 10/18/90	909649 SMW2 10/19/90
pH, lab	5.87	6.00	5.95
Chloride as Cl, mg/l	68	94	88
Conductivity, uhmos/cm	730	720	710
Turbidity, N.T.U.	3.0	3.0	3.0

Signed ____________________
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

October 23, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATTN: Michael S. Knapp

RE: Sample(s) Received 10/19/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS DATE SAMPLED	909650 SMW3 10/17/90	909651 SMW3 10/18/90	909652 SMW3 10/19/90
pH, lab	5.39	5.34	5.41
Chloride as Cl, mg/l	350	348	348
Conductivity, uhmos/cm	2,000	1,900	2,000
Turbidity, N.T.U.	5.5	17	13

Signed [signature]
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

October 23, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATTN: Michael S. Knapp

RE: Sample(s) Received 10/19/90, Submitted By Client For Analysis.
ROCKLEDGE I.W. PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS DATE SAMPLED	909653 SMW4 10/17/90	909654 SMW4 10/18/90	909655 SMW4 10/19/90
pH, lab	5.48	5.42	5.55
Chloride as Cl, mg/l	131	156	154
Conductivity, uhmos/cm	840	900	870
Turbidity, N.T.U.	66	16	38

igned Mark Kromis
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

November 5, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATTN: Michael S. Knapp

RE: Sample(s) Received 11/1/90, Submitted By Client For Analysis.
ROCKLEDGE PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS DATE SAMPLED	9010092 SW 1 10/31/90	9010093 SW 2 10/31/90	9010094 SW 3 10/31/90	9010095 SW 4 10/31/90
pH, lab	6.02	6.32	5.55	5.85
Chloride as Cl, mg/l	125	97	320	112
Conductivity, uhmos/cm	890	780	1,800	720
Turbidity, N.T.U.	26	1.9	9.8	20

Signed ______________________
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

Bionomics Laboratory, Inc.
4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

November 5, 1990

FOR: HYDRO DESIGNS
1225 U.S. Highway 1
Suite 220
Juno Beach, Florida 33408

ATTN: Michael S. Knapp

RE: Sample(s) Received 11/1/90, Submitted By Client For Analysis.
ROCKLEDGE PROJECT

LABORATORY REPORT

LAB I.D. NO. MARKS DATE SAMPLED	9010088 SW 1 10/26/90	9010089 SW 2 10/26/90	9010090 SW 3 10/26/90	9010091 SW 4 10/26/90
pH, lab	5.68	6.01	5.45	6.00
Chloride as Cl, mg/l	120	96	345	142
Conductivity, uhmos/cm	880	770	2,000	840
Turbidity, N.T.U.	8.2	3.0	9.2	23

Signed ____________
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

Bionomics Laboratory, Inc.

4310 E. Anderson Road Orlando, Florida 32812 FDHRS Cert. No. 88008
(407) 851-2560 FAX (407) 856-0886

November 13, 1990

FOR: HYDRO DESIGNS
541 N. HWY A1A
Satellite Beach, FL 32937

ATTN: Aimee Fratarcangeli

RE: Sample(s) Received 11/9/90, Submitted By Client For Analysis.
ROCKLEDGE PROJECT

LABORATORY REPORT

LAB I.D. NO.	MARKS:	TURBIDITY AS N.T.U.
9010329	SW # 1	8.7
9010330	SW # 2	1.8
9010331	SW # 3	3.2
9010332	SW # 4	140

Signed ______________________
Mark Kromis, Chemist

WATER TABLE
MONITOR WELLS

APPENDIX C

CORE SAMPLES

CORE SAMPLES

LABORATORY TEST RESULTS

Ardaman & Associates, Inc.

Consultants in Soils, Hydrogeology,
Foundations and Materials Testing

File Number 91-044
April 26, 1991

Youngquist Brothers, Inc.
15000 Pine Ridge Road
Ft. Myers, Florida 33908

Attn: Mr. Don Douglas

Subject: Geotechnical Laboratory Test Results

Gentlemen:

As requested, the eight core samples you provided us were tested to determine the vertical hydraulic conductivity, porosity, specific gravity and unconfined compressive strength.

The specific gravity of the specimens was determined in accordance with ASTM D 854. To obtain the specific gravity of the solids, a representative specimen of the rock core was crushed such that the entire portion passed a # 20 U. S. Standard sieve. The results of the specific gravity determinations were as follows:

Sample	Depth	Specific Gravity
1	1140'1"-1140'6"	2.86
1	1520'4"-1520'8"	2.85
2	1464'3"-1464'9"	2.85
2	1629'6"-1630'1"	2.75
3	1758'2"-1758'6"	2.74
4	1796'10"-1797'2"	2.74
5	1836'3"-1836'8"	2.72
9	2410'11"-2411'4"	2.89

The permeability test specimens from the rock cores were subcored and trimmed to a length between 6.8 and 8.0 cm and a diameter of 3.3 cm. Each specimen was placed within a flexible latex membrane, and mounted in a triaxial-type permeameter. The specimens were consolidated under an isotropic effective consolidation stress of 15 lbs/in^2 and permeated with deaired water under a backpressure of at least 180 lb/in^2. The specimens were permeated using a net hydraulic head across the specimen ranging between 50 and 1000

8008 S. Orange Avenue (32809), Post Office Box 593003, Orlando, Florida 32859-3003 Phone (407) 855-3860 FAX (407) 859-8121

cm of water. The inflow to and outflow from the specimen were monitored with time, and the coefficient of permeability calculated for each recorded flow increment. The test was continued until steady-state flow was achieved, as evidenced by values of inflow and outflow within ±10% of the mean of the inflow and outflow for each increment, and stable values of the coefficient of permeability were measured. The porosity was calculated from the dry density and the specific gravity. The results were as follows:

Core Number	Depth	Initial/Final* Moisture Content (%)	Final Dry Density (pcf)	Coefficient of Permeability (cm/sec)	Porosity
1	1140'1"-1140'6"	0.5/3.1	154.3	1.3×10^{-8}	0.14
1	1520'4"-1520'8"	0.3/1.8	162.9	1.1×10^{-9}	0.08
2	1464'3"-1464'9"	0.2/0.5	169.3	3.0×10^{-10}	0.05
2	1629'6"-1630'1"	4.9/8.6	135.6	7.4×10^{-7}	0.21
3	1758'2"-1758'6"	0.2/1.0	160.3	1.0×10^{-8}	0.07
4	1796'10"-1797'2"	8.2/14.7	117.0	3.8×10^{-4}	0.32
5	1836'3"-1836'8"	8.4/15.3	116.3	1.4×10^{-4}	0.31
9	2410'11"-2411'4"	3.0/9.8	129.8	2.4×10^{-3}	0.28

* Final moisture content calculated from wet weight after permeability and weight of dry solids after unconfined compression testing.

After permeation, the permeability test specimens were used as unconfined compression test specimens. The cores were tested in accordance with ASTM D 2938, Unconfined Compressive Strength of Intact Rock Core Specimens, except that the strain rate was such that failure generally occurred in less than five minutes. The deformation during loading was recorded and the stress was corrected for area change. Three of the specimens exceeded the load range for the testing equipment. These three specimens were unloaded and then reloaded in another test frame. The stress-strain curves presented herein are from the first loading, and the reported unconfined compressive strengths are from the second loading. The stress-strain curves are presented in Figures 1 through 8, and the test data are tabulated in Appendix A. The porosity was calculated from the dry density and the specific gravity. Test results are summarized below:

Core Number	Depth Depth	Moisture Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (kg/cm²)	Porosity
1	1140'1"-1140'6"	1.8	155.4	650	0.13
1	1520'4"-1520'8"	1.1	161.8	1030	0.09
2	1464'3"-1464'9"	0.5	169.4	404	0.05
2	1629'6"-1630'1"	8.6	132.7	372	0.23
3	1758'2"-1758'6"	1.0	161.1	1056	0.06

Core Number	Depth Depth	Moisture Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (kg/cm^2)	Porosity
4	1796'10"-1797'2"	14.7	116.3	152	0.32
5	1836'3"-1836'8"	15.4	116.8	124	0.31
9	2410'11"-2411'4"	9.8	128.3	155	0.29

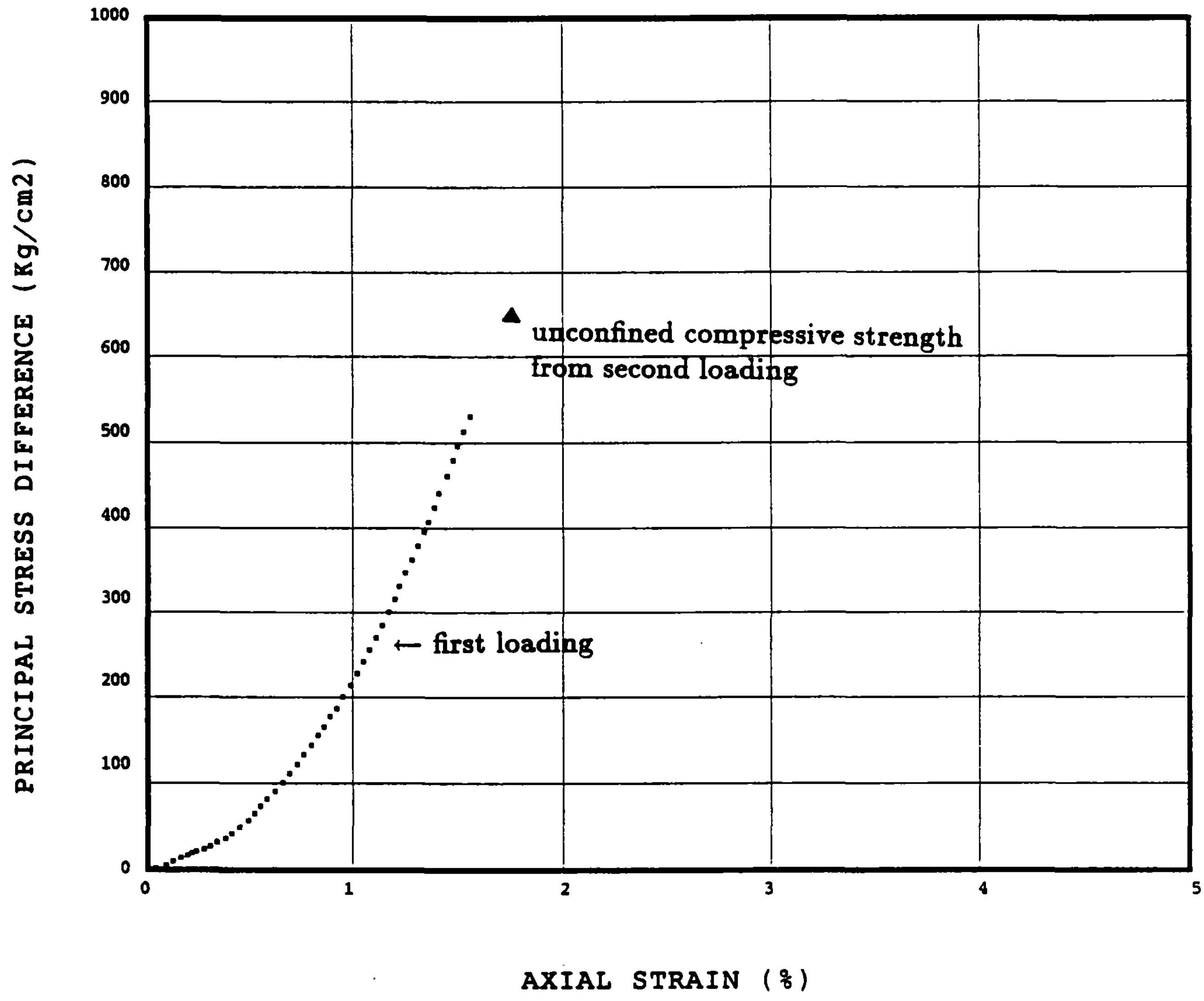
It has been a pleasure assisting you with this test program. If you have any questions or if you require additional testing, please contact us.

Very truly yours,
ARDAMAN & ASSOCIATES, INC.

Jan C. Wildman
Manager of Technical Services

Nadim F. Fuleihan
Principal
Florida Registration No. 31953

Sample Name : Core-1, 1140'1"-1140'6" Deep Well



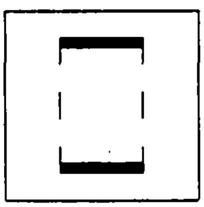
Dry density 155.4 pcf

Water content 1.8 %

Saturation 34.2 %

Cell pressure 0.00 kg/cm2

Strain rate 0.50%/min



TYPE OF FAILURE

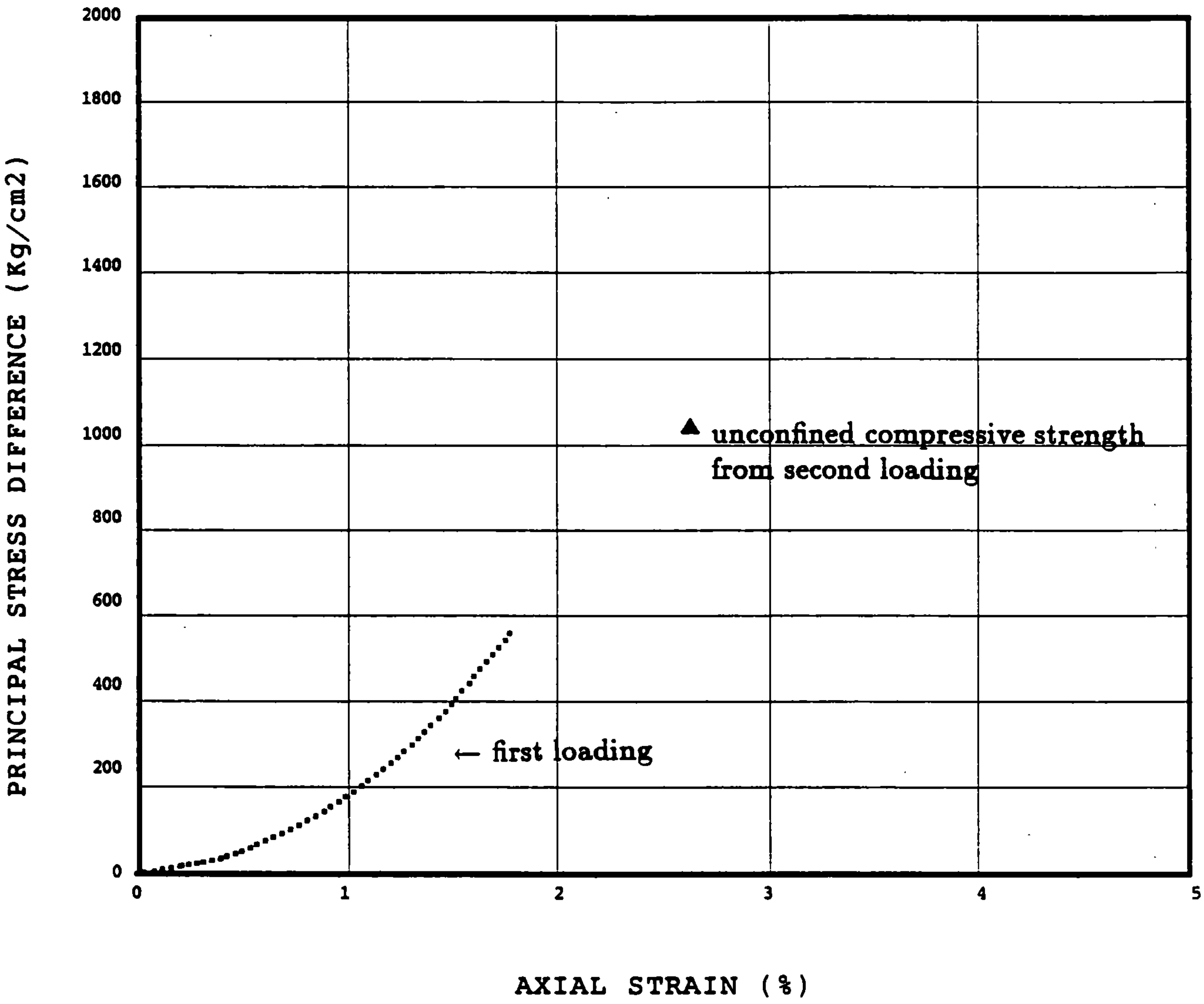
UNCONSOLIDATED – UNDRAINED TRIAXIAL COMPRESSION TEST

Ardaman & Associates Inc.

Youngquist Brothers
Ft. Myers, Florida

DRAWN BY:	CHECKED BY:	DATE:
FILE NO.	APPROVED BY:	

Sample Name : Core-1, 1520'4"-1520'8" T/I well



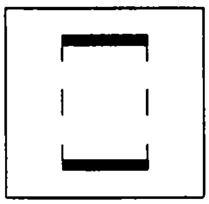
Dry density 161.8 pcf

Water content 1.1 %

Saturation 68.9 %

Cell pressure 0.00 kg/cm2

Strain rate 0.50%/min



TYPE OF FAILURE

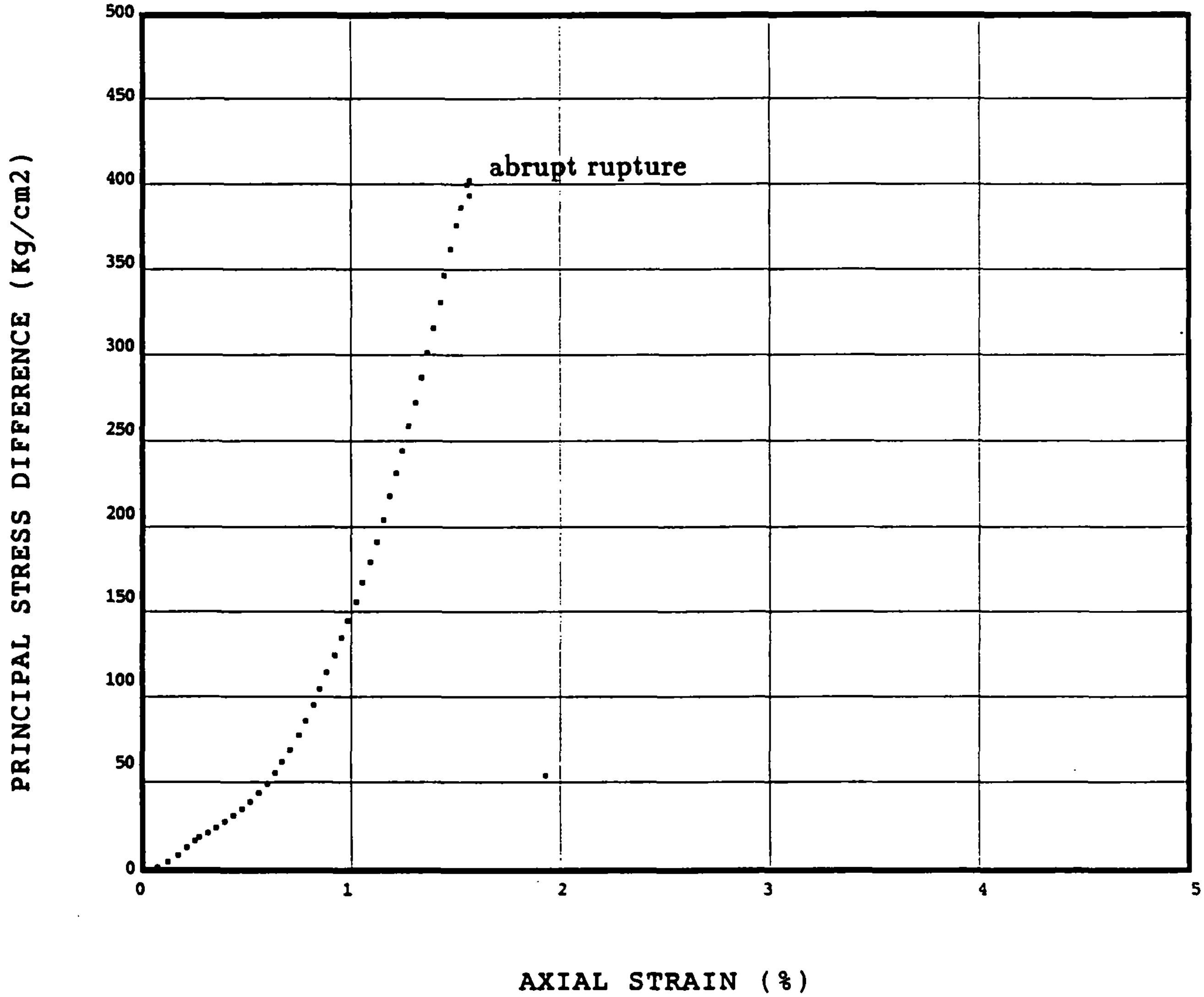
UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

Ardaman & Associates Inc.

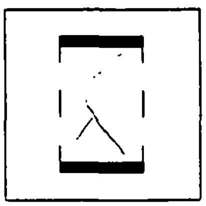
Youngquist Brothers
Ft. Myers, Florida

DRAWN BY: | CHECKED BY: | DATE:
FILE NO. | APPROVED BY:

Sample Name : Core-2, 1464'3"-1464'9"



Dry density	169.4 pcf
Water content	0.5 %
Saturation	28.0 %
Cell pressure	0.00 kg/cm2
Strain rate	0.50%/min



TYPE OF FAILURE

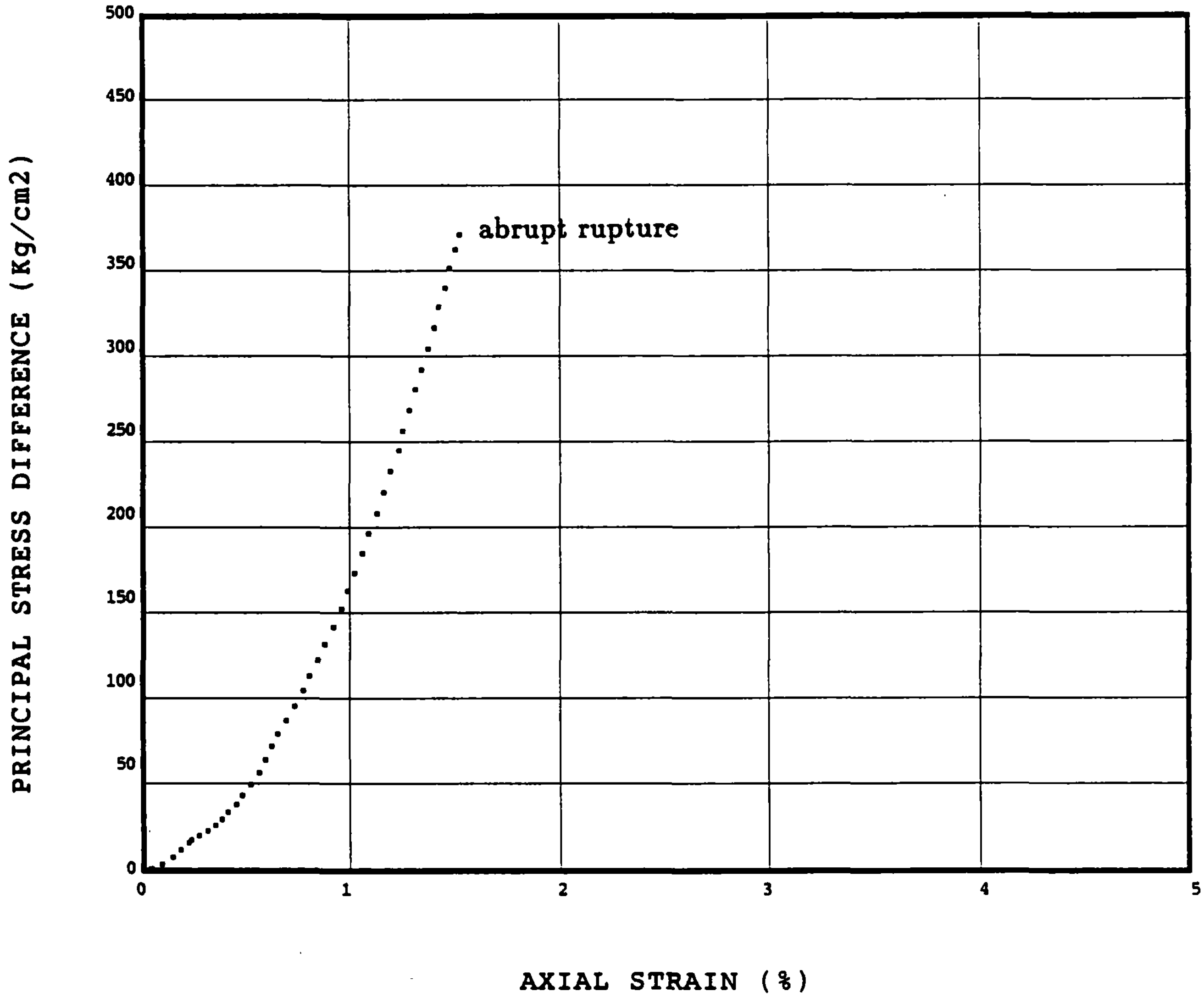
UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

Ardaman & Associates Inc.

Youngquist Brothers
Ft. Myers, Florida

DRAWN BY: JCW	CHECKED BY: JCW	DATE: 4-[illegible]-91
FILE NO. 91-044	APPROVED BY: [signature]	

Sample Name : Core-2, 1629'6"-1630'1" T/I well



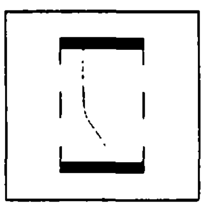
Dry density 132.7 pcf

Water content 8.6 %

Saturation 80.6 %

Cell pressure 0.00 kg/cm2

Strain rate 0.50%/min



TYPE OF FAILURE

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

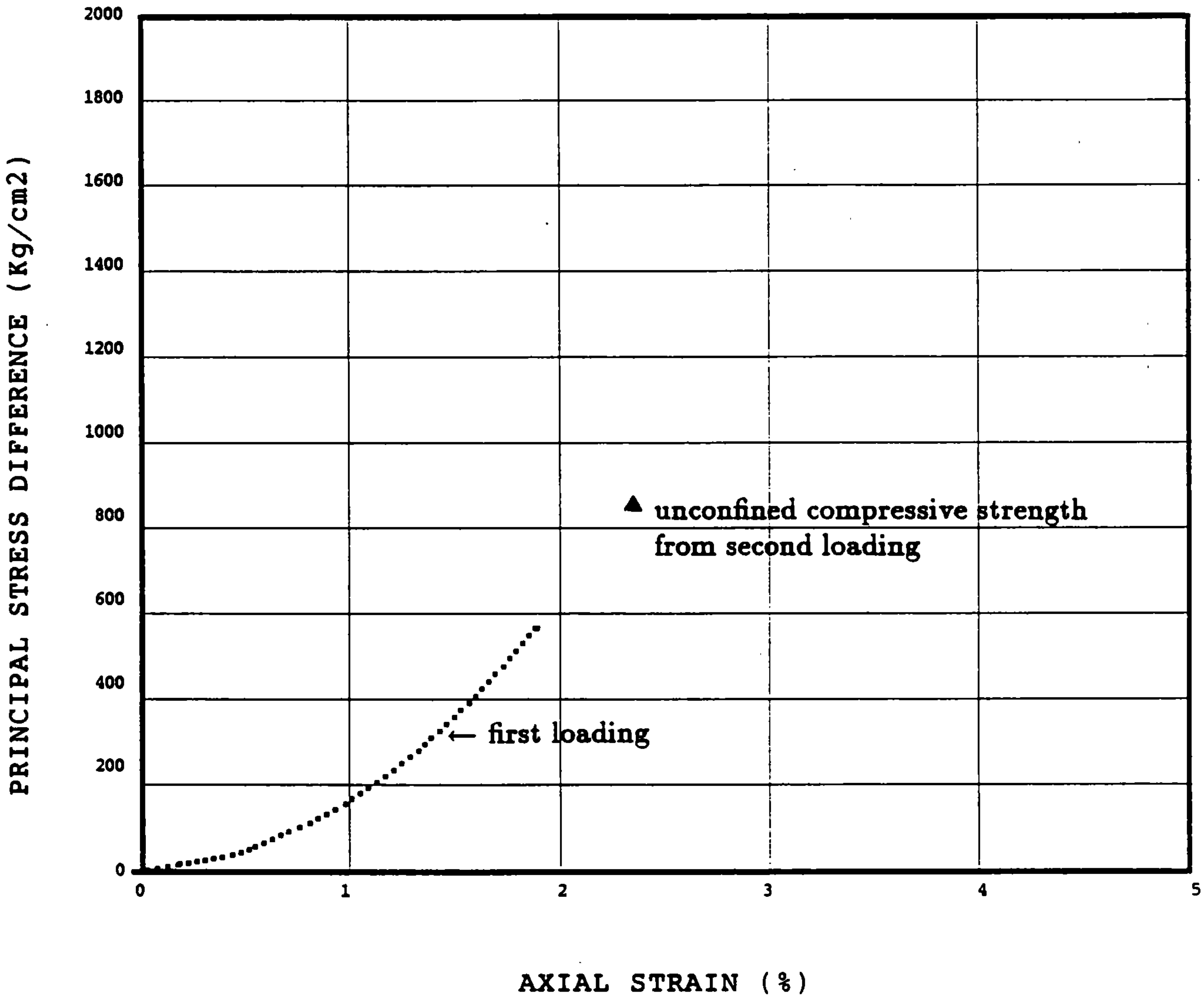
Ardaman & Associates Inc.

Youngquist Brothers
Ft. Myers, Florida

DRAWN BY: [signature] CHECKED BY: [signature] DATE: 4-23-91

FILE NO. 91-044 APPROVED BY: [signature]

Sample Name : Core-3, 1758'2"-1758'6' T/I well



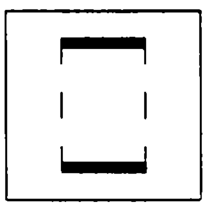
Dry density 161.1 pcf

Water content 1.0 %

Saturation 60.6 %

Cell pressure 0.00 kg/cm2

Strain rate 0.50%/min



TYPE OF FAILURE

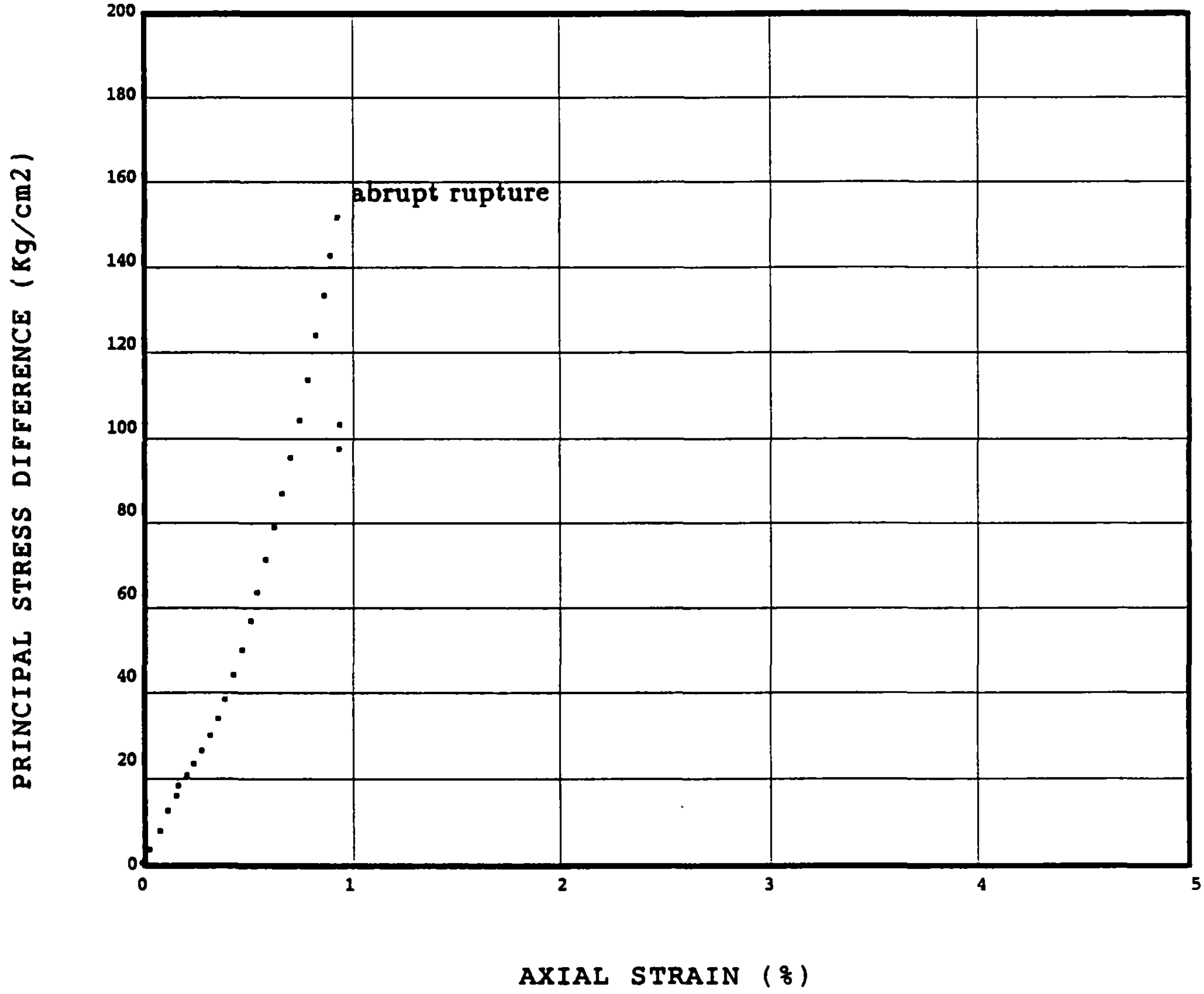
UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

Ardaman & Associates Inc.

Youngquist Brothers
Ft. Myers, Florida

DRAWN BY:	CHECKED BY:	DATE: 4-24-91
FILE NO. 91-044	APPROVED BY:	

Sample Name : Core-4, 1796'10"-1797'2"



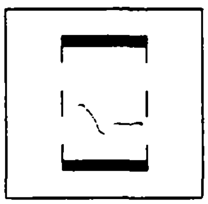
Dry density 116.3 pcf

Water content 14.7 %

Saturation 85.6 %

Cell pressure 0.00 kg/cm2

Strain rate 0.50%/min



TYPE OF FAILURE

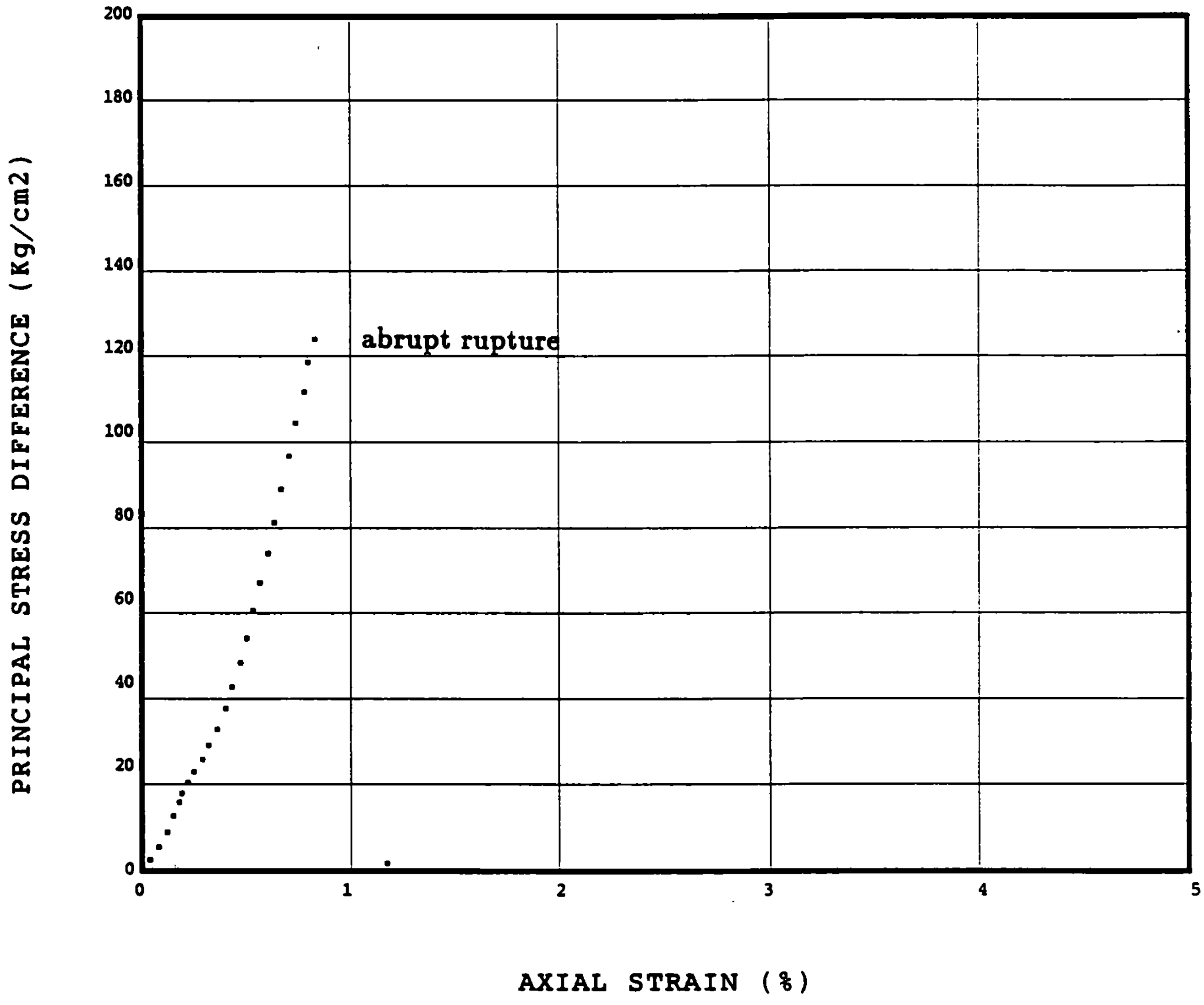
UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

Ardaman & Associates Inc.

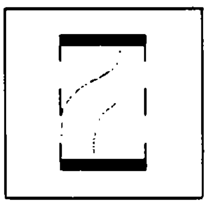
Youngquist Brothers
Ft. Myers, Florida

DRAWN BY:	CHECKED BY:	DATE:
FILE NO. 91-044	APPROVED BY:	

Sample Name : Core-5, 1836'3"-1836'8" T/I well



Dry density	116.8 pcf
Water content	15.4 %
Saturation	92.2 %
Cell pressure	0.00 kg/cm2
Strain rate	0.50%/min



TYPE OF FAILURE

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

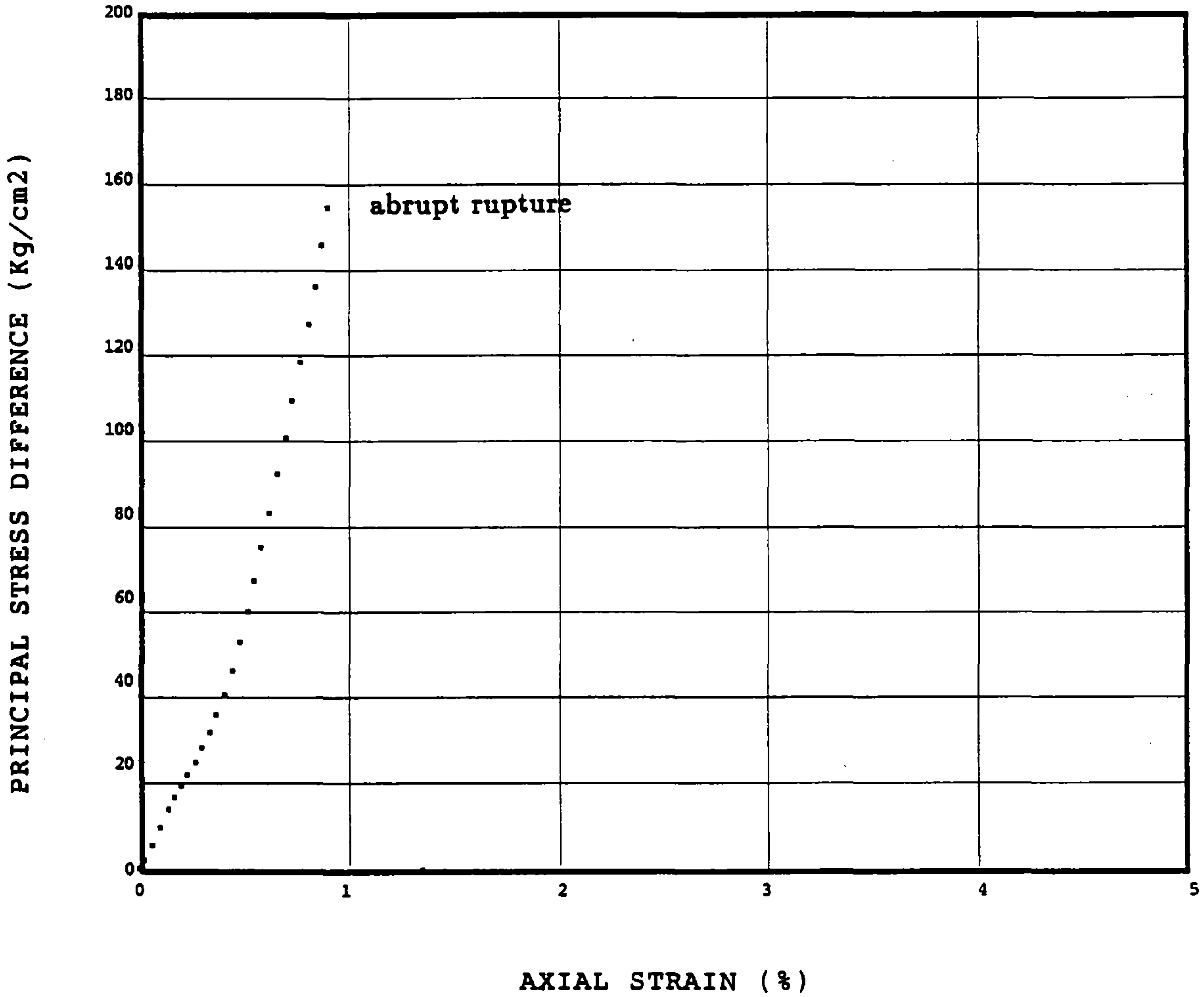
Ardaman & Associates Inc.

Youngquist Brothers
Ft. Myers, Florida

DRAWN BY: [illegible] CHECKED BY: [illegible] DATE: [illegible]

FILE NO. 91-[illegible] APPROVED BY: [illegible]

Sample Name : Core-9, 2410'11"-2411'4' T/I well



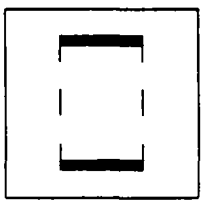
Dry density 128.3 pcf

Water content 9.8 %

Saturation 69.8 %

Cell pressure 0.00 kg/cm2

Strain rate 0.50%/min



TYPE OF FAILURE

UNCONSOLIDATED - UNDRAINED TRIAXIAL COMPRESSION TEST

Ardaman & Associates Inc.

Youngquist Brothers
Ft. Myers, Florida

DRAWN BY: JAW	CHECKED BY: JAW	DATE: 4-23-91
FILE NO: 91-044	APPROVED BY: [signature]	

APPENDIX A

Date Of Report: 23-APR-1991

Project Name: 90-044 Young Quist
Sa e Name : Core-1, 1140'1"-1140'6" Deep Well
Ce. Number : -

Area 8.378 cm2
Height 8.018 cm
Water content 1.8 %
Dry density 155.4 pcf
Saturation 34.2 %

Cell pressure 0.00 kg/cm2
Strain rate 0.50%/min

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	0.04	1.468	12.31	8.382
3	0.09	5.275	44.23	8.385
4	0.12	10.110	84.81	8.388
5	0.16	14.748	123.76	8.392
6	0.19	17.548	147.29	8.394
7	0.21	20.252	170.02	8.395
8	0.23	22.340	187.60	8.397
9	0.27	25.199	211.68	8.400
10	0.30	28.795	241.97	8.403
11	0.33	32.937	276.87	8.406
12	0.37	37.590	316.10	8.409
13	0.40	42.946	361.26	8.412
14	0.44	50.740	427.00	8.415
15	0.48	58.405	491.66	8.418
16	0.51	66.674	561.44	8.421
17	0.54	75.295	634.22	8.423
18	0.57	83.968	707.54	8.426
19	0.61	93.082	784.63	8.429
20	0.65	102.545	864.70	8.432
21	0.68	112.642	950.18	8.435
22	0.72	123.083	1038.64	8.439
23	0.75	134.477	1135.21	8.442
24	0.79	145.769	1230.97	8.445
25	0.82	157.854	1333.50	8.448
26	0.85	167.096	1411.95	8.450
27	0.88	179.681	1518.80	8.453
28	0.91	189.297	1600.50	8.455
29	0.94	202.827	1715.46	8.458
30	0.98	216.353	1830.47	8.461
31	1.01	230.114	1947.56	8.463
32	1.04	243.882	2064.70	8.466
33	1.07	258.152	2186.16	8.468
34	1.10	272.284	2306.54	8.471

36	1.16	302.787	2566.28	8.476
37	1.19	318.272	2698.51	8.479
38	1.21	333.811	2831.06	8.481
39	1.24	349.471	2964.70	8.483
40	1.27	365.187	3098.87	8.486
41	1.30	381.110	3234.94	8.488
42	1.33	397.471	3374.80	8.491
43	1.35	409.615	3478.67	8.493
44	1.38	426.660	3624.48	8.495
45	1.40	442.999	3764.34	8.497
46	1.44	463.724	3941.79	8.500
47	1.47	481.472	4093.82	8.503
48	1.49	498.123	4236.57	8.505
49	1.52	514.914	4380.57	8.507
50	1.55	532.345	4530.16	8.510

Raw Data In Volts

TIME	Ve5	Load	Dcdt
04:18:15:17:07	5.50360	0.00340	-1.54270
04:18:15:17:25	5.50360	0.00385	-1.53320
04:18:15:17:43	5.50360	0.00503	-1.52450
04:18:15:18:01	5.50360	0.00653	-1.51620
04:18:15:18:20	5.50360	0.00797	-1.50810
04:18:15:18:38	5.50360	0.00884	-1.50310
04:18:15:18:56	5.50360	0.00968	-1.49890
04:18:15:19:10	5.50360	0.01033	-1.49340
04:18:15:19:28	5.50360	0.01122	-1.48610
04:18:15:19:46	5.50360	0.01234	-1.47870
04:18:15:20:04	5.50360	0.01363	-1.47130
04:18:15:20:22	5.50360	0.01508	-1.46380
04:18:15:20:40	5.50370	0.01675	-1.45660
04:18:15:21:02	5.50370	0.01918	-1.44810
04:18:15:21:21	5.50360	0.02157	-1.44120
04:18:15:21:39	5.50370	0.02415	-1.43470
04:18:15:21:57	5.50360	0.02684	-1.42840
04:18:15:22:15	5.50350	0.02955	-1.42030
04:18:15:22:33	5.50360	0.03240	-1.41280
04:18:15:22:51	5.50360	0.03536	-1.40520
04:18:15:23:09	5.50360	0.03852	-1.39760
04:18:15:23:27	5.50360	0.04179	-1.38980
04:18:15:23:45	5.50360	0.04536	-1.38190
04:18:15:24:03	5.50360	0.04890	-1.37440
04:18:15:24:22	5.50360	0.05269	-1.36690
04:18:15:24:35	5.50360	0.05559	-1.36130
04:18:15:24:53	5.50360	0.05954	-1.35420
04:18:15:25:07	5.50360	0.06256	-1.34870
04:18:15:25:25	5.50360	0.06681	-1.34160
04:18:15:25:43	5.50350	0.07106	-1.33470
04:18:15:26:01	5.50360	0.07539	-1.32740
04:18:15:26:19	5.50360	0.07972	-1.32120
04:18:15:26:37	5.50360	0.08421	-1.31490
04:18:15:26:55	5.50360	0.08866	-1.30850
04:18:15:27:13	5.50360	0.09325	-1.30250
04:18:15:27:32	5.50350	0.09826	-1.29600
04:18:15:27:51	5.50360	0.10315	-1.28970
04:18:15:28:09	5.50360	0.10805	-1.28370

04:18:15:28:40	5.50360	0.11795	-1.27210
04:18:15:28:58	5.50360	0.12298	-1.26590
04:18:15:29:17	5.50360	0.12815	-1.25980
04:18:15:29:35	5.50360	0.13199	-1.25520
04:18:15:29:54	5.50360	0.13738	-1.24910
:18:15:30:12	5.50360	0.14255	-1.24320
:18:15:30:34	5.50360	0.14911	-1.23600
04:18:15:30:53	5.50360	0.15473	-1.23000
04:18:15:31:12	5.50370	0.16001	-1.22420
04:18:15:31:30	5.50360	0.16533	-1.21850
04:18:15:31:48	5.50360	0.17086	-1.21250

Date Of Report: 23-APR-1991

Project Name: 90-044 Young Quist
Sa' 'e Name : Core-1, 1520'4"-1520'8" T/I well
Ce Number :

Area 8.374 cm2
Height 7.055 cm
Water content 1.1 %
Dry density 161.8 pcf
Saturation 30.2 %

Cell pressure 0.00 kg/cm2
Strain rate 0.50%/min

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	-0.01	0.113	0.95	8.373
3	-0.01	0.113	0.95	8.373
4	0.02	1.986	16.64	8.376
5	0.07	5.730	48.02	8.380
6	0.11	9.955	83.45	8.383
7	0.15	14.208	119.16	8.387
8	0.19	17.395	145.94	8.390
9	0.20	19.617	164.61	8.391
10	0.23	22.221	186.52	8.394
11	0.27	24.920	209.24	8.397
12	0.30	28.068	235.75	8.399
13	0.34	31.727	266.58	8.402
14	0.38	36.028	302.83	8.406
15	0.41	40.938	344.23	8.409
16	0.45	47.001	395.36	8.412
17	0.48	53.511	450.27	8.415
18	0.52	60.916	512.76	8.418
19	0.55	69.214	582.82	8.421
20	0.59	77.796	655.32	8.424
21	0.63	86.272	727.01	8.427
22	0.67	94.741	798.69	8.430
23	0.71	104.613	882.28	8.434
24	0.75	114.512	966.14	8.437
25	0.79	124.914	1054.33	8.440
26	0.83	135.212	1141.70	8.444
27	0.87	146.208	1235.03	8.447
28	0.90	157.168	1328.09	8.450
29	0.94	168.278	1422.47	8.453
30	0.97	180.787	1528.81	8.456
31	1.01	192.937	1632.15	8.459
32	1.05	205.715	1740.89	8.463
33	1.08	218.517	1849.91	8.466
4	1.12	232.525	1969.21	8.469

36	1.19	259.725	2201.04	8.475
37	1.22	273.391	2317.63	8.477
38	1.25	287.497	2438.01	8.480
39	1.29	302.927	2569.75	8.483
40	1.32	318.158	2699.86	8.486
41	1.35	333.544	2831.33	8.489
42	1.38	349.452	2967.40	8.492
43	1.42	365.488	3104.55	8.494
44	1.45	381.141	3238.52	8.497
45	1.48	396.964	3373.98	8.499
46	1.50	412.536	3507.35	8.502
47	1.53	429.055	3648.89	8.504
48	1.57	446.463	3798.15	8.507
49	1.59	463.192	3941.60	8.510
50	1.62	480.486	4090.03	8.512
51	1.65	496.998	4231.78	8.515
52	1.68	514.038	4378.13	8.517
53	1.71	530.500	4519.61	8.520
54	1.74	546.985	4661.36	8.522
55	1.76	563.504	4803.38	8.524
56	1.77	559.826	4772.63	8.525

Raw Data In Volts

TIME	Ve5	Load	Dcdt
04:18:15:52:12	5.50360	0.00340	-1.13481
04:18:15:52:16	5.50360	0.00343	-1.13744
04:18:15:52:20	5.50360	0.00343	-1.13726
04:18:15:52:25	5.50360	0.00401	-1.13034
04:18:15:52:29	5.50360	0.00517	-1.12201
04:18:15:52:34	5.50360	0.00648	-1.11366
04:18:15:52:38	5.50360	0.00780	-1.10601
04:18:15:52:43	5.50360	0.00879	-1.09957
04:18:15:52:47	5.50360	0.00948	-1.09692
04:18:15:52:52	5.50360	0.01029	-1.09080
04:18:15:52:56	5.50360	0.01113	-1.08446
04:18:15:53:01	5.50360	0.01211	-1.07810
04:18:15:53:05	5.50370	0.01325	-1.07129
04:18:15:53:09	5.50370	0.01459	-1.06445
04:18:15:53:14	5.50360	0.01612	-1.05769
04:18:15:53:18	5.50360	0.01801	-1.05078
04:18:15:53:23	5.50360	0.02004	-1.04443
04:18:15:53:27	5.50360	0.02235	-1.03787
04:18:15:53:32	5.50360	0.02494	-1.03115
04:18:15:53:36	5.50360	0.02762	-1.02448
04:18:15:53:41	5.50360	0.03027	-1.01698
04:18:15:53:45	5.50360	0.03292	-1.00958
04:18:15:53:49	5.50360	0.03601	-1.00198
04:18:15:53:54	5.50360	0.03911	-0.99464
04:18:15:53:58	5.50360	0.04237	-0.98721
04:18:15:54:03	5.50360	0.04560	-0.97974
04:18:15:54:07	5.50360	0.04905	-0.97252
04:18:15:54:11	5.50360	0.05249	-0.96589
04:18:15:54:16	5.50370	0.05598	-0.95935
04:18:15:54:20	5.50360	0.05991	-0.95197
04:18:15:54:25	5.50360	0.06373	-0.94526
04:18:15:54:29	5.50360	0.06775	-0.93838

04:18:15:54:38	5.50360	0.07619	-0.92469
04:18:15:54:42	5.50360	0.08042	-0.91834
04:18:15:54:47	5.50360	0.08476	-0.91224
04:18:15:54:51	5.50360	0.08907	-0.90616
04:18:15:54:55	5.50360	0.09352	-0.90012
4:18:15:54:59	5.50360	0.09839	-0.89368
:18:15:55:04	5.50360	0.10320	-0.88744
04:18:15:55:08	5.50360	0.10806	-0.88148
04:18:15:55:13	5.50360	0.11309	-0.87507
04:18:15:55:17	5.50360	0.11816	-0.86925
04:18:15:55:22	5.50350	0.12311	-0.86348
04:18:15:55:26	5.50360	0.12812	-0.85792
04:18:15:55:30	5.50360	0.13305	-0.85258
04:18:15:55:34	5.50350	0.13828	-0.84699
04:18:15:55:39	5.50360	0.14380	-0.84112
04:18:15:55:44	5.50350	0.14910	-0.83581
04:18:15:55:48	5.50360	0.15459	-0.83008
04:18:15:55:53	5.50360	0.15983	-0.82487
04:18:15:55:57	5.50360	0.16524	-0.81959
04:18:15:56:01	5.50360	0.17047	-0.81440
04:18:15:56:06	5.50360	0.17571	-0.80924
04:18:15:56:10	5.50360	0.18096	-0.80446
04:18:15:56:14	5.50350	0.17982	-0.80212

Date Of Report: 23-APR-1991

Project Name: 91-044 Young Quist
Sa le Name : Core-2, 1464'3"-1464'9"
Ce Number :

Area 8.434 cm2
Height 7.286 cm
Water content 0.5 %
Dry density 169.4 pcf
Saturation 28.0 %

Cell pressure 0.00 kg/cm2
Strain rate 0.50%/min

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	0.00	0.080	0.68	8.434
3	0.02	0.112	0.95	8.436
4	0.07	1.490	12.58	8.440
5	0.12	4.757	40.17	8.444
6	0.17	8.790	74.26	8.448
7	0.21	13.266	112.13	8.452
8	0.25	17.036	144.05	8.455
9	0.27	18.952	160.28	8.457
10	0.31	21.535	182.19	8.460
11	0.35	24.403	206.54	8.464
12	0.39	27.715	234.66	8.467
13	0.43	31.409	266.05	8.470
14	0.47	35.228	298.51	8.474
15	0.51	39.553	335.30	8.477
16	0.55	44.481	377.23	8.481
17	0.59	49.820	422.68	8.484
18	0.63	56.080	475.97	8.487
19	0.66	62.687	532.24	8.490
20	0.70	69.959	594.18	8.493
21	0.74	78.528	667.22	8.497
22	0.77	86.777	737.56	8.499
23	0.81	96.386	819.52	8.503
24	0.84	105.640	898.51	8.505
25	0.87	115.458	982.37	8.508
26	0.91	125.463	1067.85	8.511
27	0.94	135.618	1154.69	8.514
28	0.97	145.804	1241.79	8.517
29	1.01	157.022	1337.83	8.520
30	1.04	168.427	1435.48	8.523
31	1.08	180.427	1538.28	8.526
32	1.11	192.204	1639.18	8.528
33	1.14	205.300	1751.44	8.531
34	1.17	218.738	1866.68	8.534

36	1.23	245.088	2092.85	8.539
37	1.26	259.635	2217.81	8.542
38	1.29	273.174	2334.13	8.544
39	1.32	287.933	2461.00	8.547
40	1.35	302.688	2587.87	8.550
41	1.38	317.128	2712.04	8.552
42	1.41	331.901	2839.18	8.554
43	1.43	347.549	2973.89	8.557
44	1.46	362.882	3105.90	8.559
45	1.49	377.122	3228.72	8.561
46	1.51	387.448	3317.99	8.564
47	1.54	400.909	3434.04	8.566
48	1.55	403.689	3458.18	8.566
49	1.55	394.558	3380.21	8.567
50	1.92	54.689	470.29	8.599

Raw Data In Volts

TIME	Ve5	Load	Dcdt
04:18:15:44:33	5.50360	0.00340	-1.76530
04:18:15:44:37	5.50360	0.00342	-1.76570
04:18:15:44:42	5.50360	0.00343	-1.76140
04:18:15:44:46	5.50360	0.00386	-1.75140
04:18:15:44:51	5.50360	0.00488	-1.74190
04:18:15:44:55	5.50360	0.00614	-1.73290
04:18:15:45:00	5.50360	0.00754	-1.72400
04:18:15:45:04	5.50360	0.00872	-1.71610
04:18:15:45:09	5.50360	0.00932	-1.71270
04:18:15:45:14	5.50360	0.01013	-1.70510
04:18:15:45:18	5.50360	0.01103	-1.69720
04:18:15:45:23	5.50370	0.01207	-1.68960
04:18:15:45:28	5.50360	0.01323	-1.68200
04:18:15:45:32	5.50360	0.01443	-1.67440
04:18:15:45:37	5.50360	0.01579	-1.66650
04:18:15:45:41	5.50360	0.01734	-1.65840
04:18:15:45:46	5.50360	0.01902	-1.65100
04:18:15:45:50	5.50360	0.02099	-1.64370
04:18:15:45:55	5.50360	0.02307	-1.63670
04:18:15:45:59	5.50360	0.02536	-1.62990
04:18:15:46:03	5.50360	0.02806	-1.62260
04:18:15:46:08	5.50360	0.03066	-1.61610
04:18:15:46:13	5.50360	0.03369	-1.60920
04:18:15:46:18	5.50360	0.03661	-1.60270
04:18:15:46:22	5.50360	0.03971	-1.59580
04:18:15:46:27	5.50360	0.04287	-1.58930
04:18:15:46:32	5.50360	0.04608	-1.58270
04:18:15:46:36	5.50360	0.04930	-1.57680
04:18:15:46:40	5.50360	0.05285	-1.56980
04:18:15:46:45	5.50360	0.05646	-1.56330
04:18:15:46:49	5.50360	0.06026	-1.55680
04:18:15:46:54	5.50360	0.06399	-1.55100
04:18:15:46:58	5.50360	0.06814	-1.54470
04:18:15:47:03	5.50360	0.07240	-1.53860
04:18:15:47:08	5.50360	0.07660	-1.53280
04:18:15:47:12	5.50360	0.08076	-1.52690
04:18:15:47:17	5.50360	0.08538	-1.52030
04:18:15:47:22	5.50360	0.08968	-1.51480

04:18:15:47:31	5.50360	0.09906	-1.50330
04:18:15:47:35	5.50360	0.10365	-1.49830
04:18:15:47:39	5.50360	0.10835	-1.49290
04:18:15:47:44	5.50360	0.11333	-1.48740
04:18:15:47:49	5.50360	0.11821	-1.48240
04:18:15:47:53	5.50360	0.12275	-1.47690
04:18:15:47:57	5.50360	0.12605	-1.47190
04:18:15:48:02	5.50360	0.13034	-1.46760
04:18:15:48:06	5.50350	0.13123	-1.46580
04:18:15:48:11	5.50360	0.12835	-1.46440
04:18:15:48:15	5.50360	0.02078	-1.39280

Date Of Report: 23-APR-1991

Project Name: 90-044 Young Quist
Sa`le Name : Core-2, 1629'6"-1630'1" T/I well
Ce Number :

Area	8.412 cm2	Cell pressure	0.00 kg/cm2
Height	7.114 cm	Strain rate	0.50%/min
Water content	8.6 %		
Dry density	132.7 pcf		
Saturation	80.6 %		

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	0.00	0.113	0.95	8.412
3	0.04	0.948	7.98	8.416
4	0.09	3.807	32.06	8.420
5	0.14	7.788	65.60	8.424
6	0.18	11.989	101.04	8.427
7	0.22	16.188	136.48	8.431
8	0.23	18.047	152.16	8.431
9	0.27	20.607	173.81	8.434
10	0.31	23.291	196.53	8.438
11	0.35	26.423	223.04	8.441
12	0.38	29.969	253.07	8.444
13	0.41	34.027	287.42	8.447
14	0.45	38.754	327.46	8.450
15	0.48	43.892	371.01	8.453
16	0.52	50.210	424.57	8.456
17	0.56	57.197	483.82	8.459
18	0.59	64.786	548.20	8.462
19	0.62	73.012	618.00	8.464
20	0.65	80.367	680.48	8.467
21	0.69	88.132	746.50	8.470
22	0.73	96.491	817.63	8.474
23	0.77	105.487	894.20	8.477
24	0.80	114.028	966.95	8.480
25	0.84	123.078	1044.07	8.483
26	0.87	132.629	1125.50	8.486
27	0.91	142.614	1210.68	8.489
28	0.95	153.457	1303.23	8.492
29	0.98	163.848	1391.96	8.495
30	1.01	174.425	1482.31	8.498
31	1.05	185.881	1580.21	8.501
32	1.08	197.490	1679.49	8.504
33	1.12	209.096	1778.76	8.507
34	1.15	221.295	1883.18	8.510

36	1.22	245.580	2091.25	8.516
37	1.24	257.069	2189.72	8.518
38	1.27	269.375	2295.22	8.521
39	1.30	281.547	2399.64	8.523
40	1.33	293.269	2500.22	8.525
41	1.36	305.276	2603.34	8.528
42	1.39	317.715	2710.19	8.530
43	1.41	329.766	2813.80	8.533
44	1.44	341.121	2911.41	8.535
45	1.46	352.478	3009.12	8.537
46	1.49	363.384	3102.99	8.539
47	1.51	372.008	3177.38	8.541
48	1.48	0.143	1.22	8.538

Raw Data In Volts

TIME	Ve5	Load	Dcdt
04:18:16:00:00	5.50360	0.00340	-1.31280
04:18:16:00:05	5.50360	0.00343	-1.31270
04:18:16:00:09	5.50360	0.00369	-1.30440
04:18:16:00:14	5.50360	0.00458	-1.29560
04:18:16:00:18	5.50360	0.00582	-1.28690
04:18:16:00:23	5.50360	0.00713	-1.27870
04:18:16:00:28	5.50350	0.00844	-1.27060
04:18:16:00:32	5.50360	0.00902	-1.26920
04:18:16:00:37	5.50360	0.00982	-1.26240
04:18:16:00:41	5.50360	0.01066	-1.25500
04:18:16:00:46	5.50360	0.01164	-1.24740
04:18:16:00:51	5.50360	0.01275	-1.24080
04:18:16:00:55	5.50360	0.01402	-1.23500
04:18:16:01:00	5.50350	0.01550	-1.22820
04:18:16:01:05	5.50360	0.01711	-1.22170
04:18:16:01:09	5.50360	0.01909	-1.21450
04:18:16:01:14	5.50350	0.02128	-1.20780
04:18:16:01:18	5.50360	0.02366	-1.20170
04:18:16:01:23	5.50350	0.02624	-1.19559
04:18:16:01:28	5.50360	0.02855	-1.18969
04:18:16:01:32	5.50350	0.03099	-1.18268
04:18:16:01:36	5.50360	0.03362	-1.17535
04:18:16:01:41	5.50350	0.03645	-1.16791
04:18:16:01:45	5.50360	0.03914	-1.16130
04:18:16:01:50	5.50350	0.04199	-1.15447
04:18:16:01:54	5.50350	0.04500	-1.14779
04:18:16:01:58	5.50360	0.04815	-1.14073
04:18:16:02:03	5.50350	0.05157	-1.13360
04:18:16:02:07	5.50350	0.05485	-1.12712
04:18:16:02:12	5.50350	0.05819	-1.12081
04:18:16:02:16	5.50360	0.06181	-1.11440
04:18:16:02:21	5.50360	0.06548	-1.10780
04:18:16:02:25	5.50360	0.06915	-1.10176
04:18:16:02:30	5.50360	0.07301	-1.09534
04:18:16:02:35	5.50360	0.07689	-1.08904
04:18:16:02:39	5.50350	0.08070	-1.08283
04:18:16:02:44	5.50350	0.08434	-1.07740
04:18:16:02:48	5.50350	0.08824	-1.07188
04:18:16:02:53	5.50350	0.09210	-1.06633
04:18:16:02:57	5.50360	0.09582	-1.06128

04:18:16:03:05	5.50350	[illegible]	[illegible]
04:18:16:03:10	5.50350	0.10741	-1.04516
04:18:16:03:14	5.50360	0.11102	-1.04060
04:18:16:03:18	5.50350	0.11463	-1.03575
04:18:16:03:23	5.50350	0.11810	-1.03114
4:18:16:03:27	5.50350	0.12085	-1.02678
4:18:16:03:32	5.50360	0.00344	-1.03360

Date Of Report: 23-APR-1991

Project Name: 91-044 Young Quist
Sa le Name : Core-3, 1758'2"-1758'6' T/I well
Ce Number :

Area	8.374 cm2	Cell pressure	0.00 kg/cm2
Height	6.784 cm	Strain rate	0.50%/min
Water content	1.0 %		
Dry density	161.1 pcf		
Saturation	46.0 %		

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	-0.04	0.081	0.68	8.371
3	-0.02	0.210	1.76	8.372
4	0.02	3.343	28.00	8.376
5	0.07	7.958	66.68	8.380
6	0.12	12.729	106.72	8.384
7	0.17	16.625	139.45	8.388
8	0.18	18.847	158.12	8.389
9	0.22	21.322	178.95	8.393
10	0.26	23.956	201.13	8.396
11	0.30	27.199	228.45	8.399
12	0.34	30.987	260.38	8.403
13	0.38	35.190	295.81	8.406
14	0.43	40.065	336.93	8.410
15	0.47	45.772	385.09	8.413
16	0.51	52.471	441.62	8.417
17	0.54	59.744	503.03	8.420
18	0.58	68.521	577.15	8.423
19	0.62	76.587	645.32	8.426
20	0.66	85.666	722.15	8.430
21	0.70	94.580	797.63	8.433
22	0.75	104.126	878.51	8.437
23	0.80	114.554	966.97	8.441
24	0.84	124.978	1055.43	8.445
25	0.88	135.398	1143.89	8.448
26	0.92	146.543	1238.57	8.452
27	0.97	158.733	1342.18	8.456
28	1.00	171.113	1447.44	8.459
29	1.04	183.891	1556.16	8.462
30	1.08	196.599	1664.37	8.466
31	1.12	209.457	1773.93	8.469
32	1.16	223.174	1890.83	8.472
33	1.20	237.855	2016.04	8.476
34	1.24	253.292	2147.79	8.479

36	1.32	283.878	2408.88	8.486
37	1.35	298.973	2537.87	8.489
38	1.38	314.194	2667.99	8.492
39	1.42	329.723	2800.82	8.494
40	1.45	345.367	2934.72	8.497
41	1.49	362.059	3077.62	8.500
42	1.52	378.909	3222.02	8.503
43	1.56	395.801	3366.81	8.506
44	1.59	412.261	3507.95	8.509
45	1.62	429.479	3655.66	8.512
46	1.65	446.718	3803.63	8.515
47	1.68	463.850	3950.79	8.517
48	1.72	482.345	4109.66	8.520
49	1.75	500.723	4267.65	8.523
50	1.78	518.076	4416.90	8.526
51	1.81	535.587	4567.58	8.528
52	1.84	553.828	4724.75	8.531
53	1.87	570.485	4868.21	8.533
54	1.88	571.208	4874.89	8.534

Raw Data In Volts

TIME	Ve5	Load	Dcdt
04:18:16:06:30	5.50360	0.00340	-1.54470
04:18:16:06:34	5.50350	0.00342	-1.55160
04:18:16:06:39	5.50350	0.00346	-1.54890
04:18:16:06:44	5.50350	0.00443	-1.54060
04:18:16:06:48	5.50350	0.00586	-1.53180
04:18:16:06:53	5.50350	0.00734	-1.52250
04:18:16:06:57	5.50350	0.00855	-1.51450
4:18:16:07:02	5.50350	0.00924	-1.51140
04:18:16:07:07	5.50350	0.01001	-1.50470
04:18:16:07:11	5.50350	0.01083	-1.49790
04:18:16:07:15	5.50350	0.01184	-1.49030
04:18:16:07:20	5.50350	0.01302	-1.48320
04:18:16:07:24	5.50350	0.01433	-1.47560
04:18:16:07:29	5.50350	0.01585	-1.46800
04:18:16:07:33	5.50350	0.01763	-1.46080
04:18:16:07:38	5.50350	0.01972	-1.45340
04:18:16:07:42	5.50350	0.02199	-1.44670
04:18:16:07:47	5.50350	0.02473	-1.43980
04:18:16:07:51	5.50350	0.02725	-1.43340
04:18:16:07:56	5.50350	0.03009	-1.42520
04:18:16:08:00	5.50350	0.03288	-1.41770
04:18:16:08:05	5.50350	0.03587	-1.40990
04:18:16:08:09	5.50350	0.03914	-1.40120
04:18:16:08:14	5.50350	0.04241	-1.39320
04:18:16:08:18	5.50350	0.04568	-1.38590
04:18:16:08:23	5.50350	0.04918	-1.37830
04:18:16:08:27	5.50350	0.05301	-1.37060
04:18:16:08:32	5.50340	0.05690	-1.36350
04:18:16:08:36	5.50350	0.06092	-1.35620
04:18:16:08:41	5.50350	0.06492	-1.34910
04:18:16:08:46	5.50350	0.06897	-1.34200
04:18:16:08:50	5.50340	0.07329	-1.33510
04:18:16:08:54	5.50350	0.07792	-1.32780
4:18:16:08:59	5.50350	0.08279	-1.32030

04:18:16:09:09	5.50340	0.09244	-1.30740
04:18:16:09:13	5.50350	0.09721	-1.30110
04:18:16:09:18	5.50350	0.10202	-1.29500
04:18:16:09:22	5.50350	0.10693	-1.28890
04:18:16:09:26	5.50350	0.11188	-1.28270
[illegible]:18:16:09:31	5.50340	0.11716	-1.27660
[illegible]:18:16:09:35	5.50350	0.12250	-1.27020
04:18:16:09:40	5.50340	0.12785	-1.26410
04:18:16:09:44	5.50350	0.13307	-1.25840
04:18:16:09:49	5.50350	0.13853	-1.25260
04:18:16:09:53	5.50350	0.14400	-1.24680
04:18:16:09:58	5.50350	0.14944	-1.24100
04:18:16:10:02	5.50340	0.15531	-1.23520
04:18:16:10:07	5.50340	0.16115	-1.22940
04:18:16:10:12	5.50350	0.16667	-1.22400
04:18:16:10:16	5.50350	0.17224	-1.21860
04:18:16:10:20	5.50350	0.17805	-1.21260
04:18:16:10:25	5.50340	0.18335	-1.20760
04:18:16:10:30	5.50350	0.18360	-1.20580

Date Of Report: 23-APR-1991

Project Name: 91-044 Young Quist
Sa 'e Name : Core-4, 1796'10"-1797'2"
Ce Number :

Area 8.245 cm2
Height 7.693 cm
Water content 14.7 %
Dry density 116.3 pcf
Saturation 85.6 %

Cell pressure 0.00 kg/cm2
Strain rate 0.50%/min

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	-0.01	0.607	5.01	8.245
3	0.02	3.789	31.25	8.247
4	0.07	8.247	68.04	8.250
5	0.11	13.028	107.53	8.254
6	0.15	16.496	136.21	8.257
7	0.16	18.818	155.41	8.259
8	0.20	21.170	174.89	8.261
9	0.23	23.814	196.81	8.264
10	0.27	26.979	223.05	8.268
11	0.31	30.436	251.72	8.271
12	0.35	34.380	284.45	8.274
13	0.38	38.910	322.05	8.277
14	0.42	44.580	369.13	8.280
15	0.46	50.506	418.37	8.283
16	0.50	57.374	475.44	8.287
17	0.53	64.176	531.98	8.289
18	0.57	71.822	595.56	8.292
19	0.61	79.424	658.86	8.296
20	0.65	87.347	724.87	8.299
21	0.69	95.944	796.54	8.302
22	0.73	104.732	869.85	8.306
23	0.77	114.034	947.49	8.309
24	0.81	124.499	1034.89	8.312
25	0.85	133.856	1113.07	8.315
26	0.88	143.237	1191.50	8.318
27	0.91	152.231	1266.73	8.321
28	0.92	103.721	863.09	8.321
29	0.92	98.029	815.77	8.322

Raw Data In Volts

TIME	Ve5	Load	Dcdt

04:18:16:19:38	5.50350	0.00340	-1.60990
04:18:16:19:43	5.50340	0.00358	-1.61110
04:18:16:19:48	5.50340	0.00455	-1.60490
04:18:16:19:52	5.50340	0.00591	-1.59630
04:18:16:19:56	5.50340	0.00737	-1.58690
04:18:16:20:01	5.50340	0.00843	-1.58000
04:18:16:20:06	5.50350	0.00914	-1.57630
04:18:16:20:10	5.50350	0.00986	-1.56930
04:18:16:20:15	5.50340	0.01067	-1.56210
04:18:16:20:19	5.50340	0.01164	-1.55400
04:18:16:20:24	5.50350	0.01270	-1.54680
04:18:16:20:28	5.50350	0.01391	-1.53890
04:18:16:20:33	5.50350	0.01530	-1.53130
04:18:16:20:37	5.50340	0.01704	-1.52300
04:18:16:20:42	5.50340	0.01886	-1.51490
04:18:16:20:47	5.50350	0.02097	-1.50720
04:18:16:20:51	5.50350	0.02306	-1.50050
04:18:16:20:56	5.50340	0.02541	-1.49350
04:18:16:21:00	5.50340	0.02775	-1.48530
04:18:16:21:05	5.50340	0.03019	-1.47750
04:18:16:21:09	5.50350	0.03284	-1.46900
04:18:16:21:14	5.50350	0.03555	-1.46080
04:18:16:21:18	5.50350	0.03842	-1.45270
04:18:16:21:23	5.50340	0.04165	-1.44400
04:18:16:21:28	5.50340	0.04454	-1.43660
04:18:16:21:33	5.50350	0.04744	-1.42940
04:18:16:21:37	5.50340	0.05022	-1.42280
04:18:16:21:41	5.50350	0.03530	-1.42240
04:18:16:21:46	5.50340	0.03355	-1.42150

Date Of Report: 23-APR-1991

Project Name: 91-044 Young Quist
Sa e Name : Core-5, 1836'3"-1836'8" T/I well
Ce. Number :

Area 8.219 cm2
Height 7.640 cm
Water content 15.4 %
Dry density 116.8 pcf
Saturation 92.2 %

Cell pressure 0.00 kg/cm2
Strain rate 0.50%/min

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	0.00	0.741	6.09	8.219
3	0.04	2.616	21.51	8.222
4	0.08	5.608	46.12	8.225
5	0.12	9.024	74.26	8.229
6	0.15	12.866	105.91	8.232
7	0.18	16.181	133.23	8.234
8	0.19	18.282	150.55	8.235
9	0.22	20.772	171.11	8.237
10	0.25	23.294	191.94	8.240
11	0.29	26.272	216.55	8.243
12	0.32	29.511	243.33	8.245
13	0.36	33.371	275.26	8.248
14	0.40	38.177	315.02	8.252
15	0.43	43.178	356.41	8.255
16	0.47	48.798	402.95	8.257
17	0.50	54.545	450.56	8.260
18	0.53	61.173	505.47	8.263
19	0.56	67.764	560.11	8.266
20	0.60	74.516	616.12	8.268
21	0.63	81.589	674.82	8.271
22	0.66	89.277	738.68	8.274
23	0.70	97.218	804.67	8.277
24	0.73	104.863	868.25	8.280
25	0.77	112.179	929.11	8.282
26	0.79	119.071	986.48	8.285
27	0.82	124.455	1031.37	8.287
28	1.16	1.708	14.20	8.316

Raw Data In Volts

TIME	Ve5	Load	Dcdt

04:18:16:24:56	5.50340	0.00382	-1.34810
04:18:16:25:00	5.50340	0.00419	-1.34080
04:18:16:25:04	5.50340	0.00510	-1.33260
04:18:16:25:09	5.50350	0.00614	-1.32450
04:18:16:25:13	5.50340	0.00731	-1.31660
:18:16:25:18	5.50340	0.00832	-1.31100
:18:16:25:23	5.50340	0.00896	-1.30940
04:18:16:25:27	5.50340	0.00972	-1.30290
04:18:16:25:32	5.50340	0.01049	-1.29650
04:18:16:25:36	5.50350	0.01140	-1.28960
04:18:16:25:41	5.50350	0.01239	-1.28290
04:18:16:25:45	5.50340	0.01357	-1.27560
04:18:16:25:50	5.50340	0.01504	-1.26770
04:18:16:25:55	5.50340	0.01657	-1.26040
04:18:16:25:59	5.50340	0.01829	-1.25340
04:18:16:26:04	5.50340	0.02005	-1.24640
04:18:16:26:09	5.50340	0.02208	-1.23970
04:18:16:26:13	5.50350	0.02410	-1.23360
04:18:16:26:18	5.50340	0.02617	-1.22700
04:18:16:26:22	5.50340	0.02834	-1.22040
04:18:16:26:27	5.50330	0.03070	-1.21300
04:18:16:26:31	5.50340	0.03314	-1.20570
04:18:16:26:36	5.50340	0.03549	-1.19881
04:18:16:26:40	5.50340	0.03774	-1.19247
04:18:16:26:45	5.50330	0.03986	-1.18660
04:18:16:26:49	5.50340	0.04152	-1.18100
04:18:16:26:54	5.50340	0.00392	-1.11197

Date Of Report: 23-APR-1991

Project Name: 91-044 Youmg Quist
Sa le Name : Core-9, 2410'11"-2411'4' T/I well
Ce Number :

Area	8.354 cm2	Cell pressure	0.00 kg/cm2
Height	7.248 cm	Strain rate	0.50%/min
Water content	9.8 %		
Dry density	128.3 pcf		
Saturation	69.8 %		

Transducer Information

Channel numbers		Transducer Number		Conversion Factors
Ve5	: 20			
Load cell	: 24	Loadcell	: 61658	148880.00 kg/v/ve
DCDT	: 26	Dcdt	: 926	2.0700 cm/v/ve

Reading	Strain (%)	Stress (kg/cm2)	Load (kg)	Area (cm2)
2	-0.01	0.567	4.73	8.353
3	0.01	2.768	23.13	8.355
4	0.05	6.134	51.27	8.358
5	0.09	10.240	85.62	8.362
6	0.13	14.374	120.25	8.365
7	0.16	17.152	143.51	8.367
8	0.19	19.797	165.69	8.370
9	0.22	22.374	187.33	8.373
10	0.26	25.274	211.68	8.376
11	0.29	28.527	239.01	8.378
12	0.33	32.228	270.11	8.381
13	0.36	36.443	305.55	8.384
14	0.40	41.138	345.05	8.387
15	0.44	46.766	392.39	8.391
16	0.47	53.515	449.20	8.394
17	0.51	60.649	509.25	8.397
18	0.54	67.972	570.93	8.399
19	0.57	75.775	636.68	8.402
20	0.61	83.823	704.57	8.405
21	0.65	92.702	779.50	8.409
22	0.69	101.126	850.65	8.412
23	0.72	109.896	924.77	8.415
24	0.76	118.920	1001.07	8.418
25	0.80	127.935	1077.34	8.421
26	0.83	136.665	1151.22	8.424
27	0.86	146.377	1233.45	8.427
28	0.89	155.091	1307.31	8.429
29	1.33	0.335	2.84	8.467

Raw Data In Volts

TIME	Ve5	Load	Dcdt

04:18:16:14:20	5.50350	0.00340	-1.87700
04:18:16:14:24	5.50350	0.00357	-1.87850
04:18:16:14:29	5.50350	0.00425	-1.87520
04:18:16:14:33	5.50340	0.00529	-1.86730
04:18:16:14:38	5.50340	0.00656	-1.85890
:18:16:14:43	5.50350	0.00784	-1.85100
:18:16:14:47	5.50350	0.00870	-1.84670
04:18:16:14:52	5.50350	0.00952	-1.84090
04:18:16:14:57	5.50350	0.01032	-1.83370
04:18:16:15:02	5.50350	0.01122	-1.82750
04:18:16:15:06	5.50340	0.01223	-1.82100
04:18:16:15:11	5.50350	0.01338	-1.81400
04:18:16:15:15	5.50350	0.01469	-1.80700
04:18:16:15:20	5.50350	0.01615	-1.80010
04:18:16:15:24	5.50350	0.01790	-1.79310
04:18:16:15:29	5.50350	0.02000	-1.78570
04:18:16:15:33	5.50350	0.02222	-1.77900
04:18:16:15:38	5.50350	0.02450	-1.77270
04:18:16:15:42	5.50340	0.02693	-1.76640
04:18:16:15:47	5.50350	0.02944	-1.75920
04:18:16:15:52	5.50350	0.03221	-1.75170
04:18:16:15:56	5.50350	0.03484	-1.74470
04:18:16:16:01	5.50350	0.03758	-1.73740
04:18:16:16:05	5.50340	0.04040	-1.73030
04:18:16:16:10	5.50350	0.04322	-1.72370
04:18:16:16:14	5.50340	0.04595	-1.71770
04:18:16:16:19	5.50340	0.04899	-1.71110
04:18:16:16:23	5.50340	0.05172	-1.70490
04:18:16:16:28	5.50350	0.00350	-1.62070

CORE SAMPLES

LITHOLOGIC DESCRIPTIONS

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
LITHOLOGIC DESCRIPTIONS OF CORES

CORE #	INTERVAL CORED	FORMATION CORED	FOOTAGE CORED	RECOVERY (FEET)	RECOVERY (%)
1	1520'-1530'	LAKE CITY	10	3	30
2	1624'-1639'	LAKE CITY	15	9	60
3	1755'-1770'	OLDSMAR	15	10	66
4	1790'-1805'	OLDSMAR	15	8	53
5	1835'-1846'	OLDSMAR	11	8	72
6	1893'-1907'	OLDSMAR	14	0	0
7	1908'-1926'	OLDSMAR	18	2	11
8	2102'-2112'	OLDSMAR	10	0	0
9	2406'-2419'	OLDSMAR	13	12	

CORE	DEPTH INTERVAL	DESCRIPTION
1	1520' - 1530'	Dolomite, calcareous, intercrystalline, vugular and moldic porosity with limestone and chert at the base of the core.
2	1624' - 1639'	Predominantly dolomitic limestone with interbeds of dolomite and chert, intercrystalline and intergranular porosity, well indurated, horizontal lignite veins throughout core and vertical veins in dolomite and chert.
3	1755' - 1770'	Limestone, crystalline and dolomitic, intergranular and intercrystalline porosity, moderately indurated with chert at base of core, horizontal lignite veins throughout core.
4	1790' - 1805'	Limestone, biosparite, with calcareous dolomite, moldic, intercrystalline and intergranular porosity, moderately to well indurated.
5	1835' - 1846'	Limestone, biosparite, moldic and intergranular porosity, horizontal lignite veins throughout core.
7	1908' - 1926'	Limestone, biomicrite, moldic and intergranular porosity, poorly indurated.
9	2406' - 2419'	Dolomite, intercrystalline and vugular porosity, medium to high alteration, horizontal lignite veins and vertical lineaments throughout core.

CORE # 1 1520'- 1530' Recovery: 3 feet

DEPTH	THICKNESS
1520' 0" - 1520' 8"	8"

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline, vugular and moldic porosity, microcrystalline to fine grained euhedral crystals, high alteration, good induration with dolomite cement, crystalline.

1520' 8" - 1521' 5" 9"

CALCAREOUS DOLOMITE, yellowish gray (5 Y 7/2) to dusky yellow (5 Y 6/4), intercrystalline, intergranular and moldic porosity, microcrystalline to coarse grained subhedral crystals, medium alteration, good induration with dolomite cement, micrite (<10%), undistinguishable fossils in section, fossil casts, relic textures, less dense than section above.

1521' 5" - 1521' 11" 6"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2), intergranular and intercrystalline porosity, microcrystalline to very fine grained, <10% allochems, grain type is micrite and crystal, moderate induration with micrite and dolomite cement, coarse grained euhedral dolomite crystals in sample.

1521' 11" - 1523' 0" 1' 1"

CHERT, olive gray (5 Y 4/1) to olive black (5 Y 2/1), no visible porosity, cryptocrystalline, good induration, micrite (10 %), white evaporite veins in section, very dense.

CORE # 2 1624'- 1639' Recovery: 9 feet

1624' 0" - 1626' 2" 2' 2"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2) to dusky yellow (5 Y 6/4), intercrystalline and intergranular porosity, possibly low permeability, grain type is micrite and crystal, low alteration, moderate induration with micrite, sparry calcite and dolomite cement, very fine dolomite crystals in section, evaporites (trace), tight, few fossils.

1626' 2" - 1626' 5" 3"

DOLOMITE, olive gray (5 Y 3/2), no visible porosity, possibly low permeability, microcrystalline, good induration, white vertical evaporite veins and vertical lineaments within dolomite in section, micrite above and below dolomite interbed.

1626' 5" - 1627' 4"   11"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2) to dusky yellow (5 Y 6/4), intercrystalline and intergranular porosity, possibly low permeability, grain type is micrite and crystal, low to medium alteration, moderate to good induration with micrite and dolomite cement, unfossiliferous, tight formation.

1627' 4" - 1627' 8"   4"

DOLOMITE and MICRITE (10%), olive gray (5 Y 4/1) to white (N 9), intergranular porosity, microcrystalline, good induration, micrite (10%), dolomite crystals, vertical evaporite veins present, hair line vertical lineaments, very dense.

1627' 8" - 1627' 10"   2"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2), intergranular and intercrystalline porosity, microcrystalline to very fine grained, 10% allochems, grain type is micrite and crystal, moderate induration with micrite and dolomite cement, coarse grained euhedral dolomite crystals in sample.

1627' 10" - 1628' 1"   3"

DOLOMITE, olive gray (5 Y 4/1), no visible porosity, microcrystalline, high alteration, good induration, vertical linements present in section, very dense.

1628' 1" - 1628' 10"   9"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2), intergranular and intercrystalline porosity, microcrystalline to very fine grained, 10% allochems, grain type is micrite and crystal, moderate induration with micrite and dolomite cement, coarse grained euhedral dolomite crystals in sample.

1628' 10" - 1629' 6"   8"

DOLOMITE with micrite and anhydrite veins, olive gray (5 Y 4/1) to dark gray (N 3) to very light gray (N 8), intergranular and intercrystalline porosity, grain type is micrite and crystal, poor to good induration with micrite and dolomite cement, very tight, hard, hair line lineaments.

1629' 6" - 1630' 8"   1' 2"

CALCAREOUS DOLOMITE, yellowish gray (5 Y 7/2), intercrystalline and intergranular porosity, grain type is crystal and micrite, low alteration, microcrystalline to very fine grained, moderate to good induration with dolomite cement and micrite, minute lignite veins in sample.

1630' 8" - 1631' 4" 8"

DOLOMITE, olive gray (5 Y 4/1), no visible porosity, microcrystalline, high alteration, good induration, vertical lineaments present in section, very dense.

1631' 4" - 1633' 0" 1' 6"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 7/2), intergranular and intercrystalline porosity, microcrystalline to very fine grained, 10% allochems, grain type is micrite and crystal, moderate induration with micrite and dolomite cement, coarse grained euhedral dolomite crystals in sample.

CORE # 3 1755'- 1770' Recovery: 10 feet

1755' 0" - 1755' 5" 5"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1) to light olive gray (5 Y 6/1), intergranular, intercrystalline and moldic porosity, grain type is micrite, crystal and skeletal, 15% allochems, microcrystalline to fine grained, moderate induration with micrite, sparry calcite and dolomite cement, forams, lignite veins.

1755' 5" - 1755' 9" 4"

DOLOMITE, yellowish gray (5 Y 8/1), intercrystalline porosity, medium alteration, microcrystalline to medium grained subhedral crystals, moderate to good induration with dolomite cement, sacchorodial texture, larger crystals occupy void spaces, calcite crystals present, slightly altered forams in sample.

1755' 9" - 1757' 6" 1' 9"

LIMESTONE, yellowish gray (5 Y 8/1), intergranular and intercrystalline porosity, grain type is micrite, crystal, intraclast and skeletal, 10% allochems, microcrystalline to very fine grained, moderate induration with micrite and sparry calcite cement, dolomitic, forams, lignite lenses and veins in section.

1757' 6" - 1758' 6" 1' 0"

CRYSTALLINE LIMESTONE, very pale orange (10 YR 8/2), intercrystalline porosity, possibly low permeability, <5% allochems, microcrystalline, good induration.

1758' 6" - 1760' 10" 2' 4"

DOLOMITIC LIMESTONE, yellowish gray (5 Y 8/1), intercrystalline, intergranular and moldic porosity, possibly low permeability, 20%

allochems, microcrystalline to fine grained crystals, moderate to good induration with sparry calcite, dolomite and micrite cement.

1760' 10" - 1762' 5"   1' 7"

CRYSTALLINE LIMESTONE, very pale orange (10 YR 8/2) intercrystalline porosity, possibly low permeability, <5% allochems, microcrystalline, good induration with sparry calcite cement, section has one vertical lineament about 1 1/2" in length.

1762' 5" - 1764' 6"   2' 1"

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 8/1), moldic, intergranular and intercrystalline porosity, 70% allochems, grain type is skeletal and crystal, microcrystalline to very fine grained, good induration with sparry calcite and dolomite cement, abundant foraminifera, Dictyoconus sp.

1764' 6" - 1765' 0"   6"

CHERT and MICRITE, very light gray (N 8) to light gray (N 7), no visible porosity, cryptocrystalline, micrite occupying void space.

CORE # 4   1790' - 1805'   Recovery: 8 feet

1790' 0" - 1792' 4"   4' 2"

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic, intercrystalline and intergranular porosity, 50% allochems, grain type is skeletal, crystal and micrite, microcrystalline to medium grained, moderate induration with sparry calcite and dolomite cement, coarse grained subhedral dolomite crystals, lignite veins, abundant forams including Dictyoconus sp.

1792' 4" - 1793' 6"   1' 2"

CALCAREOUS DOLOMITE, yellowish gray (5 Y 7/2), intercrystalline, moldic and intergranular porosity, grain type is crystal and biogenic, moderate to good induration with dolomite and sparry calcite cement.

1793' 6" - 1795' 10"   2' 4"

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic, intercrystalline and intergranular porosity, 50% allochems, grain type is skeletal, crystal and micrite, microcrystalline to medium grained, moderate induration with sparry calcite and dolomite cement, coarse grained subhedral dolomite crystals, lignite veins, abundant forams.

1795' 10" - 1796' 7" 9"

CALCAREOUS DOLOMITE, very light gray (N 6) to light gray (N 7), intercrystalline and moldic porosity, 15% allochems, grain type is crystal and biogenic, good induration with dolomite and sparry calcite cement, light gray (N 7) sparry calcite concretions in sample, forams.

1796' 7" - 1798' 0" 1' 5"

FORAMINIFEROUS LIMESTONE, very light gray (N 6) to light gray (N 7), intercrystalline and moldic porosity, 15% allochems, grain type is crystal and biogenic, good induration with dolomite and sparry calcite cement, light gray (N 7) sparry calcite concretions in sample, forams.

CORE # 5 1835' - 1846' Recovery: 8 feet

1835' 0" - 1836' 11" 1' 11"

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic, intercrystalline and intergranular porosity, 60% allochems, grain type is skeletal, crystal and micrite, microcrystalline to medium grained, moderate induration with sparry calcite, micrite and dolomite cement, Dictyoconus sp.

1836' 11" - 1838' 2" 3"

LIMESTONE, very pale orange (10 YR 8/2), intergranular porosity, 20% allochems, grain type is skeletal, crystal and micrite, microcrystalline to medium grained, moderate induration with sparry calcite, micrite and dolomite cement.

1838' 2" - 1843' 0" 4' 10"

FORAMINIFEROUS LIMESTONE, yellowish gray (5 Y 7/2), moldic, intercrystalline and intergranular porosity, 55% allochems, grain type is skeletal, crystal and micrite, microcrystalline to fine grained, moderate induration with sparry calcite, micrite and dolomite cement, lignite veins in section.

CORE # 7 1908' - 1926' Recovery: 2 feet

1924' - 1924' 2" 2"

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, possibly low permeability, 20% allochems, grain type is micrite and skeletal, microcrystalline, poor to moderate induration with micrite and sparry calcite cement, chalky, micritic, forams.

1924' 2" - 1925' 5" 1' 3"

DOLOMITE, yellowish gray (5Y 7/2), intercrystalline porosity, possibly low permeability, high alteration, good induration with dolomite cement.

1925' 5" - 1927' 0" 1' 7"

LIMESTONE, very pale orange (10 YR 8/2), intergranular and moldic porosity, 25% allochems, grain type is micrite and skeletal, microcrystalline, poor to moderate induration with micrite and sparry calcite cement, forams, dolomitic.

CORE # 9 2406' - 2419' Recovery: 12 feet

2406' 0" - 2406' 5" 5"

DOLOMITE, pale yellowish brown (10 YR 6/2) to dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, moderate to good induration with dolomite cement, lignite veins in bottom half of section, vertical lineaments.

2406' 5" - 2407' 3" 10"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, moderate induration with dolomite cement, horizontal lignite veins throughout sample.

2407' 3" - 2408' 9" 1' 6"

DOLOMITE, dark yellowish brown 10 YR 4/2), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, good induration with dolomite cement, lignite veins.

2408' 9" - 2410' 1" 4"

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, microcrystalline, medium alteration, good induration with dolomite cement.

2410' 1" - 2410' 5" 4"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, good induration with dolomite cement, lignite veins, small lineaments in sample.

2410' 5" - 2410' 9" 4"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, medium alteration, very fine to fine grained euhedral crystals, good induration with dolomite cement, lignite veins at bottom of section.

2410' 9" - 2410' 11" 2"

DOLOMITE, yellowish gray (5 Y 8/1), intercrystalline and vugular porosity, microcrystalline to very fine grained euhedral crystals, medium alteration, good induration with dolomite cement.

2410' 11" - 2411' 7" 8"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, medium alteration, fine grained euhedral crystals, moderate induration with dolomite cement.

2411' 7" - 2412' 0" 5"

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, medium alteration, fine grained euhedral crystals, moderate induration with dolomite cement.

2412' 0" - 2412' 8" 8"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, medium alteration, very fine grained euhedral crystals, moderate induration with dolomite cement.

2412' 8" - 2413' 0" 1' 4"

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement.

2413' 0" - 2415' 2" 1' 2"

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, medium alteration, very fine grained euhedral crystals, good induration with dolomite cement.

2415' 2" - 2415' 11" 9"

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement, lignite veines.

2415' 11" - 2416' 1"   1' 2"

DOLOMITE, light olive gray (5 Y 6/1) to yellowish gray (5 Y 8/1), intercrystalline and vugular porosity, medium alteration, microcrystalline to very fine grained euhedral crystals, good induration with dolomite cement.

2416' 1" - 2417' 4"   1' 3"

DOLOMITE, light olive gray (5 Y 6/1), intercrystalline and vugular porosity, medium alteration, microcrystalline, good induration with dolomite cement.

2417' 4" - 2417' 11"   7"

DOLOMITE, light olive gray (5 Y 6/1) to pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, medium to high alteration, microcrystalline to fine grained euhedral crystals, good induration with dolomite cement, vertical lineaments in section, small cavities.

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
LITHOLOGIC DESCRIPTIONS OF CORES

CORE #	INTERVAL CORED	FORMATION CORED	FOOTAGE CORED	RECOVERY (FEET)	RECOVERY (%)
1	1131'-1146'	LAKE CITY	15	15	100
2	1463'-1473'	LAKE CITY	10	8	80

CORE	DEPTH INTERVAL	DESCRIPTION
1	1131' - 1146'	Primarily dolomite with some dolomitic limestone, intercrystalline, intergranular and vugular porosity, medium alteration.
2	1463' - 1473'	Dolomite, intercrystalline, intracrystalline and vugular porosity, high alteration, good induration, dense.

CORE # 1 1131'- 1146' Recovery: 15 feet

DEPTH THICKNESS

1131' 0" - 1133' 6" 2' 6"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, microcrystalline to very fine grained euhedral crystals, medium alteration, good induration with dolomite cement, lignite veins, cavities.

1133' 6" - 1134'11" 1' 5"

DOLOMITIC LIMESTONE, moderate yellowish brown (10 YR 5/4), intergranular , intercrystalline and vugular porosity, grain type is micrite, crystal and skeletal, 20% allochems, medium grained, poor to moderate induration with micrite and dolomite cement.

1134'11" - 1136' 0" 1' 1"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, moderate to good induration with dolomite cement.

1136' 0" - 1137' 6" 1' 6"

DOLOMITE, light gray (N 7), intercrystalline and vugular porosity, microcrystalline, high alteration, good induration with dolomite cement.

1137' 6" - 1138'11"   1' 5"

DOLOMITE, moderate yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, very fine to fine grained euhedral crystals, medium alteration, moderate induration with dolomite cement.

1138'11" - 1141' 8"   2' 9"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline, moldic and vugular porosity, microcrystalline grained euhedral crystals, high alteration, good induration with dolomite cement.

1141' 8" - 1142' 2"   6"

DOLOMITE, moderate yellowish brown (10 YR 5/4), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, moderate induration with dolomite cement, cavities.

1142' 2" - 1143' 6"   1' 4"

DOLOMITE, pale yellowish brown (10 YR 6/2), intercrystalline and vugular porosity, very fine grained euhedral crystals, medium alteration, good induration with dolomite cement.

1143' 6" - 1146' 0"   2' 6"

DOLOMITIC LIMESTONE, dark yellowish brown (10 YR 4/2), intergranular, intercrystalline and vugular porosity, grain type is micrite, crystal and skeletal, very fine to medium grained, poor to moderate induration with micrite, sparry calcite and dolomite cement.

CORE # 2   1463' - 1473'   Recovery: 8 feet

Depth   Thickness

1463' 0" - 1463' 4"   4"

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline porosity, microcrystalline to very fine grained subhedral crystals, high alteration, good induration with dolomite cement.

1463' 4" - 1464'10"   1' 6"

DOLOMITE, dusky yellowish brown (10 YR 2/2), intercrystalline and vugular porosity, microcrystalline to fine grained crystals, high alteration, good induration with dolomite cement.

1464'10" - 1465' 6"   8"

DOLOMITE, dark yellowish brown (10 YR 4/2), to dusky yellowish brown (10 YR 2/2), intercrystalline and intracrystalline porosity, microcrystalline, high alteration, good induration with dolomite cement, hard, tight, dense, low permeability.

1465' 6" - 1468' 1" 2' 7"

DOLOMITE, dark yellowish brown (10 YR 4/2) to dusky yellowish brown (10 YR 2/2), intercrystalline and vugular porosity, microcrystalline to very fine grained euhedral crystals, high alteration, good induration with dolomite cement, vertical lineaments.

1468' 1" - 1468' 7" 6"

DOLOMITE, dark yellowish brown (10 YR 42), intercrystalline porosity, microcrystalline to fine grained euhedral crystals, medium to high alteration, moderate to good induration with dolomite cement, vertical lineaments in section.

1468' 7" - 1470' 5" 1' 10"

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline and vugular porosity, microcrystalline, high alteration, good induration with dolomite cement.

1470' 5" - 1471' 1" 8"

DOLOMITE, dark yellowish brown (10 YR 4/2), intercrystalline, moldic and vugular porosity, microcrystalline to very fine grained subhedral crystals, medium to high alteration, moderate to good induration with sparry calcite and dolomite cement.

CORE SECTIONS SENT FOR LABORATORY ANALYSIS

WELL	CORE #	INTERVAL SENT FROM CORE	LENGTH (INCHES)
DMW	1	1140' 1"-1140' 6"	5
DMW	2	1464' 3"-1464' 9"	6
T/I	1	1520' 4"-1520' 8"	4
T/I	2	1629' 6"-1630' 1"	7
T/I	3	1758' 2"-1758' 6"	4
T/I	4	1796'10"-1797' 2"	4
T/I	5	1836' 3"-1836' 8"	5
T/I	9	2410'11"-2411' 4"	5

CORE SAMPLES

PHOTOGRAPHS OF CORES


TEST INJECTION
WELL
CORE #7
TOP
BOTTOM
T/I WELL


TEST INJECTION WELL
T/I WELL CORE #4
1790' TOP


TEST INJECTION WELL
CORE #9
BOTTOM
2419
2406
TOP


EST INJECTION
WELL
CORE #2
TOP


THIS END UP
TEST INJECTION WELL
CORE # 1
TOP
BOTTOM

TEST INJECTION
WELL
CORE #9
2410'
2406
TOP


TEST INJECTION WELL
CORE # 5
BOTTOM
1846
TOP


DEEP FLORIDAN
MONITOR WELL
CORE # 1
1131-FT
1136-FT
1141-FT
1131
TOP


TEST INJECTION
WELL
CORE #4
TOP: 1796'
BOTTOM: 1797'

ST INJECTION
WELL
CORE # 2
TOP: 1629' 6"
BOTTOM: 1630' 1"

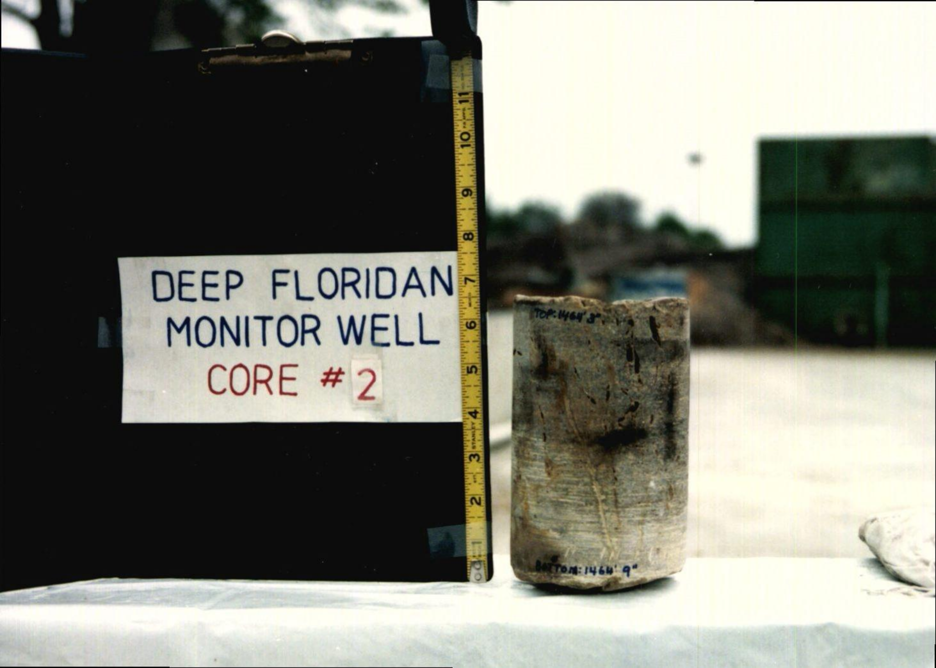

EEP FLORIDAN
ONITOR WELL
CORE # 2
TOP
1463'
2419


ST INJECTION
WELL
CORE # 3
TOP: 1758' 2"
BOTTOM: 1758' 6"


DEEP FLORIDAN
MONITOR WELL
CORE # 1
1136-Ft
1141-Ft


DEEP FLORIDAN
MONITOR WELL
CORE # 2


TEST INJECTION
WELL
CORE #9


DEEP FLORIDAN
MONITOR WELL
CORE #2
TOP: 1464' 3"
BOTTOM: 1464' 9"


ST INJECTION
WELL
CORE # 5
TOP: 1836' 9"
BOTTOM: 1836' 5"


DEEP FLORIDAN
MONITOR WELL
CORE # 1
1131
TOP


TEST INJECTION
WELL
BOTTOM


TEST INJECTION
WELL
CORE #4
TOP: 1796' 10
BOTTOM: 1797'

APPENDIX D

INJECTION TEST DATA AND TRANSMISSIVITY CALCULATIONS

INJECTION TEST DATA

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
031791	2100	4.40	15.50
031791	2200	4.40	15.48
031791	2300	4.37	15.45
031891	0000	4.31	15.40
031891	0100	4.30	15.30
031891	0200	4.25	15.32
031891	0300	4.21	15.70
031891	0400	4.15	15.70
031891	0500	4.20	15.70
031891	0600	4.25	15.60
031891	0700	4.30	15.50
031891	0800	4.36	15.49
031891	0900	4.39	15.45
031891	1000	4.48	15.40
031891	1100	4.50	15.43
031891	1200	4.35	15.48
031891	1300	4.30	15.54
031891	1400	4.24	15.58
031891	1500	4.22	15.60
031891	1600	4.20	15.63
031891	1700	4.22	15.60
031891	1800	4.25	15.57
031891	1900	4.45	15.42
031891	2000	4.48	15.40
031891	2100	4.58	15.35
031891	2200	4.60	15.35
031891	2300	4.60	15.30
031991	0000	4.58	15.27
031991	0100	4.55	15.32
031991	0200	4.45	15.35
031991	0300	4.42	15.40
031991	0400	4.38	15.41
031991	0500	4.35	15.45
031991	0600	4.35	15.45
031991	0700	4.36	15.43
031991	0800	4.39	15.34
031991	0900	4.43	15.35
031991	1000	4.46	15.30
031991	1100	4.49	15.27
031991	1200	4.48	15.31
031991	1300	4.45	15.35
031991	1400	4.38	15.41
031991	1500	4.34	15.47
031991	1600	4.28	15.51
031991	1700	4.26	15.52
031991	1800	4.29	15.51
031991	1900	4.31	15.48
031991	2000	4.36	15.38

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
031991	2200*	4.47	15.30	032091	2130	4.36	15.88
031991	2210	4.50	15.28	032091	2200	4.36	15.88
031991	2220	4.50	15.28	032091	2230	4.38	15.86
031991	2230	4.51	15.27	032091	2300	4.40	15.81
031991	2240	4.51	15.26	032091	2330	4.46	15.76
031991	2250	4.52	15.26	032191	0000	4.48	15.70
031991	2300	4.52	15.25	032191	0030	4.49	15.68
031991	2310	4.53	15.24	032191	0100	4.50	15.67
031991	2320	4.54	15.24	032191	0130	4.50	15.67
031991	2330	4.54	15.23	032191	0200	4.48	15.66
032091	0710	4.25	15.52	032191	0230	4.45	15.71
032091	0720	4.25	15.51	032191	0300	4.42	15.74
032091	0730	4.24	15.53	032191	0330	4.40	15.76
032091	0740	4.26	15.51	032191	0400	4.36	15.79
032091	0750	4.26	15.52	032191	0430	4.32	15.83
032091	0800	4.26	15.53	032191	0500	4.30	15.88
032091	0810	4.25	15.51	032191	0530	4.27	15.89
032091	0820	4.26	15.51	032191	0600	4.25	15.94
032091	0830	4.27	15.51	032191	0630	4.23	15.95
032091	0840	4.27	15.51	032191	0700	4.22	15.95
032091	0850	4.28	15.50	032191	0730	4.20	15.91
032091	0900	4.29	15.50	032191	0800	4.21	15.91
032091	0910	4.29	15.48	032191	0830	4.22	15.89
032091	0940	4.32	15.45	032191	0900	4.23	15.89
032091	1010	4.34	15.44	032191	1000	4.25	15.87
032091	1040	4.35	15.42	032191	1030	4.29	15.83
032091	1110	4.36	15.41	032191	1108	4.30	15.80
032091	1210	4.35	15.43	032191	1130	4.34	15.79
032091	1310	4.37	15.41	032191	1200	4.33	15.79
032091	1410	4.35	15.42	032191	1230	4.35	15.76
032091	1510	4.25	15.54	032191	1300	4.35	15.79
032091	1610	4.19	15.70	032191	1330	4.34	15.81
032091	1710	4.16	15.84	032191	1400	4.33	15.83
032091	1810	4.13	16.00	032191	1430	4.31	15.84
032091	1910	4.18	15.96	032191	1500**	4.29	15.91
032091	2000	4.21	15.89				
032091	2030	4.25	15.88				
032091	2100	4.29	15.88				

* Begin pumping fresh water down t/i well at a rate of 100 gpm for T.V. survey

** Stop pumping

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
032191	1530	+4.26	-15.90	032291	1130	+4.35	-15.83
032191	1600	+4.25	-15.94	032291	1200	+4.35	-15.83
032191	1630	+4.20	-15.98	032291	1230	+4.38	-15.80
032191	1700	+4.18	-15.95	032291	1300	+4.38	-15.77
032191	1730	+4.15	-16.00	032291	1330	+4.40	-15.77
032191	1800	+4.16	-16.05	032291	1400	+4.42	-15.75
032191	1830	+4.13	-16.03	032291	1430	+4.40	-15.74
032191	1900	+4.14	-16.05				
032191	1930	+4.15	-16.02	032291*	1445	+4.40	-15.75
032191	2000	+4.15	-16.00	032291	1500	+4.39	-15.76
032191	2030	+4.16	-15.98	032291	1515	+4.37	-15.80
032191	2100	+4.19	-15.97	032291	1530	+4.35	-15.79
032191	2130	+4.21	-15.94	032291	1600	+4.32	-15.80
032191	2200	+4.25	-15.90	032291	1615	+4.31	-15.84
032191	2230	+4.27	-15.85	032291	1700	+4.26	-15.89
032191	2300	+4.30	-15.80	032291	1730	+4.24	-15.90
032191	2330	+4.33	-15.77	032291	1800	+4.20	-15.94
032291	0000	+4.37	-15.75	032291	1830	+4.13	-15.97
032291	0030	+4.41	-15.73	032291	1900	+4.16	-15.98
032291	0100	+4.43	-15.70	032291	1930	+4.14	-16.00
032291	0130	+4.45	-15.68	032291	2000	+4.13	-16.00
032291	0200	+4.46	-15.67	032291	2030	+4.13	-15.98
032291	0230	+4.46	-15.66	032291	2100	+4.16	-15.95
032291	0300	+4.46	-15.64	032291	2130	+4.19	-15.91
032291	0330	+4.45	-15.69	032291	2200	+4.22	-15.88
032291	0400	+4.42	-15.72	032291	2230	+4.24	-15.86
032291	0430	+4.40	-15.75	032291	2300	+4.30	-15.81
032291	0500	+4.37	-15.78	032291	2330	+4.32	-15.78
032291	0530	+4.34	-15.80	032391	0000	+4.35	-15.74
032291	0600	+4.31	-15.83	032391	0030	+4.38	-15.70
032291	0630	+4.30	-15.85	032391	0100	+4.41	-15.67
032291	0700	+4.26	-15.88	032391	0130	+4.44	-15.65
032291	0730	+4.25	-15.90	032391	0200	+4.46	-15.63
032291	0800	+4.23	-15.90	032391	0230	+4.47	-15.61
032291	0830	+4.23	-15.89	032391	0300	+4.46	-15.62
032291	0900	+4.22	-15.90	032391	0330	+4.46	-15.64
032291	0930	+4.23	-15.89	032391	0400	+4.45	-15.67
032291	1000	+4.27	-15.88	032391	0430	+4.43	-15.70
032291	1030	+4.31	-15.87	032391	0500	+4.43	-15.70
032291	1100	+4.34	-15.85	032391	0530	+4.39	-15.73

* Begin pumping fresh water down t/i well at a rate 100 gpm for radioactive tracer survey

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
032391	0600	+4.35	-15.78	032491	0300	+4.50	-15.60
032391	0630	+4.31	-15.80	032491	0330	+4.50	-15.60
032391	0700	+4.28	-15.83	032491	0400	+4.51	-15.58
032391	0730	+4.26	-15.85	032491	0430	+4.51	-15.61
				032491	0500	+4.48	-15.61
032391	0800*	+4.24	-15.88	032491	0530	+4.46	-15.65
032391	0830	+4.21	-15.89	032491	0600	+4.43	-15.68
032391	0900	+4.20	-15.90	032491	0630	+4.40	-15.70
032391	0930	+4.21	-15.89	032491	0700	+4.37	-15.73
032391	1000	+4.19	-15.88	032491	0730	+4.32	-15.76
032391	1030	+4.21	-15.87	032491	0800	+4.29	-15.80
032391	1100	+4.25	-15.85	032491	0830	+4.25	-15.84
032391	1130	+4.28	-15.83	032491	0900	+4.25	-15.85
032391	1200	+4.30	-15.81	032491	0930	+4.24	-15.86
032391	1230	+4.32	-15.78	032491	1000	+4.22	-15.87
032391	1300	+4.31	-15.75	032491	1030	+4.23	-15.88
032391	1330	+4.31	-15.72	032491	1100	+4.24	-15.86
032391	1400	+4.37	-15.70	032491	1130	+4.26	-15.84
032391	1430	+4.41	-15.70	032491	1200	+4.26	-15.82
032391	1500	+4.40	-15.68	032491	1230	+4.30	-15.79
032391	1530	+4.43	-15.70	032491	1300	+4.35	-15.75
032391	1600	+4.42	-15.72	032491	1330	+4.38	-15.72
032391	1630	+4.43	-15.73	032491	1400	+4.41	-15.70
032391	1700	+4.37	-15.75	032491	1430	+4.44	-15.67
032391	1730	+4.34	-15.79	032491	1500	+4.46	-15.65
032391	1800	+4.31	-15.81	032491	1530	+4.50	-15.62
032391	1830	+4.28	-15.85	032491	1600	+4.50	-15.62
032391	1900	+4.26	-15.88	032491	1630	+4.51	-15.63
032391	1930	+4.22	-15.90	032491	1700	+4.48	-15.63
032391	2000	+4.21	-15.90	032491	1730	+4.46	-15.65
032391	2030	+4.21	-15.91	032491	1800	+4.42	-15.68
032391	2100	+4.20	-15.93	032491	1830	+4.39	-15.70
032391	2130	+4.19	-15.94	032491	1900	+4.36	-15.75
032391	2200	+4.20	-15.92	032491	1930	+4.34	-15.78
032391	2230	+4.23	-15.87	032491	2000	+4.30	-15.82
032391	2300	+4.27	-15.83	032491	2030	+4.27	-15.84
032391	2330	+4.31	-15.79	032491	2100	+4.25	-15.87
032491	0000	+4.35	-15.73	032491	2130	+4.23	-15.90
032491	0030	+4.38	-15.70	032491	2200	+4.22	-15.91
032491	0100	+4.43	-15.66	032491	2230	+4.21	-15.90
032491	0130	+4.44	-15.63	032491	2300	+4.23	-15.88
032491	0200	+4.47	-15.61	032491	2330	+4.26	-15.84
032491	0230	+4.48	-15.61	032591	0000	+4.28	-15.82

* Stop pumping down t/i well

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
032591	0030	+4.32	-15.77	032591	2200	+4.18	-15.93
032591	0100	+4.35	-15.74	032591	2230	+4.16	-15.95
032591	0130	+4.39	-15.70	032591	2300	+4.15	-15.95
032591	0200	+4.44	-15.65	032591	2330	+4.16	-15.94
032591	0230	+4.46	-15.63	032691	0000	+4.16	-15.92
032591	0300	+4.50	-15.67	032691	0030	+4.20	-15.89
032591	0330	+4.51	-15.56	032691	0100	+4.23	-15.85
032591	0400	+4.53	-15.55	032691	0130	+4.26	-15.82
032591	0430	+4.56	-15.54	032691	0200	+4.30	-15.79
032591	0500	+4.56	-15.55	032691	0230	+4.33	-15.75
032591	0530	+4.54	-15.58	032691	0300	+4.37	-15.71
032591	0600	+4.51	-15.60	032691	0330	+4.40	-15.67
032591	0630	+4.48	-15.63	032691	0400	+4.42	-15.65
032591	0700	+4.46	-15.66	032691	0430	+4.41	-15.64
032591	0730	+4.41	-15.67	032691	0500	+4.39	-15.63
032591	0800	+4.35	-15.72	032691	0530	+4.38	-15.62
032591	0830	+4.31	-15.77	032691	0600	+4.40	-15.64
032591	0900	+4.29	-15.80	032691	0630	+4.42	-15.66
032591	0930	+4.26	-15.84	032691	0700	+4.41	-15.67
032591	1000	+4.24	-15.86	032691	0730	+4.38	-15.70
032591	1030	+4.23	-15.88	032691	0800	+4.34	-15.74
032591	1100	+4.21	-15.88	032691	0830	+4.31	-15.78
032591	1130	+4.22	-15.87	032691	0900	+4.26	-15.83
032591	1200	+4.23	-15.85	032691	0930	+4.25	-15.86
032591	1230	+4.24	-15.84	032691	1000	+4.21	-15.90
032591	1300	+4.26	-15.80	032691	1030	+4.18	-15.92
032591	1330	+4.32	-15.78	032691	1100	+4.16	-15.94
032591	1400	+4.34	-15.74	032691	1130	+4.16	-15.95
032591	1430	+4.37	-15.71	032691	1200	+4.14	-15.95
032591	1500	+4.43	-15.68	032691	1230	+4.18	-15.93
032591	1530	+4.43	-15.67	032691	1300	+4.18	-15.92
032591	1600	+4.45	-15.65	032691	1330	+4.21	-15.90
032591	1630	+4.46	-15.63	032691	1400	+4.26	-15.86
032591	1700	+4.45	-15.63	032691	1430	+4.28	-15.83
032591	1730	+4.45	-15.65	032691	1500	+4.31	-15.79
032591	1800	+4.42	-15.66	032691	1530	+4.34	-15.75
032591	1830	+4.41	-15.68	032691	1600	+4.37	-15.73
032591	1900	+4.37	-15.70	032691	1630	+4.41	-15.70
032591	1930	+4.34	-15.75	032691	1700	+4.43	-15.68
032591	2000	+4.31	-15.80	032691	1730	+4.42	-15.67
032591	2030	+4.27	-15.84	032691	1800	+4.42	-15.68
032591	2100	+4.24	-15.87	032691	1830	+4.41	-15.68
032591	2130	+4.21	-15.90	032691	1900	+4.39	-15.71

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
032691	1930	+4.36	15.74	032791	1700	4.41	15.66
032691	2000	+4.34	15.77	032791	1730	4.43	15.62
032691	2030	+4.31	15.81	032791	1800	4.43	15.61
032691	2100	+4.25	15.84	032791	1830	4.43	15.60
032691	2130	+4.21	15.89	032791	1900	4.42	15.61
032691	2200	+4.18	15.92	032791	1930	4.40	15.64
032691	2230	+4.16	15.94	032791	2000	4.41	15.67
032691	2300	+4.14	15.96	032791	2030	4.38	15.69
032691	2330	+4.13	15.97	032791	2100	4.34	15.92
032791	0000	+4.11	15.96	032791	2130	4.31	15.75
032791	0030	+4.12	15.95	032791	2200	4.28	15.80
032791	0100	+4.15	15.94	032791	2230	4.24	15.83
032791	0130	+4.18	15.90	032791	2300	4.20	15.88
032791	0200	+4.20	15.87	032791	2330	4.17	15.90
032791	0230	+4.24	15.84	032891	0000	4.14	15.93
032791	0300	4.28	15.80	032891	0030	4.14	15.94
032791	0330	4.31	15.75	032891	0100	4.15	15.92
032791	0400	4.33	15.70	032891	0130	4.15	15.90
032791	0430	4.35	15.65	032891	0200	4.18	15.91
032791	0500	4.36	15.64	032891	0230	4.21	15.88
032791	0530	4.38	15.66	032891	0300	4.25	15.86
032791	0600	4.41	15.68	032891	0330	4.28	15.82
032791	0630	4.42	15.69	032891	0400	4.31	15.77
032791	0700	4.43	15.70	032891	0430	4.34	15.72
032791	0730	4.41	15.70	032891	0500	4.36	15.68
032791	0800	4.36	15.70	032891	0530	4.39	15.63
032791	0830	4.35	15.71	032891	0600	4.41	15.62
032791	0900	4.31	15.73	032891	0630	4.41	15.64
032791	0930	4.29	15.77	032891	0700	4.42	15.63
032791	1000	4.25	15.81	032891	0730	4.40	15.63
032791	1030	4.23	15.85	032891	0800	4.39	15.63
032791	1100	4.20	15.87	032891	0830	4.34	15.64
032791	1130	4.17	15.89	032891	0900	4.36	15.66
032791	1200	4.17	15.90	032891	0930	4.34	15.70
032791	1230	4.14	15.90	032891	1000	4.30	15.74
032791	1300	4.17	15.88	032891	1030	4.28	15.77
032791	1330	4.18	15.87	032891	1100	4.25	15.80
032791	1400	4.19	15.85	032891	1130	4.23	15.82
032791	1430	4.23	15.83	032891	1200	4.21	15.84
032791	1500	4.28	15.78	032891	1230	4.19	15.86
032791	1530	4.31	15.75	032891	1300	4.18	15.87
032791	1600	4.33	15.73	032891	1330	4.20	15.86
032791	1630	4.36	15.70	032891	1400	4.22	15.83

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
032891	1430	4.24	15.81	032991	1130	4.35	15.70
032891	1500	4.28	15.78	032991	1200	4.34	15.71
032891	1530	4.32	15.75	032991	1230	4.32	15.73
032891	1600	4.35	15.69	032991	1300	4.31	15.75
032891	1630	4.40	15.65	032991	1330	4.30	15.76
032891	1700	4.43	15.60	032991	1400	4.30	15.76
032891	1730	4.45	15.58	032991	1430	4.30	15.75
032891	1800	4.49	15.56	032991	1500	4.33	15.71
032891	1830	4.51	15.54	032991	1530	4.35	15.68
032891	1900	4.52	15.53	032991	1600	4.38	15.65
032891	1930	4.54	15.53	032991	1630	4.40	15.62
032891	2000	4.53	15.52	032991	1700	4.45	15.58
032891	2030	4.51	15.55	032991	1730	4.49	15.55
032891	2100	4.49	15.58	032991	1800	4.53	15.50
032891	2130	4.46	15.62	032991	1830	4.55	15.49
032891	2200	4.43	15.65	032991	1900	4.58	15.46
032891	2230	4.39	15.68	032991	1930	4.60	15.45
032891	2300	4.36	15.70	032991	2000	4.61	15.45
032891	2330	4.32	15.74	032991	2030	4.62	15.43
032991	0000	4.29	15.78	032991	2100	4.60	15.45
032991	0030	4.26	15.80	032991	2130	4.58	15.48
032991	0100	4.24	15.83	032991	2200	4.56	15.51
032991	0130	4.23	15.85	032991	2230	4.53	15.54
032991	0200	4.24	15.84	032991	2300	4.50	15.57
032991	0230	4.26	15.82	032991	2330	4.47	15.59
032991	0300	4.29	15.78	033091	0000	4.43	15.63
032991	0330	4.31	15.75	033091	0030	4.39	15.67
032991	0400	4.33	15.73	033091	0100	4.35	15.72
032991	0430	4.37	15.69	033091	0130	4.31	15.74
032991	0500	4.40	15.65	033091	0200	4.28	15.75
032991	0530	4.42	15.64	033091	0230	4.26	15.77
032991	0600	4.46	15.60	033091	0300	4.25	15.77
032991	0630	4.48	15.57	033091	0330	4.26	15.76
032991	0700	4.50	15.55	033091	0400	4.28	15.74
032991	0730	4.51	15.53	033091	0430	4.31	15.72
032991	0800	4.50	15.54	033091	0500	4.34	15.70
032991	0830	4.50	15.54	033091	0530	4.36	15.67
032991	0900	4.49	15.55	033091	0600	4.37	15.65
032991	0930	4.49	15.58	033091	0630	4.39	15.64
032991	1000	4.45	15.61	033091	0700	4.41	15.62
032991	1030	4.40	15.66	033091	0730	4.41	15.58
032991	1100	4.38	15.67	033091	0800	4.41	15.60

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
033091	0830	4.41	15.60	033191	0500	4.18	15.83
033091	0900	4.40	15.60	033191	0530	4.19	15.82
033091	0930	4.36	15.62	033191	0600	4.20	15.81
033091	1000	4.34	15.65	033191	0630	4.22	15.79
033091	1030	4.31	15.68	033191	0700	4.24	15.75
033091	1100	4.28	15.72	033191	0730	4.25	15.71
033091	1130	4.25	15.76	033191	0800	4.27	15.71
033091	1200	4.22	15.79	033191	0830	4.30	15.69
033091	1230	4.20	15.82	033191	0900	4.30	15.68
033091	1300	4.18	15.84	033191	0930	4.31	15.68
033091	1330	4.13	15.88	033191	1000	4.28	15.68
033091	1400	4.12	15.89	033191	1030	4.26	15.72
033091	1430	4.11	15.90	033191	1100	4.24	15.76
033091	1500	4.10	15.90	033191	1130	4.21	15.79
033091	1530	4.12	15.89	033191	1200	4.18	15.83
033091	1600	4.13	15.85	033191	1230	4.16	15.85
033091	1630	4.15	15.83	033191	1300	4.14	15.86
033091	1700	4.18	15.81	033191	1330	4.12	15.89
033091	1730	4.21	15.78	033191	1400	4.10	15.92
033091	1800	4.23	15.75	033191	1430	4.09	15.92
033091	1830	4.28	15.71	033191	1500	4.08	15.91
033091	1900	4.31	15.68	033191	1530	4.08	15.91
033091	1930	4.35	15.67	033191	1600	4.08	15.91
033091	2000	4.37	15.65	033191	1630	4.09	15.90
033091	2030	4.38	15.63	033191	1700	4.10	15.89
033091	2100	4.38	15.64	033191	1730	4.13	15.86
033091	2130	4.37	15.64	033191	1800	4.15	15.83
033091	2200	4.36	15.65	033191	1830	4.17	15.80
033091	2230	4.35	15.67	033191	1900	4.22	15.78
033091	2300	4.32	15.69	033191	1930	4.25	15.74
033091	2330	4.30	15.72	033191	2000	4.30	15.70
033191	0000	4.27	15.76	033191	2030	4.31	15.70
033191	0030	4.25	15.79	033191	2100	4.32	15.69
033191	0100	4.22	15.82	033191	2130	4.33	15.67
033191	0130	4.20	15.85	033191	2200	4.35	15.65
033191	0200	4.17	15.87	033191	2230	4.36	15.66
033191	0230	4.15	15.89	033191	2300	4.34	15.67
033191	0300	4.13	15.90	033191	2330	4.32	15.70
033191	0330	4.13	15.89	040191	0000	4.29	15.72
033191	0400	4.15	15.87	040191	0030	4.26	15.75
033191	0430	4.16	15.85	040191	0100	4.24	15.76

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
040191	0130	4.21	15.79	040191	2200	4.28	15.73
040191	0200	4.18	15.82	040191	2230	4.29	15.73
040191	0230	4.16	15.85	040191	2300	4.29	15.72
040191	0300	4.14	15.87	040191	2330	4.28	15.72
040191	0330	4.12	15.89	040291	0000	4.26	15.73
040191	0400	4.11	15.90	040291	0030	4.23	15.76
040191	0430	4.10	15.91	040291	0100	4.21	15.78
040191	0500	4.10	15.91	040291	0130	4.19	15.81
040191	0530	4.11	15.90	040291	0200	4.17	15.83
040191	0600	4.12	15.89	040291	0230	4.16	15.85
040191	0630	4.14	15.87	040291	0300	4.14	15.87
040191	0700	4.14	15.86	040291	0330	4.13	15.88
040191	0730	4.15	15.82	040291	0400	4.12	15.90
040191	0800	4.17	15.81	040291	0430	4.11	15.91
040191	0830	4.19	15.79	040291	0500	4.11	15.91
040191	0900	4.20	15.79	040291	0530	4.10	15.92
040191	0930	4.20	15.78	040291	0600	4.10	15.92
040191	1000	4.21	15.78	040291	0630	4.09	15.91
040191	1030	4.20	15.78	040291	0700	4.10	15.88
040191	1100	4.19	15.80	040291	0730	4.12	15.87
040191	1130	4.18	15.82	040291	0800	4.14	15.84
040191	1200	4.16	15.84	040291	0830	4.16	15.82
040191	1230	4.14	15.87	040291	0900	4.18	15.80
040191	1300	4.12	15.89	040291	0930	4.19	15.80
040191	1330	4.08	15.90	040291	1000	4.19	15.80
040191	1400	4.08	15.92	040291	1030	4.19	15.78
040191	1430	4.06	15.93	040291	1100	4.20	15.78
040191	1500	4.05	15.96	040291	1130	4.20	15.80
040191	1530	4.04	15.97	040291	1200	4.19	15.80
040191	1600	4.03	15.98	040291	1230	4.18	15.81
040191	1630	4.03	15.97	040291	1300	4.17	15.83
040191	1700	4.04	15.96	040291	1330	4.15	15.84
040191	1730	4.06	15.95	040291	1400	4.12	15.87
040191	1800	4.09	15.91	040291	1430	4.11	15.89
040191	1830	4.11	15.88	040291	1500	4.10	15.91
040191	1900	4.14	15.85	040291	1530	4.09	15.93
040191	1930	4.16	15.83	040291	1600	4.08	15.95
040191	2000	4.17	15.81	040291	1630	4.08	15.95
040191	2030	4.21	15.79	040291	1700	4.07	15.94
040191	2100	4.24	15.76	040291	1730	4.08	15.92
040191	2130	4.26	15.74	040291	1800	4.09	15.89

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
040291	1830	4.11	15.87	040391	1500	4.12	15.87
040291	1900	4.14	15.87	040391	1530	4.10	15.89
040291	1930	4.16	15.85	040391	1600	4.09	15.90
040291	2000	4.18	15.82	040391	1630	4.07	15.92
040291	2030	4.21	15.79	040391	1700	4.06	15.94
040291	2100	4.23	15.77	040391	1730	4.06	15.94
040291	2130	4.25	15.75	040391	1800	4.05	15.93
040291	2200	4.28	15.72	040391	1830	4.06	15.92
040291	2230	4.31	15.68	040391	1900	4.07	15.90
040291	2300	4.32	15.67	040391	1930	4.10	15.88
040291	2330	4.34	15.66	040391	2000	4.13	15.86
040391	0000	4.34	15.66	040391	2030	4.15	15.84
040391	0030	4.34	15.67	040391	2100	4.18	15.81
040391	0100	4.33	15.68	040391	2130	4.20	15.79
040391	0130	4.31	15.70	040391	2200	4.24	15.75
040391	0200	4.29	15.72	040391	2230	4.26	15.73
040391	0230	4.26	15.73	040391	2300	4.30	15.69
040391	0300	4.24	15.76	040391	2330	4.31	15.67
040391	0330	4.22	15.78	040491	0000	4.33	15.65
040391	0400	4.20	15.80	040491	0030	4.35	15.64
040391	0430	4.18	15.83	040491	0100	4.35	15.65
040391	0500	4.14	15.86	040491	0130	4.34	15.65
040391	0530	4.13	15.87	040491	0200	4.33	15.66
040391	0600	4.12	15.86	040491	0230	4.31	15.68
040391	0630	4.12	15.88	040491	0300	4.29	15.72
040391	0700	4.11	15.86	040491	0330	4.26	15.73
040391	0730	4.12	15.86	040491	0400	4.22	15.77
040391	0800	4.13	15.85	040491	0430	4.20	15.81
040391	0830	4.15	15.84	040491	0500	4.18	15.83
040391	0900	4.15	15.83	040491	0530	4.17	15.85
040391	0930	4.16	15.82	040491	0600	4.15	15.87
040391	1000	4.17	15.80	040491	0630	4.13	15.86
040391	1030	4.18	15.80	040491	0700	4.13	15.87
040391	1100	4.20	15.79	040491	0730	4.12	15.86
040391	1130	4.20	15.78	040491	0800	4.13	15.88
040391	1200	4.20	15.78	040491	0830	4.13	15.88
040391	1230	4.20	15.77	040491	0900	4.14	15.87
040391	1300	4.18	15.80	040491	0930	4.15	15.85
040391	1330	4.18	15.82	040491	1000	4.16	15.85
040391	1400	4.15	15.84	040491	1030	4.17	15.84
040391	1430	4.14	15.85	040491	1100	4.18	15.84

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	DFMW feet BPL
040491	1130	4.19	15.83	040591	0800	4.11	15.88
040491	1200	4.19	15.82	040591	0830	4.12	15.87
040491	1230	4.19	15.81	040591	0900	4.12	15.85
040491	1300	4.20	15.80	040591	0930	4.14	15.85
040491	1330	4.19	15.83	040591	1000	4.15	15.84
040491	1400	4.17	15.81	040591	1030	4.16	15.84
040491	1430	4.14	15.84	040591	1100	4.17	15.82
040491	1500	4.15	15.85	040591	1130	4.18	15.80
040491	1530	4.13	15.85	040591	1200	4.20	15.79
040491	1600	4.11	15.88	040591	1230	4.22	15.79
040491	1630	4.10	15.91	040591	1300	4.22	15.78
040491	1700	4.09	15.91	040591	1330	4.23	15.78
040491	1730	4.08	15.92	040591	1400	4.24	15.78
040491	1800	4.07	15.94	040591	1430	4.26	15.77
040491	1830	4.07	15.92	040591	1500	4.28	15.77
040491	1900	4.07	15.92	040591	1530	4.26	15.78
040491	1930	4.08	15.90	040491	1600	4.21	15.80
040491	2000	4.10	15.90	040591	1630	4.20	15.82
040491	2030	4.11	15.89	040591	1700	4.18	15.83
040491	2100	4.13	15.88	040591	1730	4.17	15.84
040491	2130	4.15	15.84	040591	1800	4.14	15.86
040491	2200	4.18	15.80	040591	1830	4.14	15.86
040491	2230	4.21	15.78	040591	1900	4.12	15.88
040491	2300	4.24	15.75	040591	1930	4.13	15.91
040491	2330	4.27	15.73	040591	2000	4.13	15.88
040591	0000	4.29	15.70	040591	2030	4.13	15.88
040591	0030	4.31	15.68	040591	2100	4.14	15.86
040591	0100	4.33	15.67	040591	2130	4.15	15.85
040591	0130	4.34	15.66	040591	2200	4.18	15.83
040591	0200	4.34	15.67	040591	2230	4.21	15.79
040591	0230	4.33	15.68	040591	2300	4.23	15.76
040591	0300	4.31	15.70	040591	2330	4.26	15.73
040591	0330	4.29	15.73	040691	0000	4.29	15.70
040591	0400	4.27	15.76	040691	0030	4.31	15.67
040591	0430	4.24	15.77	040691	0100	4.34	15.66
040591	0500	4.21	15.81	040691	0130	4.35	15.64
040591	0530	4.19	15.82	040691	0200	4.33	15.62
040591	0600	4.17	15.83	040691	0230	4.31	15.61
040591	0630	4.16	15.84	040691	0300	4.31	15.61
040591	0700	4.14	15.87	040691	0330	4.29	15.63
040591	0730	4.13	15.87	040691	0400	4.29	15.64

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
040691	0430	4.27	15.67	040791	0100	4.34	15.64
040691	0500	4.24	15.69	040791	0130	4.37	15.62
040691	0530	4.21	15.72	040791	0200	Begin Daylight	
040691	0600	4.21	15.75			Savings Time	
040691	0630	4.20	15.77	040791	0300	4.39	15.60
040691	0700	4.20	15.78	040791	0330	4.40	15.58
040691	0730	4.20	15.80	040791	0400	4.41	15.58
040691	0800	4.18	15.82	040791	0430	4.41	15.59
040691	0830	4.16	15.82	040791	0500	4.40	15.60
040691	0900	4.17	15.83	040791	0530	4.39	15.62
040691	0930	4.18	15.83	040791	0600	4.38	15.64
040691	1000	4.19	15.81	040791	0630	4.36	15.66
040691	1030	4.20	15.80	040791	0700	4.32	15.68
040691	1100	4.20	15.79	040791	0730	4.28	15.70
040691	1130	4.22	15.78	040791	0800	4.27	15.72
040691	1200	4.23	15.76	040791	0830	4.26	15.74
040691	1230	4.25	15.75	040791	0900	4.24	15.76
040691	1300	4.27	15.73	040791	0930	4.22	15.78
040691	1330	4.28	15.72	040791	1000	4.20	15.79
040691	1400	4.28	15.72	040791	1030	4.19	15.80
040691	1430	4.29	15.72	040791	1100	4.20	15.81
040691	1500	4.29	15.73	040791	1130	4.20	15.81
040691	1530	4.28	15.73	040791	1200	4.21	15.80
040691	1600	4.28	15.72	040791	1230	4.22	15.78
040691	1630	4.26	15.74	040791	1300	4.23	15.77
040691	1700	4.24	15.78	040791	1330	4.24	15.76
040691	1730	4.22	15.79	040791	1400	4.26	15.74
040691	1800	4.21	15.80	040791	1430	4.28	15.72
040691	1830	4.19	15.81	040791	1500	4.30	15.70
040691	1900	4.18	15.81	040791	1530	4.32	15.68
040691	1930	4.17	15.83	040791	1600	4.32	15.68
040691	2000	4.16	15.85	040791	1630	4.32	15.69
040691	2030	4.15	15.84	040791	1700	4.33	15.69
040691	2100	4.16	15.83	040791	1730	4.31	15.70
040691	2130	4.18	15.82	040791	1800	4.29	15.71
040691	2200	4.20	15.81	040791	1830	4.28	15.73
040691	2230	4.22	15.79	040791	1900	4.27	15.76
040691	2300	4.24	15.76	040791	1930	4.25	15.78
040691	2330	4.27	15.73	040791	2000	4.22	15.80
040791	0000	4.29	15.70	040791	2030	4.20	15.82
040791	0030	4.32	15.66	040791	2100	4.17	15.85

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
040791	2130	4.15	15.87	040891	1830	4.28	15.72
040791	2200	4.14	15.87	040891	1900	4.27	15.74
040791	2230	4.14	15.88	040891	1930	4.26	15.77
040791	2300	4.14	15.87	040891	2000	4.22	15.78
040791	2330	4.15	15.86	040891	2030	4.20	15.81
040891	0000	4.17	15.84	040891	2100	4.17	15.84
040891	0030	4.19	15.83	040891	2130	4.14	15.87
040891	0100	4.19	15.82	040891	2200	4.12	15.89
040891	0130	4.22	15.80	040891	2230	4.10	15.91
040891	0200	4.25	15.78	040891	2300	4.10	15.91
040891	0230	4.28	15.76	040891	2330	4.10	15.91
040891	0300	4.30	15.74	040991	0000	4.11	15.89
040891	0330	4.32	15.71	040991	0030	4.12	15.88
040891	0400	4.33	15.70	040991	0100	4.14	15.86
040891	0430	4.35	15.69	040991	0130	4.16	15.84
040891	0500	4.36	15.67	040991	0200	4.17	15.83
040891	0530	4.36	15.66	040991	0230	4.19	15.81
040891	0600	4.35	15.64	040991	0300	4.21	15.79
040891	0630	4.32	15.66	040991	0330	4.24	15.77
040891	0700	4.30	15.70	040991	0400	4.27	15.74
040891	0730	4.26	15.74	040991	0430	4.32	15.71
040891	0800	4.24	15.76	040991	0500	4.30	15.70
040891	0830	4.21	15.79	040991	0530	4.31	15.69
040891	0900	4.18	15.82	040991	0600	4.32	15.68
040891	0930	4.17	15.84	040991	0630	4.31	15.69
040891	1000	4.15	15.86	040991	0700	4.28	15.71
040891	1030	4.13	15.88	040991	0730	4.27	15.73
040891	1100	4.12	15.88	040991	0800	4.24	15.75
040891	1130	4.11	15.88	040991	0830	4.21	15.78
040891	1200	4.12	15.88	040991	0900	4.20	15.81
040891	1230	4.13	15.88	040991	0930	4.18	15.82
040891	1300	4.14	15.86	040991	1000	4.17	15.85
040891	1330	4.15	15.85	040991	1030	4.14	15.87
040891	1400	4.18	15.82	040991	1100	4.12	15.88
040891	1430	4.21	15.79	040991	1130	4.11	15.90
040891	1500	4.23	15.76	040991	1200	4.10	15.90
040891	1530	4.25	15.75	040991	1230	4.12	15.90
040891	1600	4.28	15.73	040991	1300	4.14	15.87
040891	1630	4.29	15.71	040991	1330	4.17	15.83
040891	1700	4.31	15.70	040991	1400	4.20	15.81
040891	1730	4.32	15.70	040991	1430	4.23	15.80
040891	1800	4.30	15.70	040991	1500	4.26	15.77

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
040991	1530	4.28	15.74	041091	1230	4.13	15.87
040991	1600	4.30	15.71	041091	1300	4.13	15.87
040991	1630	4.32	15.68	041091	1330	4.14	15.86
040991	1700	4.32	15.66	041091	1400	4.17	15.83
040991	1730	4.33	15.65	041091	1430	4.21	15.79
040991	1800	4.34	15.64	041091	1500	4.25	15.74
040991	1830	4.34	15.65	041091	1530	4.28	15.70
040991	1900	4.33	15.67	041091	1600	4.31	15.68
040991	1930	4.31	15.69	041091	1630	4.34	15.65
040991	2000	4.29	15.72	041091	1700	4.36	15.63
040991	2030	4.26	15.76	041091	1730	4.38	15.60
040991	2100	4.22	15.80	041091	1800	4.42	15.58
040991	2130	4.19	15.83	041091	1830	4.44	15.57
040991	2200	4.15	15.87	041091	1900	4.44	15.57
040991	2230	4.12	15.90	041091	1930	4.43	15.58
040991	2300	4.11	15.90	041091	2000	4.40	15.60
040991	2330	4.10	15.90	041091	2030	4.38	15.63
041091	0000	4.10	15.90	041091	2100	4.35	15.65
041091	0030	4.11	15.88	041091	2130	4.32	15.69
041091	0100	4.13	15.87	041091	2200	4.28	15.73
041091	0130	4.15	15.84	041091	2230	4.25	15.76
041091	0200	4.18	15.80	041091	2300	4.23	15.77
041091	0230	4.21	15.77	041091	2330	4.21	15.80
041091	0300	4.25	15.74	041191	0000	4.19	15.82
041091	0330	4.29	15.70	041191	0030	4.19	15.82
041091	0400	4.32	15.68	041191	0100	4.20	15.81
041091	0430	4.30	15.66	041191	0130	4.20	15.80
041091	0500	4.27	15.64	041191	0200	4.21	15.79
041091	0530	4.30	15.62	041191	0230	4.23	15.77
041091	0600	4.32	15.61	041191	0300	4.25	15.75
041091	0630	4.34	15.60	041191	0330	4.27	15.72
041091	0700	4.36	15.60	041191	0400	4.31	15.69
041091	0730	4.36	15.62	041191	0430	4.33	15.67
041091	0800	4.33	15.65	041191	0500	4.35	15.65
041091	0830	4.30	15.68	041191	0530	4.37	15.63
041091	0900	4.28	15.71	041191	0600	4.39	15.61
041091	0930	4.25	15.74	041191	0630	4.40	15.61
041091	1000	4.22	15.78	041191	0700	4.39	15.60
041091	1030	4.19	15.82	041191	0730	4.37	15.59
041091	1100	4.17	15.85	041191	0800	4.37	15.59
041091	1130	4.13	15.85	041191	0830	4.35	15.62
041091	1200	4.12	15.86	041191	0900	4.32	15.65

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
041191	0930	4.30	15.69	041291	0700	4.38	15.61
041191	1000	4.27	15.73	041291	0730	4.36	15.60
041191	1030	4.23	15.77	041291	0800	4.35	15.61
041191	1100	4.20	15.81	041291	0830	4.35	15.62
041191	1130	4.18	15.84	041291	0900	4.34	15.64
041191	1200	4.17	15.86	041291	0930	4.33	15.66
041191	1230	4.15	15.87	041291	1000	4.31	15.69
041191	1300	4.14	15.88	041291	1030	4.27	15.73
041191	1330	4.15	15.86	041291	1100	4.23	15.77
041191	1400	4.16	15.86	041291	1130	4.19	15.82
041191	1430	4.18	15.84	041291	1200	4.16	15.85
041191	1500	4.21	15.81	041291	1230	4.12	15.87
041191	1530	4.24	15.77	041291	1300	4.13	15.88
041191	1600	4.27	15.74	041291	1330	4.12	15.87
041191	1630	4.29	15.71	041291	1400	4.13	15.86
041191	1700	4.31	15.68	041291	1430	4.15	15.84
041191	1730	4.32	15.65	041291	1500	4.17	15.83
041191	1800	4.36	15.61	041291	1530	4.19	15.80
041191	1830	4.40	15.59	041291	1600	4.22	15.77
041191	1900	4.42	15.58	041291	1630	4.26	15.73
041191	1930	4.43	15.59	041291	1700	4.30	15.70
041191	2000	4.40	15.60	041291	1730	4.32	15.67
041191	2030	4.38	15.61	041291	1800	4.35	15.64
041191	2100	4.36	15.63	041291	1830	4.38	15.60
041191	2130	4.35	15.66	041291	1900	4.41	15.58
041191	2200	4.31	15.69	041291	1930	4.39	15.56
041191	2230	4.27	15.72	041291	2000	4.37	15.57
041191	2300	4.24	15.75	041291	2030	4.34	15.57
041191	2330	4.21	15.78	041291	2100	4.35	15.58
041291	0000	4.19	15.81	041291	2130	4.36	15.60
041291	0030	4.17	15.83	041291	2200	4.36	15.60
041291	0100	4.16	15.84	041291	2230	4.37	15.61
041291	0130	4.15	15.85	041291	2300	4.32	15.66
041291	0200	4.16	15.83	041291	2330	4.27	15.71
041291	0230	4.18	15.81	041391	0000	4.24	15.74
041291	0300	4.20	15.79	041391	0030	4.21	15.76
041291	0330	4.23	15.76	041391	0100	4.20	15.78
041291	0400	4.26	15.74	041391	0130	4.19	15.78
041291	0430	4.28	15.71	041391	0200	4.19	15.75
041291	0500	4.31	15.69	041391	0230	4.20	15.72
041291	0530	4.33	15.66	041391	0300	4.21	15.71
041291	0600	4.36	15.64	041391	0330	4.22	15.70
041291	0630	4.38	15.61	041391	0400	4.24	15.68

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
041391	0430	4.27	15.65	041491	0130	4.28	15.69
041391	0500	4.29	15.62	041491	0200	4.26	15.71
041391	0530	4.31	15.60	041491	0230	4.25	15.72
041391	0600	4.34	15.58	041491	0300	4.26	15.72
041391	0630	4.37	15.57	041491	0330	4.27	15.71
041391	0700	4.38	15.58	041491	0400	4.28	15.68
041391	0730	4.38	15.58	041491	0430	4.30	15.66
041391	0800	4.39	15.57	041491	0500	4.32	15.64
041391	0830	4.40	15.57	041491	0530	4.35	15.61
041391	0900	4.38	15.59	041491	0600	4.37	15.59
041391	0930	4.36	15.61	041491	0630	4.38	15.58
041391	1000	4.33	15.64	041491	0700	4.38	15.57
041391	1030	4.30	15.68	041491	0730	4.41	15.56
041391	1100	4.28	15.70	041491	0800	4.42	15.55
041391	1130	4.24	15.74	041491	0830	4.43	15.54
041391	1200	4.20	15.78	041491	0900	4.43	15.54
041391	1230	4.18	15.81	041491	0930	4.42	15.56
041391	1300	4.16	15.84	041491	1000	4.40	15.58
041391	1330	4.16	15.84	041491	1030*	4.41	15.57
041391	1400	4.15	15.85	041491	1100	4.40	15.58
041391	1430	4.15	15.85	041491	1130**	4.35	15.65
041391	1500	4.16	15.83	041491	1145	4.32	15.67
041391	1530	4.18	15.81	041491	1200	4.29	15.69
041391	1600	4.22	15.78	041491	1215	4.28	15.71
041391	1630	4.25	15.74	041491	1230	4.26	15.73
041391	1700	4.30	15.69	041491	1245	4.24	15.75
041391	1730	4.34	15.65	041491	1300	4.22	15.77
041391	1800	4.38	15.60	041491	1315	4.21	15.79
041391	1830	4.41	15.57	041491	1330	4.20	15.81
041391	1900	4.45	15.54	041491	1345	4.19	15.82
041391	1930	4.49	15.51	041491	1400	4.18	15.83
041391	2000	4.51	15.48	041491	1415	4.18	15.83
041391	2030	4.52	15.45	041491	1430	4.17	15.84
041391	2100	4.51	15.45	041491	1445	4.16	15.84
041391	2130	4.49	15.49	041491	1500	4.16	15.84
041391	2200	4.49	15.49	041491	1515	4.17	15.84
041391	2230	4.46	15.52	041491	1530	4.18	15.83
041391	2300	4.44	15.54	041491	1545	4.18	15.82
041391	2330	4.41	15.57	041491	1600	4.19	15.81
041491	0000	4.36	15.60	041491	1615	4.20	15.80
041491	0030	4.34	15.63	041491	1630	4.22	15.78
041491	0100	4.30	15.66	041491	1645	4.23	15.76

* Begin t/i well pump test
** End test

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
041491	1700	4.25	15.74	041591	1200	4.34	15.65
041491	1715	4.27	15.72	041591	1230	4.31	15.69
041491	1730	4.29	15.70	041591	1300	4.27	15.72
041491	1745	4.31	15.68	041591	1330	4.24	15.76
041491	1800	4.33	15.66	041591	1400	4.22	15.79
041491	1815	4.35	15.64	041591	1430	4.20	15.81
041491	1830	4.37	15.62	041591	1500	4.18	15.82
041491	1845	4.39	15.60	041591	1530	4.17	15.82
041491	1900	4.41	15.58	041591	1600	4.18	15.81
041491	1930	4.44	15.53	041591	1630	4.20	15.80
041491	2000	4.46	15.50	041591	1700	4.23	15.76
041491	2030	4.50	15.45	041591	1730	4.25	15.74
041491	2100	4.52	15.43	041591	1800	4.30	15.70
041491	2130	4.53	15.42	041591	1830	4.34	15.66
041491	2200	4.53	15.45	041591	1900	4.39	15.60
041491	2230	4.52	15.46	041591	1930	4.38	15.54
041491	2300	4.49	15.47	041591	2000	4.41	15.50
041491	2330	4.48	15.50	041591	2030	4.48	15.49
041591	0000	4.46	15.53	041591	2100	4.51	15.47
041591	0030	4.43	15.55	041591	2130	4.55	15.45
041591	0100	4.39	15.58	041591	2200	4.56	15.43
041591	0130	4.36	15.61	041591	2230	4.55	15.42
041591	0200	4.33	15.63	041591	2300	4.54	15.43
041591	0230	4.31	15.65	041591	2330	4.51	15.46
041591	0300	4.29	15.56	041691	0000	4.46	15.49
041591	0330	4.26	15.69	041691	0030	4.47	15.51
041591	0400	4.27	15.68	041691	0100	4.50	15.52
041591	0430	4.28	15.66	041691	0130	4.48	15.55
041591	0500	4.30	15.65	041691	0200	4.45	15.60
041591	0530	4.32	15.64	041691	0230	4.42	15.62
041591	0600	4.34	15.63	041691	0300	4.39	15.64
041591	0630	4.35	15.63	041691	0330	4.37	15.67
041591	0700	4.35	15.62	041691	0400	4.34	15.70
041591	0730	4.37	15.60	041691	0430	4.25	15.72
041591	0800	4.39	15.58	041691	0500	4.26	15.74
041591	0830	4.40	15.57	041691	0530	4.26	15.74
041591	0900	4.42	15.56	041691	0600	4.25	15.72
041591	0930	4.42	15.55	041691	0630	4.27	15.70
041591	1000	4.42	15.56	041691	0700	4.27	15.70
041591	1030	4.41	15.58	041691	0730	4.29	15.68
041591	1100	4.39	15.60	041691	0800	4.31	15.67
041591	1130	4.36	15.62	041691	0830*	4.33	15.65

* Pressure transducer in t/i well at 1940 feet, begin readings.

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	DFMW feet BPL
				041691	1830	4.20	15.79
				041691	1845	4.24	15.75
				041691	1900	4.25	15.73
041691	0845	4.34	15.63	041691	1915	4.27	15.71
041691	0900	4.35	15.62	041691	1930	4.29	15.69
041691	0915	4.36	15.62	041691	1945	4.31	15.66
041691	0930	4.37	15.61	041691	2000	4.33	15.64
041691	0945	4.37	15.61	041691	2015	4.34	15.61
041691	1000	4.38	15.60	041691	2030	4.36	15.59
041691	1015	4.38	15.60	041691	2045	4.38	15.58
041691	1030	4.38	15.60	041691	2100	4.40	15.57
041691	1045	4.38	15.60	041691	2115	4.42	15.55
041691	1100	4.38	15.60	041691	2130	4.43	15.53
041691	1115	4.37	15.62	041691	2145	4.42	15.52
041691	1130	4.36	15.64	041691	2200	4.44	15.51
041691	1145	4.35	15.64	041691	2215	4.46	15.52
041691	1200	4.34	15.64	041691	2230	4.47	15.50
041691	1215	4.34	15.65	041691	2245	4.49	15.49
041691	1230	4.33	15.67	041691	2300	4.50	15.48
041691	1245	4.32	15.68	041691	2315	4.50	15.48
041691	1300	4.30	15.70	041691	2330	4.49	15.48
041691	1315	4.28	15.71	041691	1345	4.49	15.48
041691	1330	4.27	15.72	041791	0000	4.49	15.47
041691	1345	4.26	15.74	041791	0015	4.48	15.48
041691	1400	4.25	15.78	041791	0030	4.48	15.50
041691	1415	4.23	15.79	041791	0045	4.47	15.52
041691	1430	4.22	15.80	041791	0100	4.45	15.53
041691	1445	4.20	15.81	041791	0115	4.43	15.55
041691	1500	4.19	15.82	041791	0130	4.42	15.55
041691	1515	4.18	15.83	041791	0145	4.42	15.55
041691	1530	4.17	15.84	041791	0200	4.41	15.56
041691	1545	4.17	15.84	041791	0215	4.40	15.58
041691	1600	4.16	15.85	041791	0230	4.38	15.60
041691	1615	4.16	15.85	041791	0245	4.36	15.62
041691	1630	4.16	15.85	041791	0300	4.35	15.65
041691	1645	4.16	15.85	041791	0315	4.34	15.64
041691	1700	4.16	15.85	041791	0330	4.32	15.64
041691	1715	4.17	15.84	041791	0345	4.30	15.64
041691	1730	4.18	15.82	041791	0400	4.29	15.65
041691	1745	4.19	15.81	041791	0415	4.28	15.67
041691	1800	4.20	15.79	041791	0430	4.27	15.69
041691	1815	4.21	15.78	041791	0445	4.26	15.70

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
041791	0500	4.25	15.71	041791	1530	4.23	15.75
041791	0515	4.26	15.72	041791	1545	4.24	15.76
041791	0530	4.26	15.72	041791	1600	4.21	15.99
041791	0545	4.25	15.73	041791	1615	4.19	15.82
041791	0600	4.26	15.74	041791	1630	4.20	15.81
041791	0615	4.26	15.72	041791	1645	4.21	15.79
041791	0630	4.26	15.72	041791	1700	4.22	15.78
041791	0645	4.26	15.72	041791	1715	4.22	15.78
041791	0700	4.26	15.72	041791	1730	4.22	15.78
041791	0715	4.26	15.72	041791	1745	4.23	15.77
041791	0730	4.26	15.72	041791	1800	4.23	15.77
041791	0745	4.26	15.72	041791	1815	4.23	15.77
041791	0800	4.27	15.71	041791	1830	4.24	15.77
041791	0815	4.28	15.70	041791	1845	4.25	15.76
041791	0830	4.29	15.68	041791	1900	4.26	15.75
041791	0845	4.30	15.67	041791	1915	4.28	15.73
041791	0900	4.32	15.66	041791	1930	4.30	15.70
041791	0915	4.33	15.65	041791	1945	4.33	15.68
041791	0930	4.34	15.64	041791	2000	4.34	15.66
041791	0945	4.35	15.63	041791	2015	4.36	15.64
041791	1000	4.36	15.62	041791	2030	4.38	15.64
041791	1015	4.36	15.61	041791	2045	4.40	15.59
041791	1030	4.37	15.60	041791	2100	4.42	15.57
041791	1045	4.37	15.59	041791	2115	4.44	15.55
041791	1100	4.38	15.59	041791	2130	4.46	15.53
041791	1115	4.38	15.59	041791	2145	4.49	15.51
041791	1130	4.39	15.60	041791	2200	4.51	15.50
041791	1145	4.39	15.60	041791	2215	4.53	15.48
041791	1200	4.38	15.61	041791	2230	4.55	15.46
041791	1215	4.38	15.61	041791	2245	4.58	15.44
041791	1230	4.39	15.60	041791	2300	4.59	15.43
041791	1245	4.37	15.62	041791	2315	4.61	15.41
041791	1300	4.36	15.63	041791	2330	4.62	15.40
041791	1315	4.35	15.65	041791	2345	4.64	15.37
041791	1330	4.34	15.67	041891	0000	4.65	15.35
041791	1345	4.33	15.68	041891	0015	4.66	15.34
041791	1400	4.32	15.69	041891	0030	4.67	15.33
041791	1415	4.30	15.70	041891	0045	4.67	15.32
041791	1430	4.28	15.71	041891	0100	4.68	15.32
041791	1445	4.27	15.72	041891	0115	4.68	15.32
041791	1500	4.26	15.73	041891	0130	4.68	15.32
041791	1515	4.25	15.74	041891	0145	4.67	15.32

ROCKLEDGE CLASS I INJECTION WELL PROJECT
BACKGROUND DATA

DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL	DATE m/d/y	TIME	WATER LEVEL SFMW feet APL	WATER LEVEL DFMW feet BPL
041891	0200	4.66	15.34				
041891	0215	4.65	15.36				
041891	0230	4.64	15.38				
041891	0245	4.62	15.40				
041891	0300	4.59	15.43				
041891	0315	4.58	15.44				
041891	0330	4.57	15.45				
041891	0345	4.56	15.46				
041891	0400	4.54	15.48				
041891	0415	4.52	15.48				
041891	0430	4.52	15.49				
041891	0445	4.51	15.50				
041891	0500	4.49	15.51				
041891	0515	4.47	15.52				
041891	0530	4.45	15.54				
041891	0545	4.45	15.54				
041891	0600	4.45	15.55				
041891	0615	4.45	15.57				
041891	0630	4.43	15.58				
041891	0645	4.43	15.58				
041891	0700	4.42	15.59				
041891	0715	4.42	15.59				
041891	0730	4.43	15.58				
041891	0745	4.43	15.57				
041891	0800	4.43	15.56				
041891	0815	4.44	15.55				
041891	0830	4.45	15.54				
041891	0845	4.46	15.54				
041891	0900	4.47	15.53				
041891	0915	4.48	15.52				
041891	0930	4.48	15.51				
041891	0945	4.49	15.50				
041891	1000	4.50	15.49				
041891	1010*	4.52	15.48				

* Begin injection test

ROCKLEDGE CLASS I INJECTION WELL PROJECT
INJECTION TEST DATA

TIME EDT	ELAPSED TIME (min)	T/I WELL GPM	T/I WELL welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)	COMMENTS
1010	0.0	0	9.5	15.48	4.52	Flowmeter 063120000
	0.5		14.0	15.48	4.52	
1011	1.0		14.5	15.48	4.52	
	1.5		15.0	15.47	4.52	
1012	2.0		15.5	15.47	4.53	
	2.5		15.5	15.47	4.53	
1013	3.0		15.5	15.47	4.54	
	3.5		15.5	15.46	4.53	
1014	4.0		15.25	15.46	4.54	
	4.5		15.25	15.46	4.54	
1015	5.0		15.25	15.46	4.54	
1016	6.0		15.25	15.45	4.55	
1017	7.0		15.25	15.45	4.54	
1018	8.0	4000	15.25	15.44	4.54	
1019	9.0		15.25	15.44	4.55	
1020	10.0		15.25	15.43	4.56	
1021	11.0		15.25	15.43	4.56	
1022	12.0		15.5	15.43	4.56	
1023	13.0		15.5	15.43	4.56	
1024	14.0		15.5	15.43	4.57	
1025	15.0		15.5	15.42	4.57	
1030	20.0		15.5	15.41	4.59	
1035	25.0		15.5	15.40	4.59	
1040	30.0		15.5	15.40	4.59	
1050	40.0	3200	15.5	15.39	4.60	
1100	50.0		15.5	15.38	4.61	
1110	60.0	3200	15.5	15.37	4.62	Increase pump rate
1125	75.0	3900	16.5	15.36	4.63	
1140	90.0	3700	16.5	15.34	4.64	
1155	105.0	3700	16.5	15.33	4.65	
1210	120.0	3700	16.5	15.33	4.66	
1225	135.0	3700	16.5	15.33	4.67	
1240	150.0	3700	16.5	15.33	4.67	
1255	165.0	3700	16.5	15.33	4.68	
1310	180.0	3700	16.5	15.33	4.67	
1325	195.0	3700	16.5	15.33	4.67	
1340	219.0	3700	16.5	15.33	4.67	
1355	225.0	3700	16.5	15.33	4.67	
1410	240.0	3600	16.0	15.34	4.67	
1425	255.0	3600	16.0	15.35	4.66	
1440	270.0	3600	16.0	15.36	4.65	
1455	285.0	3600	16.0	15.37	4.65	

ROCKLEDGE CLASS I INJECTION WELL PROJECT
INJECTION TEST DATA

TIME EDT	ELAPSED TIME (min)	T/I WELL GPM	T/I WELL welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)	COMMENTS
1510	300.0	3600	16.0	15.38	4.64	
1525	315.0	3600	16.0	15.39	4.63	
1540	330.0	3600	16.0	15.40	4.62	
1555	345.0	3600	16.0	15.42	4.61	
1610	360.0	3600	16.0	15.43	4.59	
1625	375.0	3600	16.0	15.45	4.57	
1640	390.0	3500	16.0	15.46	4.56	
1655	405.0	3500	16.0	15.48	4.54	
1710	420.0	3500	16.0	15.49	4.53	
1725	435.0	3500	16.0	15.50	4.52	
1740	450.0	3500	16.0	15.51	4.51	
1755	465.0	3500	16.0	15.52	4.50	
1810	480.0		16.0	15.52	4.50	Increase to 8000 gpm
	480.5	8000	32.0	15.51	4.50	
1811	481.0		32.0	15.50	4.50	
	481.5		34.0	15.50	4.51	
1812	482.0		35.0	15.49	4.51	
	482.5		35.0	15.49	4.51	
1813	483.0		34.0	15.49	4.52	
	483.5		35.0	15.48	4.52	
1814	484.0		35.0	15.48	4.52	
	484.5		35.0	15.48	4.53	
1815	485.0		35.0	15.48	4.53	
1816	486.0		35.0	15.48	4.54	
1817	487.0		35.0	15.47	4.54	
1818	488.0		35.0	15.47	4.54	
1819	489.0		35.0	15.47	4.55	
1820	490.0		35.0	15.46	4.55	
1821	491.0		35.0	15.46	4.56	
1822	492.0		35.0	15.45	4.55	
1823	493.0		35.0	15.45	4.56	
1824	494.0		35.0	15.45	4.56	
1825	495.0		35.0	15.45	4.56	
1830	500.0		35.0	15.44	4.57	
1835	505.0		35.0	15.44	4.59	
1840	510.0	8200	35.0	15.43	4.60	
1850	520.0	8100	35.0	15.43	4.60	
1900	530.0	7500	35.0	15.43	4.61	
1910	540.0		35.0	15.42	4.61	Begin recovery

ROCKLEDGE CLASS I INJECTION WELL PROJECT

ROCKLEDGE CLASS I INJECTION WELL PROJECT
RECOVERY DATA

TIME EDT	TIME min.	T/I W welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)	TIME EDT	TIME min.	T/I W welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)
date-041891					date-041991				
1910	0	35.0	15.42	4.61	0000	290	11.5	15.30	4.70
	0.5		15.42	4.60	0015	305	11.5	15.28	4.72
1911	1.0		15.43	4.58	0030	320	11.0	15.27	4.73
	1.5		15.44	4.58	0045	335	11.0	15.26	4.73
1912	2.0		15.45	4.57	0100	350	11.0	15.26	4.74
	2.5		15.46	4.57	0115	365	11.0	15.26	4.75
1913	3.0		15.47	4.56	0130	380	11.0	15.25	4.76
	3.5		15.48	4.56	0145	395	11.0	15.25	4.77
1914	4.0		15.49	4.56	0200	410	11.0	15.24	4.77
	4.5		15.49	4.55	0215	425	11.0	15.24	4.77
1915	5		15.49	4.55	0230	440	11.0	15.25	4.76
1916	6		15.50	4.54	0245	465	11.0	15.26	4.76
1917	7		15.50	4.54	0300	480	10.5	15.26	4.75
1918	8		15.50	4.54	0315	495	10.5	15.27	4.74
1919	9		15.50	4.53	0330	510	10.5	15.28	4.72
1920	10		15.50	4.53	0345	515	10.5	15.30	4.71
1921	11		15.50	4.52	0400	530	10.5	15.32	4.70
1922	12		15.51	4.51	0415	545	10.5	15.34	4.68
1923	13		15.51	4.51	0430	560	10.5	15.34	4.67
1924	14		15.51	4.51	0445	575	10.5	15.35	4.66
1925	15		15.51	4.50	0500	590	10.5	15.37	4.63
1930	20	11.5	15.52	4.50	0515	605	10.5	15.40	4.62
1935	25	11.5	15.52	4.51	0530	620	10.5	15.42	4.60
1940	30	11.5	15.53	4.51	0545	635	10.5	15.44	4.59
1950	40	11.5	15.54	4.52	0600	650	10.5	15.44	4.58
2000	50	11.5	15.54	4.52	0615	665	10.5	15.45	4.56
2010	60	11.5	15.53	4.52	0630	680	10.5	15.47	4.54
2030	80	11.5	15.52	4.49	0645	695	10.5	15.49	4.52
2045	95	11.5	15.50	4.50	0700	710	10.5	15.49	4.51
2100	110	11.5	15.48	4.51	0715	725	10.5	15.49	4.50
2115	125	11.5	15.46	4.52	0730	740	10.5	15.50	4.49
2130	140	11.5	15.45	4.54	0745	755	10.5	15.51	4.48
2145	155	11.5	15.43	4.56	0800	770	10.5	15.52	4.47
2200	170	11.5	15.41	4.58	0815	785	10.0	15.52	4.47
2215	185	11.5	15.39	4.60	0830	800	10.0	15.52	4.47
2230	200	11.5	15.38	4.62	0845	815	10.0	15.51	4.48
2245	215	11.5	15.36	4.64	0900	830	10.0	15.51	4.48
2300	230	11.5	15.34	4.66	0915	845	10.0	15.50	4.49
2315	245	11.5	15.33	4.68	0930	860	10.0	15.49	4.49
2330	260	11.5	15.32	4.69	0945	875	10.0	15.49	4.50
2345	275	11.5	15.31	4.70	1000	890	10.0	15.48	4.51

ROCKLEDGE CLASS I INJECTION WELL PROJECT
RECOVERY DATA

TIME EDT	TIME min.	T/I W welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)	TIME EDT	TIME min.	T/I W welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)
date-041991					date-041991				
1015	905	10.0	15.47	4.52	2045	1535	0.0	15.52	4.46
1030	920	10.0	15.46	4.53	2100	1550	0.0	15.51	4.47
1045	935	10.0	15.45	4.54	2115	1565	0.0	15.50	4.49
1100	950	10.0	15.44	4.56	2130	1580	0.0	15.48	4.51
1115	965	10.0	15.43	4.57	2145	1595	0.0	15.47	4.52
1130	980	10.0	15.42	4.58	2200	1610	0.0	15.46	4.53
1145	995	10.0	15.42	4.59	2215	1625	0.0	15.45	4.55
1200	1010	10.0	15.41	4.60	2230	1640	0.0	15.44	4.57
1215	1025	10.0	15.40	4.61	2245	1655	0.0	15.41	4.58
1230	1040	10.0	15.38	4.62	2300	1670	0.0	15.39	4.59
1245	1055	10.0	15.38	4.62	2315	1685	0.0	15.37	4.61
1300	1070	10.0	15.37	4.62	2330	1700	0.0	15.36	4.63
1315	1085	10.0	15.37	4.63	2345	1715	0.0	15.36	4.65
1330	1100	10.0	15.37	4.63	0000	1730	0.0	15.35	4.66
1345	1115	10.0	15.37	4.63	0015	1745	0.0	15.35	4.68
1400	1130	9.5	15.38	4.63	0030	1760	0.0	15.33	4.69
1415	1145	9.5	15.38	4.63	0045	1775	0.0	15.32	4.71
1430	1160	9.5	15.38	4.63	0100	1790	0.0	15.29	4.73
1445	1175	9.5	15.38	4.64	0115	1805	0.0	15.27	4.75
1500	1190	9.5	15.38	4.64	0130	1820	0.0	15.25	4.76
1515	1205	9.5	15.39	4.62	0145	1835	0.0	15.23	4.78
1530	1220	9.5	15.41	4.60	0200	1850	0.0	15.22	4.79
1545	1235	9.5	15.42	4.59	0215	1865	0.0	15.21	4.81
1600	1250	9.5	15.43	4.58	0230	1880	0.0	15.20	4.80
1615	1265	9.5	15.44	4.57	0245	1895	0.0	15.20	4.80
1630	1280	9.5	15.45	4.56	0300	1910	0.0	15.20	4.80
1645	1295	9.5	15.46	4.55	0315	1925	0.0	15.21	4.80
1700	1310	9.5	15.47	4.54	0330	1940	0.0	15.21	4.80
1715	1325	9.5	15.49	4.52	0345	1955	0.0	15.21	4.79
1730	1340	9.5	15.51	4.50	0400	1970	0.0	15.22	4.77
1745	1355	9.5	15.52	4.49	0415	1985	0.0	15.23	4.75
1800	1370	9.5	15.53	4.48	0430	2000	0.0	15.25	4.74
1815	1385	9.5	15.54	4.47	0445	2015	0.0	15.26	4.73
1830	1400	9.5	15.55	4.46	0500	2030	0.0	15.28	4.72
1845	1415	9.5	15.56	4.45	0515	2045	0.0	15.29	4.71
1900	1430	9.5	15.57	4.44	0530	2060	0.0	15.31	4.69
1915	1445	0.0	15.59	4.43	0545	2075	0.0	15.33	4.68
1930	1460	0.0	15.57	4.42	0600	2090	0.0	15.34	4.66
1945	1475	0.0	15.56	4.42	0615	2105	0.0	15.35	4.67
2000	1490	0.0	15.55	4.44	0630	2120	0.0	15.37	4.65
2015	1505	0.0	15.55	4.45	0645	2135	0.0	15.39	4.63
2030	1520	0.0	15.54	4.46	0700	2150	0.0	15.40	4.61

ROCKLEDGE CLASS I INJECTION WELL PROJECT
RECOVERY DATA

TIME EDT	TIME min.	T/I W welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)	TIME EDT	TIME min.	T/I W welhd press (psi)	DFMW wtr lvl BPL (feet)	SFMW wtr lvl APL (feet)
date-042091									
0715	2165	0.0	15.41	4.60					
0730	2180	0.0	15.42	4.59					
0745	2195	0.0	15.43	4.59					
0800	2210	0.0	15.44	4.58					
0815	2225	0.0	15.45	4.57					
0830	2240	0.0	15.46	4.56					
0845	2255	0.0	15.46	4.55					
0900	2270	0.0	15.46	4.55					
0915	2285	0.0	15.45	4.55					
0930	2300	0.0	15.45	4.56					
0945	2315	0.0	15.45	4.56					
1000	2330	0.0	15.44	4.57					
1015	2345	0.0	15.43	4.57					
1030	2360	0.0	15.42	4.58					
1045	2375	0.0	15.41	4.59					
1100	2390	0.0	15.40	4.60					
1115	2405	0.0	15.39	4.61					
1130	2420	0.0	15.38	4.62					
1145	2435	0.0	15.37	4.63					
1200	2450	0.0	15.36	4.64					
1215	2465	0.0	15.34	4.66					
1230	2480	0.0	15.32	4.68					
1245	2495	0.0	15.30	4.70					
1300	2510	0.0	15.28	4.72					
1315	2525	0.0	15.27	4.73					
1330	2540	0.0	15.27	4.73					
1345	2555	0.0	15.26	4.74					
1400	2570	0.0	15.26	4.74					
1415	2585	0.0	15.26	4.74					
1430	2600	0.0	15.25	4.75					
1445	2615	0.0	15.25	4.75					
1500	2630	0.0	15.25	4.75					
1515	2645	0.0	15.25	4.75					
1530	2660	0.0	15.25	4.75					
1545	2675	0.0	15.25	4.75					
1600	2690	0.0	15.25	4.75					
1615	2705	0.0	15.26	4.74					
1630	2720	0.0	15.27	4.74					
1645	2735	0.0	15.28	4.73					
1700	2750	0.0	15.29	4.72					
1715	2765	0.0	15.30	4.71					
1730	2780	0.0	15.31	4.70					
1745	2795	0.0	15.32	4.68					
1800	2810	0.0	15.33	4.66					

TRANSMISSIVITY CALCULATIONS

ESTIMATION OF TRANSMISSIVITY IN THE INJECTION ZONE

I. FROM CHANGE OF WELLHEAD PRESSURE

1. FIRST INJECTION STEP

Q = 5.4 MGD (3750 GPM)

PRESSURE CHANGE = 16 PSI - 9.5 PSI

= 6.5 PSI

FRICTION LOSS = 10 FEET

AVAILABLE HEAD = 15 FEET - 10 FEET = 5 FEET

T = Q/HEAD

= 5.4 MGD/5 FEET

= 1.08 MGD/FT

2. DIFFERENCE BETWEEN FIRST AND SECOND INJECTION STEP

Q(1) = 5.4 MGD

Q(2) = 11.5 MGD (8000 GPM)

DELTA Q = Q(2) - Q(1)

= 6.1 MGD

PRESSURE DIFFERENCE

DELTA P = P(2) - P(1)

= 32 PSI - 16 PSI

= 16 PSI

= 30 FEET OF H2O HEAD

FRICTION LOSS = 15 FEET

AVAILABLE HEAD = 30 FEET - 15 FEET

= 15 FEET

T = DELTA Q/DELTA P

= 6.1 MGD/15 FEET

= 0.406 MGD/FT

II. FROM BOTTOM HOLE PRESSURE TRANSDUCER

1. FIRST INJECTION STEP

DELTA Q = 5.4 MGD

DELTA P = 862.10 PSI - 857.75 PSI

= 4.35 PSI

= 10.0 FEET

T = DELTA Q/DELTA P

= 5.4 MGD/10.0 FEET

= 0.54 MGD/FT

2. DIFFERENCE BETWEEN FIRST AND SECOND INJECTION

DELTA Q = Q(2) - Q(1)

= 11.5 - 5.4

= 6.1 MGD

DELTA P = P(2) - P(1)

= 870.30 - 862.10

= 8.2 PSI

= 19 FEET

T = DELTA Q/DELTA P

= 6.1 MGD/19 FEET

= 0.32 MGD/FT

III. GEOMETRIC MEAN OF ESTIMATES

$$T = (0.32 \times 0.54 \times 0.406 \times 1.1)^{1/4}$$

= 0.527 MGD/FT

CONSTRUCTION MATERIALS

APPENDIX E

CEMENT VOLUMES AND LETTER OF VERIFICATION

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
CEMENT PROGRAM

DATE MODYYR	CSG O.D in.	LFT NO.	INTRVL FILLED feet	LINEAR FILL feet	VOLUME PUMPED cu.ft.	VOLUME THEORE -TICAL	% OF THEORE -TICAL	ADDITIVES TO ASTM C150 TYPE II CEMENT
	48"							
120190		1	156-0	156	471			None
	38"							
121190		1	450-0	450	1441	1720	84%	None
	30"							
011991		1	1656-1484	172	739	510	145%	None
011991		2	1484-1446	38	157	125	125%	None
011991		3	1446-1349	97	560	401	140%	12% bentonite
012091		4	1349-1262	87	560	372	151%	12% bentonite
012191		5	1262-1120	142	476	461	103%	12% bentonite
012191		6	1120-961	159	672	472	142%	12% bentonite
012291		7	961-817	144	550	440	125%	12% bentonite
012291		8	817-709	108	420	375	112%	12% bentonite
012391		9	709-565	144	567	457	124%	12% bentonite
012491		10	565-542	23	84	84	100%	12% bentonite
012491		11	542-450	92	683	348	196%	12% bentonite
012591		12	450-270	180	521	478	109%	12% bentonite
012691		13	270-0	270	694	708	98%	12% bentonite
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					6683	5231	128%	

DATE MODYYR	CSG O.D in.	LFT NO.	INTRVL FILLED feet	LINEAR FILL feet	VOLUME PUMPED cu.ft.	VOLUME THEORE -TICAL	% OF THEORE -TICAL	ADDITIVES TO ASTM C150 TYPE II CEMENT
	20"							
021491		1	1955-1728	227	785	577	136%	None
021591		2	1728-1630	98	319	251	127%	None
021691		3	1630-1278	352	874	874	100%	8% bentonite
021691		4	1278- 907	371	897	897	100%	4% bentonite
021691		5	907- 546	361	897	897	100%	4% bentonite
021691		6	546- 255	291	723	723	100%	4% bentonite
022091		7	255- 74	181	448	448	100%	None
022091		8	74- 0	74	185	185	100%	None
					----	----	----	
					5128	4876	105%	

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
CEMENT PROGRAM

DATE MODYYR	CSG O.D in.	LFT NO.	INTRVL FILLED feet	LINEAR FILL feet	VOLUME PUMPED cu.ft.	VOLUME THEORE -TICAL	% OF THEORE -TICAL	ADDITIVES TO ASTM C150 TYPE II CEMENT
	16"							
102690		1	140-0	140	533	451	118%	None
	10 3/4"							
103190		1	240- 152		286	123	232%	None
		2	152- 0		106	106	100%	None
					393	230	171%	
	4 1/2"							
111990		1	1321-1265	56	101	61	165%	None
		2	1265-1217	48	112	79	141%	None
112090		3	1217-1140	77	79	63	125%	None
		4	1140- 988	152	168	97	172%	None
		5	988- 819	169	196	160	122%	6% Bentonite
		6	819- 770	49	90	76	118%	6% Bentonite
112190		7	770- 653	117	224	148	151%	6% Bentonite
112290		8	653- 540	113	168	168	100%	6% Bentonite
		9	540- 521	19	224	48	460%	6% Bentonite
		10	521- 428	93	168	113	149%	6% Bentonite
112390		11	428- 349	79	196	172	114%	6% Bentonite
		12	349- 315	34	112	78	144%	6% Bentonite
112490		13	315- 157	158	224	176	127%	6% Bentonite
022091		14	157- 0	157	51	57	90%	None
					2113	1496	141%	

CEMENT PLUG BENEATH 4 1/2" SCREEN

DATE MODYYR	CSG O.D in.	LFT NO.	INTRVL FILLED feet	LINEAR FILL feet	VOLUME PUMPED cu.ft.	VOLUME THEORE -TICAL	% OF THEORE -TICAL	ADDITIVES TO ASTM C150 TYPE II CEMENT
111690		1	1506-1477	29	61	30	203%	None
111790		2	1477-1472	5	59	3	1967%	None
		3	1472-1462	10	56	6	933%	None
		4	1462-1414	48	61	41	147%	None
		5	1414-1396	18	11	17	65%	None
				110	248	84	295%	

GRAVEL PACK AROUND 4 1/2" SCREEN

111790		1	1396-1326	70	93	90	103%	Silica Gravel

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
CEMENT PROGRAM

DATE MODYYR	CSG O.D in.	LFT NO.	INTRVL FILLED feet	LINEAR FILL feet	VOLUME PUMPED cu.ft.	VOLUME THEORE-TICAL	% OF THEORE-TICAL	ADDITIVES TO ASTM C150 TYPE II CEMENT
	16"							
120990		1	140-0	140	364			None
	10 3/4"							
121290		1	240- 0	240	174	165	105%	None
	4 1/2"							
010691		1	883- 853	30	17	25	68%	None
		2	853- 720	133	146	108	135%	None
		3	720- 590	130	146	102	143%	None
010791		4	590- 488	102	146	112	131%	None
		5	488- 373	115	146	112	131%	None
		6	373- 220	153	281	214	132%	None
022091		7	220- 0	220	90	81	90%	None
					---	---	----	
					972	754	129%	

GRAVEL PACK AROUND SCREEN

DATE MODYYR	CSG O.D in.	LFT NO.	INTRVL FILLED feet	LINEAR FILL feet	VOLUME PUMPED cu.ft.	VOLUME THEORE-TICAL	% OF THEORE-TICAL	GRAVEL
010691		1	959- 888	71	39	43	91%	Silica Gravel

FCI

Florida Cement, Inc.
15000 Pine Ridge Road
Ft. Myers, FL 33908
(813) 433-3400

CEMENTING CASING FOR INJECTION WELL

Company YOUNGQUIST BROS. INC. Date District

Lease ROCKLEDGE No. Cty. Sec. Twp. Rge. State

Size Prod. Csg Wt. Set @ PBTD

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Tubing Size 1.9 Wt. Set @ Pkr. Type

Instructions: Tub Cap bbls

Csg Cap bbls

Annulus bbls

Bleed bbls

Flush bbls

DATE Reading	Csg SIZE	LIFT NUMBER	CU. FT. Away	CEMENT TYPE	REPORT
12/1/90	48"	1	471	NEAT	NEAT PRESSURE GROUT
12/11/90	38"	1	1441	NEAT	PRESSURE GROUT
1/19/91	30"	1	739	NEAT	PRESSURE GROUT
1/19/91	30"	2	157	NEAT	ANULAR CEMENT STAGE
1/19/91	30"	3	560	12% GEL	ANULAR CEMENT STAGE
1/20/91	30"	4	560	12% GEL	ANULAR CEMENT STAGE
1/21/91	30"	5	476	12% GEL	ANULAR CEMENT STAGE
1/21/91	30"	6	672	12% GEL	ANULAR CEMENT STAGE
1/22/91	30"	7	550	12% GEL	ANULAR CEMENT STAGE
1/22/91	30"	8	420	12% GEL	ANULAR CEMENT STAGE
1/23/91	30"	9	567	12% GEL	ANULAR CEMENT STAGE
1/24/91	30"	10	84	12% GEL	ANULAR CEMENT STAGE
1/24/91	30"	11	683	12% GEL	ANULAR CEMENT STAGE
1/25/91	30"	12	521	12% GEL	ANULAR CEMENT STAGE
1/26/91	30"	13	694	12% GEL	ANULAR CEMENT STAGE

TOTAL LOAD TREATMENT ENGR. JIM BRANTLEY

FCI

Florida Cement, Inc.
15000 Pine Ridge Road
Ft. Myers, FL 33908
(813) 433-3400

CEMENTING CASING FOR INJECTION WELL

Company YOUNGQUIST BROS. INC. Date District

Lease ROCKLEDGE No. Cty. Sec. Twp. Rge. State

Size Prod. Csg Wt. Set @ PBTD

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Tubing Size 1.9 Wt. Set @ Pkr. Type

Instructions:

Tub Cap bbls

Csg Cap bbls

Annulus bbls

Bleed bbls

Flush bbls

DATE Reading	Csg SIZE	LIFT NUMBER	CU. FT. Away	CEMENT TYPE	REPORT
2/14/91	20"	1	785	NEAT	PRESSURE GROUT
2/15/91	20"	2	319	NEAT	
2/16/91	20"	3	874	8% GEL	ANULAR CEMENT STAGE
2/16/91	20"	4	897	4% GEL	ANULAR CEMENT STAGE
2/16/91	20"	5	897	4% GEL	ANULAR CEMENT STAGE
2/16/91	20"	6	723	4% GEL	ANULAR CEMENT STAGE
2/20/91	20"	7	448	NEAT	ANULAR CEMENT STAGE
2/20/91	20"	8	185	NEAT	ANULAR CEMENT STAGE

TOTAL LOAD 5128 CU.FT. TREATMENT ENGR. JIM BRANTLEY

FCI

Florida Cement, Inc.
15000 Pine Ridge Road
Ft. Myers, FL 33908
(813) 433-3400

CEMENTING CASINGS FOR DEEP FLORIDAN MONTOR WELL

Company YOUNGQUIST BROS. INC. Date District

Lease ROCKLEDGE No. Cty. Sec. Twp. Rge. State

Size Prod. Csg Wt. Set @ PBTD

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Tubing Size 1.9 Wt. Set @ Pkr. Type

Instructions:

Tub Cap bbls

Csg Cap bbls

Annulus bbls

Bleed bbls

Flush bbls

DATE Reading	CSG. SIZE	LIFT NUMBER	CU. FT. Away	CEMENT TYPE	REPORT
10/26/90	16"	1	533	NEAT	PRESSURE GROUT
10/31/90	10¾"	1	286	NEAT	PRESSURE GROUT
10/31/90	10¾"	2	106	NEAT	ANULAR CEMENT STAGE
11/19/90	4½"	1	101	NEAT	ANULAR CEMENT STAGE
11/19/90	4½"	2	112	NEAT	ANULAR CEMENT STAGE
11/20/90	4½"	3	79	NEAT	ANULAR CEMENT STAGE
11/20/90	4½"	4	168	NEAT	ANULAR CEMENT STAGE
11/20/90	4½"	5	196	6% GEL	ANULAR CEMENT STAGE
11/20/90	4½"	6	90	6% GEL	ANULAR CEMENT STAGE
11/21/90	4½"	7	224	6% GEL	ANULAR CEMENT STAGE
11/22/90	4½	8	168	6% GEL	ANULAR CEMENT STAGE
11/22/90	4½	9	224	6% GEL	ANULAR CEMENT STAGE
11/22/90	4½	10	168	6% GEL	ANULAR CEMENT STAGE
11/23/90	4½	11	196	6% GEL	ANULAR CEMENT STAGE
11/23/90	4½	12	112	6% GEL	ANULAR CEMENT STAGE
11/24/90	4½	13	224	6% GEL	ANULAR CEMENT STAGE

TOTAL LOAD TREATMENT ENGR. JIM BRANTLEY

FCI

Florida Cement, Inc.
15000 Pine Ridge Road
Ft. Myers, FL 33908
(813) 433-3400

CEMENTING CASINGS FOR DEEP FLORIDAN MONITOR WELL

Company YOUNGQUIST BROS. INC Date District

Lease No. Cty. Sec. Twp. Rge. State

Size Prod. Csg Wt. Set @ PBTD

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Tubing Size 1.9 Wt. Set @ Pkr. Type

Instructions:

Tub Cap bbls

Csg Cap bbls

Annulus bbls

Bleed bbls

Flush bbls

DATE Reading	CASING SIZE	LIFT NUMBER	CU FT. AWAY	CEMENT TYPE	REPORT
2/20/91	4½"	14	51	NEAT	

TOTAL LOAD 2113 TREATMENT ENGR. JIM BRANTLEY

FCI

Florida Cement, Inc.
15000 Pine Ridge Road
Ft. Myers, FL 33908
(813) 433-3400

CEMENTING CASINGS FOR SHALLOW FLORIDAN MONITOR WELL

Company YOUNGQUIST BROS INC Date District

Lease ROCKLEDGE No. Cty. Sec. Twp. Rge. State

Size Prod. Csg Wt. Set @ PBTD

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Surface Csg Wt. Set @ Cmtd W/ Sx. Date

Tubing Size 1.9 Wt. Set @ Pkr. Type

Instructions: Tub Cap bbls

Csg Cap bbls

Annulus bbls

Bleed bbls

Flush bbls

DATE Reading	Csg. Size	LIFT NUMBER	Cu. Ft. Away	CEMENT TYPE	REPORT
12/9/90	16"	1	364	NEAT	PRESSURE GROUT
12/12/90	10¾"	1	174	NEAT	PRESSURE GROUT
1/6/91	4½	1	17	NEAT	ANULAR CEMENT STAGE
1/6/91	4½	2	146	NEAT	ANULAR CEMENT STAGE
1/6/91	4½	3	146	NEAT	ANULAR CEMENT STAGE
1/7/91	4½	4	146	NEAT	ANULAR CEMENT STAGE
1/7/91	4½	5	146	NEAT	ANULAR CEMENT STAGE
1/7/91	4½	6	281	NEAT	ANULAR CEMENT STAGE
2/20/91	4½	7	90	NEAT	TOP OFF AFTER BOND LOG

TOTAL LOAD 972 cu.ft. TREATMENT ENGR. JIM BRANTLEY

Schlumberger

SCHLUMBERGER WELL SERVICES
15 COVINGTON ROAD
NATCHEZ, MISSISSIPPI 39120

April 29, 1991

Mr. Jimmie Brantley
Youngquist Brothers Drilling
15000 Pine Ridge Road
Fort Myers, FL 33908

Dear Jimmie:

On February 18, 1991, Schlumberger Well Services ran Cement Bond/Variable Density logs on three Youngquist Brothers Drilling wells for the City of Rockledge, Florida. The CBL/VDLs were run on two monitor wells with 4½ inch casing and one injection well, 20 inch casing.

The first monitor well logged was the Deep Monitor Well No.1. It was logged to a depth 1388 feet. The cement quality in this well is excellent, text book. There is excellent evidence that the cement not only bond to pipe, but also to the formation. This scenario is the ideal cement job.

The second monitor well, the Shallow Monitor Well No. 1, was logged to a depth of 950 feet. Again, its cement job was exceptional. Both monitor wells' cement jobs produced the best looking Cement Bond Logs either Barry Schuler or I have seen in Florida.

Injection wells with their larger casing diameters, make interpretation of Cement Bond Logs difficult. Test Injection Well No. 1, with its 20 inch casing, is no exception. Nothing stands out on the log indicating anything unusual. There is some evidence of cement bond to pipe to formation as read in the VDL. Perhaps the best way to interpret an injection well's CBL is to compare it to its peers. By comparison, Test Injection Well No. 1's Cement Bond Log is better than average for the area and quite a bit better than the CBL/VDLs in the South Florida region.

Thank you for the opportunity to interpret these logs on your Rockledge wells. If I can be of any further assistance or if a more detailed interpretation is required, don't hesitate to contact me. Thank you for your patronage.

Sincerely,

SCHLUMBERGER WELL SERVICES

Steve Miller

Steve Miller
General Field Engineer

SM/jss

MILL CERTIFICATES

TEST/INJECTION WELL

USS — A division of USX Corporation

TUBULAR PRODUCTS

METALLURGICAL TEST REPORT

JOB, CONTRACT NO.	P.O. DATE	PURCHASE ORDER NO.
		1397-409

USS TUBULAR PRODUCTS

SHIPPERS NO.	MILL ORDER NO.	INVOICE NO.
	DR91650	

VEHICLE IDENTITY 11/28/90

BARTOW STEEL INC
P O BOX 1789
BARTOW FL 33830

MAIL TO:
BARTOW STEEL INC
P O BOX 1789
BARTOW FL 33830

THIS IS TO CERTIFY THAT TH[illegible]
PRODUCT DESCRIBED HEREIN [illegible]
MFGD., SAMPLED, TESTED, A[illegible]
OR INSPD. IN ACCORDANCE WI[illegible]
THE SPECIFICATION AND FUL-
FILLS REQUIREMENTS IN SUC[illegible]
RESPECTS.
APPROVED BY THE OFFICE OF:
D.S. DABKOWSKI MGR. MET. [illegible]
Q.A. USS TUBULAR PRODUCTS.

DATE 11/28/90

M NO.	SIZE	WALL	SPECIFICATION & GRADE	MATL.	HEAT/ LOT NO.	MIN. HYDRO PSI	YIELD STR. PSI	TENSILE STR. PSI	ELONG. % IN 2"	GAGE WIDTH IN.	FLAT
	20 OD	.500	ASTMA5389AGRBASMESA53GRB69	SMLS	N09266	1310	41500	70200	42.0	1 1/2	OK
	ED889AD	DASTMA	106 89GRBASMESA106GRB89ED89AD DAPI5LGRB38THED5/90								
	20 OD	.500	ASTMA5389AGRBASMESA53GRB89	SMLS	N09269	1310	44000	72100	39.0	1 1/2	OK
	ED869AD	DASTMA	106 89GRBASMESA106GRB89ED89AD DAPI5LGRB38THED5/90								

M NO.	HEAT NO.	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	SN	AL	N	V	B	TI	CB	CO	
	N09266	HEAT	22	65	013	009	250	02	02	08	02				**					**LESS THAN .01
	N09266	PROD	24	66	011	005	230													
	N09269	HEAT	24	64	011	013	250	02	02	06	01				**					**LESS THAN .01
	N09269	PROD	24	66	012	016	260													

END OF DATA THIS SHEET *** ALL MELTING AND MANUFACTURING TOOK PLACE IN THE USA.

[illegible] DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE [illegible]

TELEPHONE (416) 259-1113
FAX (416) 259-5051
TELEX 06-967775

CANADIAN PHOENIX STEEL PRODUCTS

DIVISION OF JAY-M HOLDINGS LIMITED
289 HORNER AVENUE
TORONTO, ONTARIO, CANADA
M8Z 4Y4

LABORATORY REPORT AND MILL TEST CERTIFICATE

DATE Aug. 9/90 CUSTOMER Bartow Steel

SPECIFICATION A 139 B ADDRESS Bartow, Florida 33830

O.D. & GAUGE 30" O.D. x .375 / 30" O.D. x .500 CUSTOMER'S P.O. NO. 1572

HYDROTEST — P.S.I. FOR — MIN. CANADIAN PHOENIX REF. NO. 90-2629

PHYSICAL PROPERTIES

HEAT NO.	PIPE NO.	LONGITUDINAL TEST YIELD STRENGTH	LONGITUDINAL TEST TENSILE STRENGTH	ELONGATION % IN 2"	TRANSVERSE WELD TENSILE	BREAK LOCATION	REMARKS
30 x .375 260989	8	40280	64470	32.0	69220	PM	
30 x .500 254513	11	39890	63990	32.0	68960	PM	

CHEMICAL PROPERTIES

HEAT NO.	LADLE ANALYSIS C.	Mn	P	S	
260989	.21	.79	.017	.014	
254513	.21	.78	.010	.014	

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL WAS TESTED IN ACCORDANCE WITH THE SPECIFICATION ORDERED

M. Nefamura
APPROVED BY

Aug 9/90
DATE

TELEPHONE (416) 259-1113
FAX (416) 259-6951
TELEX 06-967775

CANADIAN PHOENIX STEEL PRODUCTS

DIVISION OF JAY-M HOLDINGS LIMITED
289 HORNER AVENUE
TORONTO, ONTARIO, CANADA
M8Z 4Y4

LABORATORY REPORT AND MILL TEST CERTIFICATE

DATE: OCT. 26/90 — CUSTOMER: BARTOW STEEL

SPECIFICATION: A139 B — ADDRESS: BARTOW, FLORIDA 33830

O.D. & GAUGE: 30" O.D. X .375 — CUSTOMERS'S P.O. NO. 1399-411

HYDROTEST 700 P.S.I. FOR 2 MIN. CANADIAN PHOENIX REF. NO. 90-2651

PHYSICAL PROPERTIES

HEAT NO.	PIPE NO.	LONGITUDINAL TEST YIELD STRENGTH	LONGITUDINAL TEST TENSILE STRENGTH	ELONGATION % IN 2"	TRANSVERSE WELD TENSILE	BREAK LOCATION	REMARKS
[illegible]	17	41980	65490	32.0	68190	PM	
[illegible]	30	43870	66200	32.0	69320	PM	

CHEMICAL PROPERTIES

HEAT NO.	LADLE ANALYSIS C.	Mn	P	S		
169728	.22	.82	.006	.011		
169945	.22	.82	.008	.013		

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL WAS TESTED IN ACCORDANCE WITH THE SPECIFICATION ORDERED

M. McNamara
APPROVED BY

Oct 26/90
DATE

TELEPHONE (416) 259-1113
FAX (416) 259-6981
TELEX 06-967775

CANADIAN PHOENIX STEEL PRODUCTS

DIVISION OF JAY-M HOLDINGS LIMITED
289 HORNER AVENUE
TORONTO, ONTARIO, CANADA
M8Z 4Y4

LABORATORY REPORT AND MILL TEST CERTIFICATE

DATE Nov. 5/90 CUSTOMER BARTOW STEEL INC.

SPECIFICATION A 139-B ADDRESS BARTOW, FLORIDA 33830

O.D. & GAUGE 38" O.D. X .375 CUSTOMERS'S P.O. NO. 1399-411

HYDROTEST 555 P.S.I. FOR 2 MIN. CANADIAN PHOENIX REF. NO. 90-2651

PHYSICAL PROPERTIES

HEAT NO.	PIPE NO.	LONGITUDINAL TEST YIELD STRENGTH	LONGITUDINAL TEST TENSILE STRENGTH	ELONGATION % IN 2"	TRANSVERSE WELD TENSILE	BREAK LOCATION	REMARKS
166854	10	44960	67020	31.0	70280	pm	

CHEMICAL PROPERTIES

HEAT NO.	LADLE ANALYSIS C.	Mn	P	S		
166854	.23	.84	.012	.018		

WE HEREBY CERTIFY THAT THE ABOVE MATERIAL WAS TESTED IN ACCORDANCE WITH THE SPECIFICATION ORDERED

M. Nakamura
APPROVED BY

Nov. 5/90
DATE

STANDARD CERTIFIED TEST REPORT
GEORGIA TUBULAR PRODUCTS, INC.

GTP

Customer Name: BARTOW STEEL, INC.
Address: P.O. BOX 1789
City, State, Zip: BARTOW, FLA. 33830

Date: 11-21-90
Customer Order No. 152428-619
G.T.P. Invoice No.

Specification A-139 GR. B

Coil or Lot No.	Size O.D.	Wt./Ft. or Wall Thick.	Min. Hydro. Test Pres. P.S.I.	MECHANICAL PROPERTIES Yield Strength P.S.I. Point	Tensile Strength P.S.I.	Elong In 2" %	CHEMICAL ANALYSIS (%) C	Mn	P	S	Si
9K0836	48"	.375	WAIVE	54,720	72,203	36.2	.18	.71	.014	.013	
9I0915	"	"	"	58,051	75,254	32.7	.15	.74	.020	.016	

The undersigned hereby certifies that the above materials have been inspected and tested in accordance with the methods prescribed in the applicable specifications and the results of such inspection and tests shown above. In determining properties or characteristics for which no methods of inspection or testing are prescribed by said specifications, the standard mill inspection and testing practices of Georgia Tubular Products, Inc. have been applied. Unless otherwise indicated in the results of such inspection and tests shown above, the undersigned believes that said materials conform to said specifications.

Subscribed and sworn to before me

This 21 day of NOV 1990

H. Stanley Gresser, Jr.
MY COMMISSION EXPIRES FEB. 28, 1993 Notary Public

NOTARY PUBLIC BARTOW COUNTY, GEORGIA

Marvin M. Hendrix

MARVIN M. HENDRIX
MANUFACTURING MANAGER
Name & Title

Georgia Tubular Products, Inc.
~~P.O. Box 748~~ 109 Dent Drive, Cartersville, GA 30120
(404) 386-2353

SENT BY:BARTON STEEL INC. ;10-29-90 11:27AM ; 8134255860→ 8134255860;# 2

鋼管検査証明書
INSPECTION CERTIFICATE

新日本製鐵株式會社
Nippon Steel Corporation

本社 〒100 東京都千代田区大手町二丁目6番3号
HEAD OFFICE: 6-3, OTEMACHI, CHIYODA-KU, TOKYO, 100, JAPAN
八幡製鐵所 〒805 北九州市八幡東区枝光一丁目1番1号
YAWATA WORKS: 1-1-1, EDAMITSU, YAHATA-HIGASHI-KU, KITAKYUSHU, 805, JAPAN

注文者 SHIPPER: MITSUI & CO., LTD.
注文者照合番号 REFERENCE No: 371-E240582
契約番号 CONTRACT No.: 9-843-M3-5-8-6115-01
品名 COMMODITY: SEAMLESS STEEL PIPE
規格 SPECIFICATION: API SPEC 5L GRADE B/ASTM A53 TYPE S GRADE B/ASTM A106GRADE B
特記 NOTE: A1 ASME SA106 GRADE B SHALL BE CERTIFIED ON MILL SHEET B1 P/O NO. 7700-JL

CLIENT:
需要家 CUSTOMER: THOMAS PIPE INC
需要家管理番号 CUSTOMER'S CONTROL No:

証明書番号 CERTIFICATE No.: 0000303532 頁 PAGE: 1
発行年月日 DATE OF ISSUE: 1989-08-23

寸法 Size	員数 Quantity	TOTAL 重量 Weight KG	製鋼番号 Heat No.	化学成分 Chemical Composition (%) C, Si, Mn, P, S, CU, NI, CR / MO, V, TE3	管理番号 Control No. / MILL LOT NO / 試験番号 Test Piece No.	引張試験 Tensile Test YS / TS (0.5% UNDER-L, PSI)	EL	Impact Test	水圧試験 Hydrostatic Test (MIN PSI / MIN SECONDS)
		SPEC	MIN MAX	H 10 29 27 1106 2525 40 40 40	SPEC MIN MAX	J 35000 60000	2T6		2800 5
				15 8 1000					
		SPEC	MIN MAX	P 30 120 5060					
6-5/8"X280-6.31X1968	53	21,624	N781B3	H 21 18 67 25 2 2 2 5 0 3 120	323n3 4215A11	U 47900 73300	6.10		G
				P 21 18 67 25 2					
				P 21 18 66 27 3					
TO BE CONTINUED									

その他試験 Descriptions of Test	外観・寸法 Visual & Dimensions	ドリフト試験 Drift Test
	GOOD	

備考 Notes: 1. GL: 標点距離 Gage Length A: 16in B: 2in C: 2inch D: 8inch E: 5.65√S F: 4√S YF: 降伏点 Yield Point RA: 絞り Reduction of Area SF: 脆性破面率 Shear Fracture CF: 延性破面率 Crystalline Fracture
*1 H: 溶鋼分析 Heat Analysis P: 製品分析 Product Analysis C: コントロール分析 Control Analysis
*2 L: 管軸方向 Longitudinal T: 管軸直角方向 Transverse Z: 板厚方向 Through-Thickness C: コントロール引張試験 Control Tensile Test
*3 JIS No.4 5 No.5 11 No.11 A No.12A B No.12B C No.12C Strip ... R: Round Bar F: Full Section S: Strip Specimen
*4 V: 2mV U: 2mU B: 3mU C: 4mU D: 5mU E: 2mmVフェースノッチ Face Notch F: 2mmVフェースノッチ Face Notch
*5 F: 10X10mm 7: 10X7.5mm 6: 10X6.67mm 5: 10X5mm 3: 10X3.3mm 2: 10X2.5mm
*6 E: 個々値 Each Value A: 平均値 Average Value
*7 UT: 超音波探傷試験 Ultrasonic Test MT: 磁粉探傷試験 Magnetic Particle Test FT: 漏洩磁束探傷試験 Flux Leakage Test (Electro-Magnetic Test) ET: 渦流探傷試験 Eddy-Current Test

上記注文品は、御指定の規格または仕様に従って製造され、その要求事項を満足していることを証明します。
WE HEREBY CERTIFY THAT THE MATERIAL DESCRIBED HEREIN HAS BEEN MADE IN ACCORDANCE WITH THE RULES OF THE CONTRACT.

TO BE CONTINUED
八幡製鐵所 試験分析室長
MANAGER, INSPECTION
YAWATA WORKS

SEAMLESS

SEAMLESS TUBES LTD.
A Subsidiary of British Steel PLC
Waddens Brook Lane, Wednesfield,
Wolverhampton, West Midlands WV11 3SQ.
Telephone: (0902) 305000 Telex: 338681
Facsimile: (0902) 307277

CERTIFICATE NO	M 2550
DATE	30.8.89

Certificate of Tests & Analysi

CUSTOMER UNIVERSAL PIPING GMBH

CUSTOMER'S ORDER NO. 2449.06.89 7.6.89 WORKS ORDER NO. P 45166

PARTICULARS OF ORDER INTERPIPE P.O. 1296/89

ITEM NO	NO. OF TUBES	SIZE	LENGTH	DESCRIPTION
				HOT FINISHED SEAMLESS STEEL TUBES TO:
1	73	2" NB X SCH 40	R/Ls 2850'-0"	ASTM A 106 GRADE B
2	20	2" NB X SCH 80	R/Ls 766'-0"	ASTM A53 GRADE B
3	11	2" NB X SCH 160	R/Ls 432'-8"	API 5L GRADE B
15	7	4" NB X SCH 160	R/Ls 273'-0"	BEVELLED ENDS TO ANSI B16.25
16	20	4" NB X SCH XXS	R/Ls 775'-0"	
17	43	4" NB X SCH 120	R/Ls 1683'-10"	

CHEMICAL ANALYSIS

ITEM NO	STEEL MAKER	CAST NO.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Sn	Al	V
1		V 5160	.14	.25	.72	.012	.004	.10	.04	.11	.17	.010	.027	.[illegible]
1		V 5163	.16	.21	.84	.021	.006	.10	.04	.13	.19	.015	.033	.[illegible]
2		V 5165	.15	.23	.77	.018	.003	.11	.04	.09	.20	.013	.033	.[illegible]
3		V 3506	.15	.23	.75	.017	.009	.10	.02	.10	.25	.015	.044	.[illegible]
15		V 5225	.15	.32	.82	.015	.003	.10	.03	.10	.18	.013	.032	.[illegible]
16-17		X 2530	.15	.20	.81	.004	.007	.27	.05	.16	.15	.014	.030	.[illegible]

MECHANICAL TESTS

ITEM NO	TEST NO.	SECTION	YIELD STRENGTH	TENSILE STRENGTH	ELONGATION %		ADDITIONAL TESTS
			P.S.I	P.S.I.	2"	CAST NO	REF
1	1	STRIP	53289	75578	40.0	V 5160	8928/104/1
1	2	"	52460	73718	37.0	V 5163	8928/5104/2
2	3	"	51475	74480	38.0	V 5165	8928/91/1
3	4	"	48921	70269	40.0	V 3506	8932/GS/26
15	5	"	46323	69484	38.0	V 5225	8933/135/1
16	6	"	41552	67267	48.0	X 2530	8933/139/1
17	7	"	45696	68768	45.0	X 2530	8933/128/1
			ITEMS	1, 2 & 3	2500 P.S.I		
			ITEM	15 - 17	2800 P.S.I.		

FLATTENING TEST ITEMS 15 - 17 Satisfactory

EXPANSION TEST

HYDROSTATIC TEST PRESSURE See Above

NDT

BEND TEST ITEMS 1 - 3 Satisfactory

Tested on behalf of the above company

[signature]

SEAMLESS

SEAMLESS TUBES LTD.
A Subsidiary of British Steel PLC
Waddens Brook Lane, Wednesfield,
Wolverhampton, West Midlands WV11 3SQ
Telephone: (0902) 305000 Telex: 338561
Facsimile: (0902) 307277

CERTIFICATE NO	M 3840
DATE	31.10.89

Certificate of Tests & Analysis

CUSTOMER UNIVERSAL PIPING GMBH WEST GERMANY

CUSTOMER'S ORDER NO. 2449.06.89 7.6.89 WORKS ORDER NO. P 45166

PARTICULARS OF ORDER

ITEM NO	NO. OF TUBES	SIZE	LENGTH	DESCRIPTION
				HOT FINISHED SEAMLESS STEEL TUBES TO:
16	5	4" NB X SCH 160 .50'	R/Ls 201' - 3"	ASTM A 106 GRADE B
				ASME SA 106 GRADE B
				ASTM A 53 GRADE B
				API 5L GRADE B
				BEVELLED ENDS TO ANSI B16.25

CHEMICAL ANALYSIS

ITEM NO	STEEL MAKER	CAST NO.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Sn	Al	V
		V 5574	.16	.21	.82	.010	.004	.10	.03	.11	.18	.012	.031	.002
	8941/194/1													

MECHANICAL TESTS

ITEM NO	TEST NO.	SECTION	YIELD STRENGTH	TENSILE STRENGTH	ELONGATION %		ADDITIONAL TESTS
			P.S.I.	P.S.I.	2"		
	1	STRIP	43008	69216	45.0		

FLATTENING TEST	Satisfactory
EXPANSION TEST	
HYDROSTATIC TEST PRESSURE	2800 P.S.I.
NDT	

Tested on behalf of the above company

SEAMLESS TUBES LTD. TEST HOUSE SUPT. M.S. WHITEHOUSE QUALITY ASSURANCE DEPT.

SEAMLESS

SEAMLESS TUBES LTD.
A Subsidiary of British Steel PLC
Waddens Brook Lane, Wednesfield,
Wolverhampton, West Midlands WV11 3SQ.
Telephone: (0902) 305000 Telex: 338681
Facsimile: (0902) 307277

CERTIFICATE NO M 2504
DATE 28.8.89

Certificate of Tests & Analys

CUSTOMER UNIVERSAL PIPING GMBH

CUSTOMER'S ORDER NO. 2449.06.89 7.6.89 WORKS ORDER NO. P 45166

PARTICULARS OF ORDER INTERPIPE P.O. 1296/89

ITEM NO	NO. OF TUBES	SIZE	LENGTH	DESCRIPTION
				HOT FINISHED SEAMLESS STEEL TUBES TO:
4	125	2" NB X SCH XXS	R/Ls 4763' - 4"	ASTM A 106 GRADE B
15	44	4" NB X SCH 160	R/Ls 1711' - 0"	ASTM A53 GRADE B
17	19	4" NB X SCH 120	R/Ls 745' - 11"	API 5L GRADE B
				BEVELLED ENDS TO ANSI B16.25

CHEMICAL ANALYSIS

ITEM NO	STEEL MAKER	CAST NO.	C	Si	Mn	P	S	Cr	Mo	Ni	Cu	Sn	Al
4	8928/47/1	X 2468	.13	.19	.80	.006	.004	.14	.04	.13	.16	.014	.036
15	8933/135/1	V 5225	.15	.32	.82	.015	.003	.11	.03	.10	.18	.013	.032
17	8933/128/1	X 2350	.14	.20	.81	.004	.007	.27	.05	.16	.15	.014	.030

MECHANICAL TESTS

ITEM NO	TEST NO.	SECTION	YIELD STRENGTH	TENSILE STRENGTH	ELONGATION %		ADDITIONAL TESTS
			P.S.I.	P.S.I.	2"		
4	1	STRIP	47936	71904	44.0		
15	2	"	47712	71008	45.0		
17	3	"	48160	72128	41.0		
			ITEM 4	2500	P.S.I.		
			ITEM 15	2800	P.S.I.		
			ITEM 17	2800	P.S.I.		

FLATTENING TEST ITEMS 15 & 17 Satisfactory

EXPANSION TEST

HYDROSTATIC TEST PRESSURE See Above

NDT

BEND TEST ITEM 4 Satisfactory

Tested on behalf of the above company

0134255860:# 6

SEAMLESS

SEAMLESS TUBES LTD.
Waddens Brook Lane, Wednesfield,
Wolverhampton, West Midlands WV11 3SQ.
Telephone: (0902) 305000 Telex: 338661
Fax: (0902) 307277

MSW/EEC

20 November 1989

UNIVERSAL PIPING GMBH
GERMANY

RE: Your order No: 2449.08.89 -

Our Order No: P 45166

Interpipe P.O. 1296/89

Test certificates No: M 2382, M2393, M 2440, M 2477, 2504, M 2529, M 2550, M 2817, M 2899, M 3590, M 3817, M 3840 and M 3901.

I would confirm that the material covered by the above Test Certificates fully conforms to ASME SA 106 GRADE B.

M S WHITEHOUSE
TEST HOUSE SUPERINTENDENT

MILL CERTIFICATES

SHALLOW FLORIDAN MONITOR WELL
AND
DEEP FLORIDAN MONITOR WELL

PAGE 1-1

CERTIFICATE NO. P90-05-0341-01888(LDWD018)

COMMODITY E.R.W STEEL PIPE

SPECIFICATION API 5LB/ASTM A53B DUAL

INSPECTION CERTIFICATE

주식회사 부산파이프

PUSAN STEEL PIPE CORPORATION

SEOUL OFFICE 40-153, 3GA HANGANG-NO, YONGSAN-GU, SEOUL, KOREA
POHANG PLANT 14-1, JANGHEUNG-DONG, POHANG
SEOUL PLANT 180-15, GAEBONG-DONG, KURO-GU, SEOUL

DATE OF ISSUE : 90/05/29

L/C NO. (P/O NO.) :

CUSTOMER :

SHIPPER : DAEWOO CORP.

ITEM NO.	HEAT (LOT) NO.	관종 TYPE •1	주문치수 ORDER SIZE	수량 QUANTITY 본수 PCS	총길이 TOTAL LENGTH	중량(M/T) WEIGHT	비고 REMARK
1	Y30254	BBE	4-1/2 " X .237" X 40.000'	40	1600FT	7.824	투명 바니쉬 코팅(VARNISH COATING)
2	Y30679	BBE	[redacted]	18	720FT	20.441	투명 바니쉬 코팅(VARNISH COATING)
			********	REST'S	BLANK	********	

ITEM NO.	HEAT (LOT) NO.	수압시험 HYDROSTATIC psi	RESULT	N.D.T •2	VISUAL & DIMENSION	FLATTENING	WELD DUCTILITY	BENDING	DRIFT	CRUSH	FLARING	FLANGE	R-FLATTENING	도금시험 COATING TEST WEIGHT OF ZINC COAT	C.S •3	ALK •4
1	Y30254	2210	G	G	G	G	G									
[redacted]																
														********	REST'S	

구분 •5	C	Si	Mn	P	S				방향 •6	인장강도 T.S psi	항복점 Y.P psi	연신율 E.L %	충격시험 IMPACT 흡수에너지 ENERGY Joule	전단파면율 SHEAR VALUE %	경도 HARDNESS TEST	도복장 COALTAR (ASPHALT) COATING 두께(㎛) THICKNESS 내면 IN	외면 OUT	절연 P.H •7
	•8 2			•8 3		•8												
H	15	5	76	16	8													
P	15	3	75	15	8				L	68560	47510	41						
H	20	3	85	16	6													
P	20	3	87	15	6				T	74250	47080	36						
P									W	77670								
S	BLANK	********																

NOTE

•1 TYPE OF PIPE END
BPE(CPE) : Black (Galvanized) Plain End.
BBE(CBE) : Black (Galvanized) Bevel End.
BTC(GTC) : Black (Galvanized) Thread & Coupled.
BVJ (GVJ) : Black (Galvanized) Victaulic Joints.
ETC : Enameled Threaded & Coupled.
GSW : Galvanized Swaging End.

•2 U : Ultrasonic Test.
E : Eddy Current Test.
M : Magnetic Particle Test.
R : Radiographic Test.
•3 C.S : Copper Sulphate
•4 ALK : Alkalinity.
•5 H : Heat (Ladle) Analysis 용선분석
P : Product Analysis 제품분석

•6 L : Base Metal Longitudinal, 모재종방향
T : Base Metal Transverse, 모재횡방향
W : Weld Part, 용접부
•7 P.H : Pin Hole Test.
•8 2 : ×100
3 : ×1000
G : Good

Surveyor :

본 제품은 관련 규격에 정한 시험 및 검사에 합격하였음을 증명합니다.

WE HEREBY CERTIFY THAT THE MATERIAL HEREIN HAS BEEN MADE AND TESTED IN ACCORDANCE WITH ABOVE SPECIFICATION AND THE RESULTS OF ALL TEST ARE ACCEPTABLE.

Manager of Q.A Dept.

INSPECTION CERTIFICATE

HKK
한 국 강 관 주 식 회 사
Korea Steel Pipe Co., Ltd.
C. P. O. Box 904 Seoul, Korea

Supplier : DAEWOO CORPORATION
Contract No. (L/C No.) : CIS-00112/K
Specification : ASTM A53B/API 5L GR.B
Kind of Article : E. R. W. Steel Pipe

Customer : DAEWOO INT'L (AMERICA) CORP.
Issued Date : APR. 24, 1990
Certificate No : 900424-0831
Manufactured No : 90-04-029

LOT No. (Heat)	Q'TY (Pcs)	Type	Nominal Size (in)	Dimension: Outside Diameter (in)	Dimension: Wall Thickness (in)	Dimension: Length (ft)	Dimension: Straightness (%)	Weight (kg/ft.)	Chemical Comp. (%): C ×100	Si ×100	Mn ×100	P ×1000	S ×1000	Tension Test: Tensile Strength (kg/mm²)	Yield Strength (kg/mm²)	Elongation (%)	WTS (kg/mm²)	NDT (UST, ET)	F(B) T	WDT	Hydrostatic Test psi	Ring Gage Test	Drift Test	V. I	Remark
[redacted]	51	BEEB	10-3/4	10.75	0.365	42	0.1	18.36	17	8	70	14	6	54	33	42	*	pass	G	G	1430	pass	*	G	
Y-50491	42	"	12-3/4	12.75	0.375	42	0.1	22.48	19	6	81	17	5	57	41	37	*	pass	G	G	1950	pass	*	G	
									——		LAST	ITEM		——											

We hereby certify that the above products have been made in accordance with the specification and the requirements called for the order.

Note
(1) F(B)T : Flattening(Bending) Test. (5) NDT : Non Destructive Test.
(2) WTS : Weld Tensile Test. E.T : Eddy Current Test.
(3) V.I : Visual Inspection. UST : Ultrasonic Test.
(4) WDT : Weld Ductility Test.

Inspector in Charge

HOUSTON

Houston Well Screen Company
11939 Aldine-Westfield Road
Houston, Texas 77093-1095

Telephone (713) 449-7261
Telefax (713) 449-6010

July 2, 1991

Youngquist Brothers Well Drilling
15000 Pine Ridge Rd
Fort Meyers, FL 33908

REF: HWS Invoices #09097 & 09267

CERTIFICATION OF MATERIALS

This is to certify that all materials used in the above referenced invoices were manufactured with ASTM A 312 304 stainless steel.

MANUFACTURER: HOUSTON WELL SCREEN COMPANY
11939 ALDINE WESTFIELD ROAD
HOUSTON, TEXAS 77093
U.S.A.

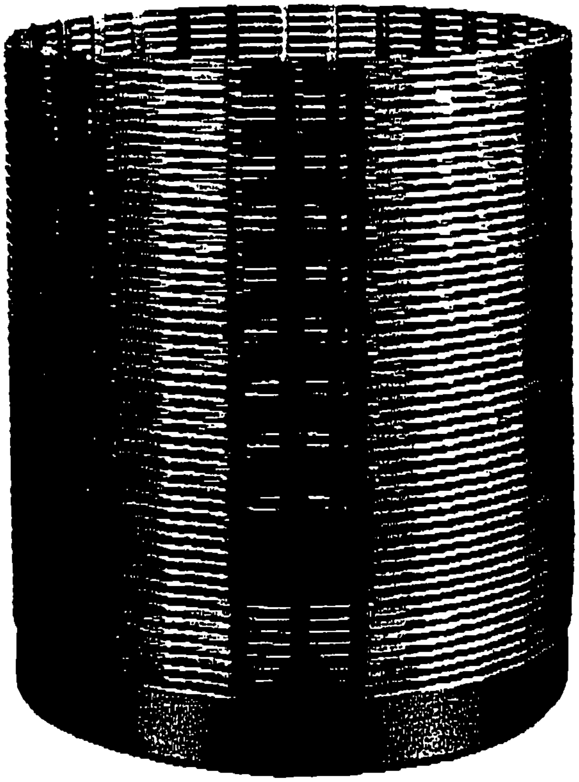
REGARDS,

Mark Meisner

MARK MEISNER
CUSTOMER SERVICE REPRESENTATIVE

Approved
YOUNGQUIST BROTHERS, INC.
JOB # 8802-02-02
DATE 7/3/91
BY K.R. [illegible]

HOUSTON FREE-FLOW™ SCREENS



HOUSTON

Houston Well Screen Company

HOUSTON WELL SCREEN COMPANY
11939 Aldine-Westfield Road
Houston, Texas 77093
Telephone No.: (713) 449-7261
Telex No.: 775280 HOU WS CO HOU
Telefax No.: (713) 449-6010
Wats: (800) 237-7593

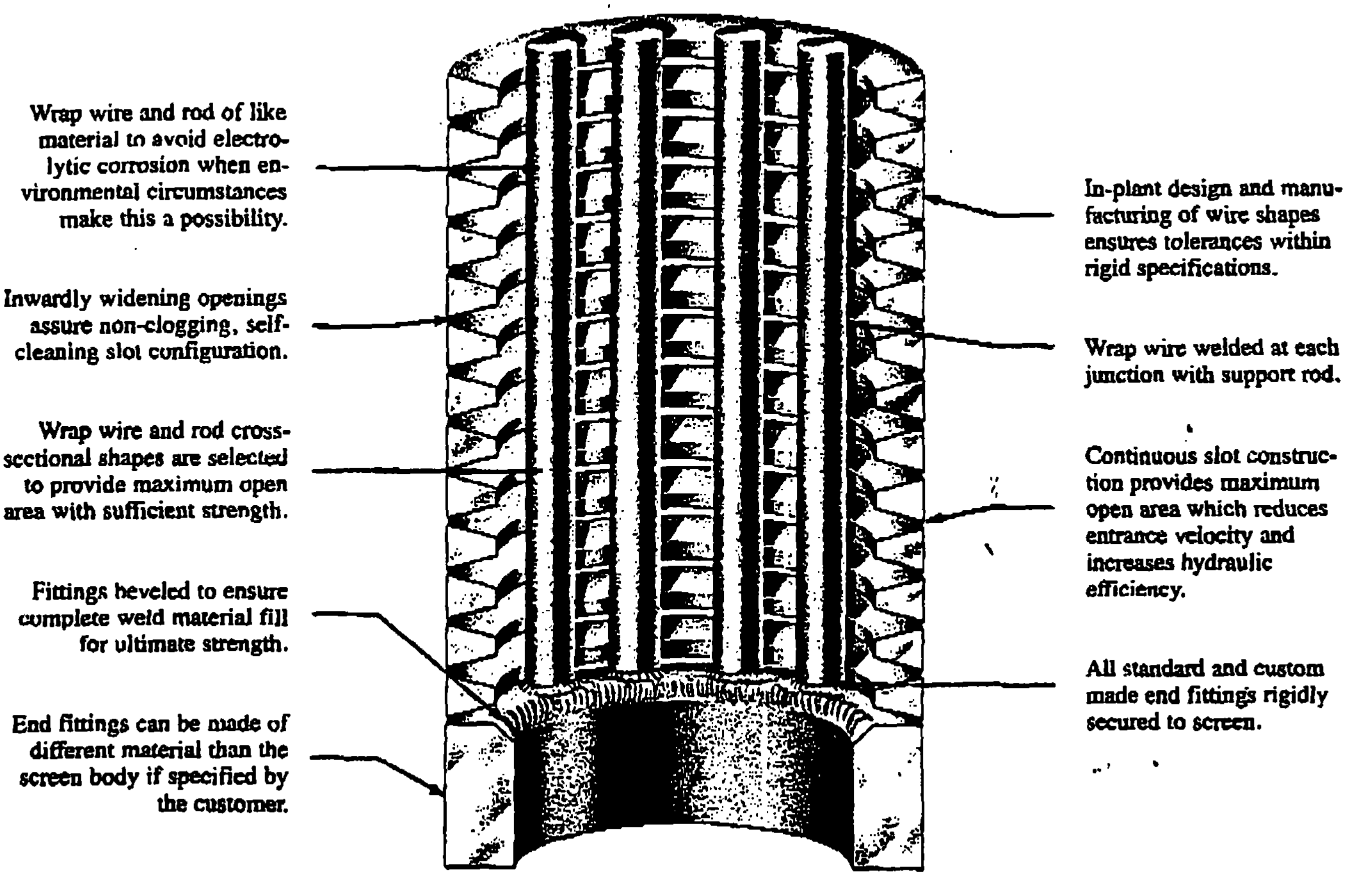
HOUSTON WELL SCREEN EUROPE B.V.
Slachthuiskade 24-26
7602 CV Almelo, Holland
Telephone No.: (05490) 51515
Telex No.: 30603 H.W.S.E
Telefax No: 31(5490)27395

HOUSTON WELL SCREEN ASIA PTE LTD.
11A Pandan Crescent
Singapore 0512
Telephone No.: (65) 778-8323
Telex No.: RS 50077 HWSA
Telefax No.: (65) 774-2206

HOUSTON WELL SCREEN COMPANY
Distribution Center
412 High Meadows Blvd.
Lafayette, Louisiana 70507
Telephone No.: (318) 237-3838
Telefax No.: (318) 233-9263

HOUSTON WELL SCREEN INT'L., LTD.
Unit BT570/1, Thornhill Ind. Est.
Hope Street, Rotherham S60 1LH
United Kingdom
Telephone No.: 44 (709) 829-521
Telex No.: 547798 HWSI G
Telefax No.: 44 (709) 367-309

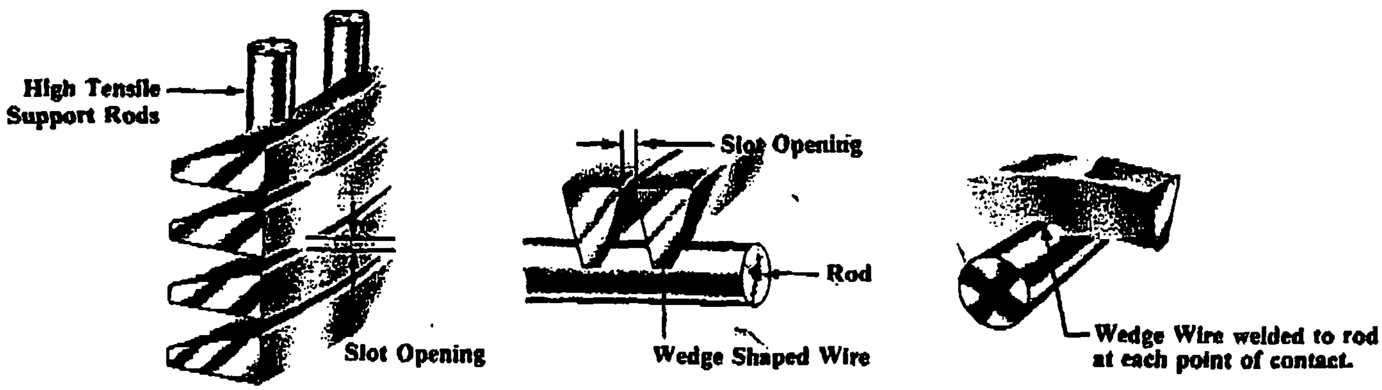
FREE-FLOW SCREENS



Houston well screens feature non-clogging wedge wire welded construction. Houston screens are manufactured with wrap wire drawn in our own plant to assure the maintenance of precise specifications. By varying the size, shape, and alloy we can achieve the exact results you desire.

The Houston Free-Flow™ Screen provides the maximum inlet area of any well screen design. This Screen is versatile and can be adapted to many types of industrial functions. The strength and durability of this type of screen depends on the shape and mass of the wrap wire and rods combined with the efficiency of the welding techniques used in manufacturing.

Houston Well Screen manufactures the special trapezoidal shaped wire for this screen, as it does for all of its' screens. The wire is drawn from the specified material, double-annealed and roll formed to the precise desired dimensions. The wire is then spiral wrapped around longitudinal rods of the same material and resistance welded at each point of contact.



FREE-FLOW SCREEN DATA

Open Area (Squares Inches) and Transmitting Capacity (Gallons Per Minute) Per Lineal Foot of Screen

Pipe Size Screen	Telescope Size Screen	Approx. O.D.	Slot Size (In Thousandths)									
			8	10	12	14	16	20	25	30	40	50
1¼R"	—	1¹¹/₁₆"	6.5 2.0	7.9 2.5	9.3 2.9	10.6 3.3	11.8 3.7	14.1 4.4	16.7 5.2	19.1 5.9	23.1 7.2	26.5 8.2
2"R	—	2⅜"	9.2 2.9	11.2 3.5	13.1 4.1	14.9 4.6	16.7 5.2	19.9 6.2	23.6 7.3	26.9 8.4	32.6 10.2	37.3 11.6
2"	3"	2¾"	10.6 3.3	13.0 4.0	15.2 4.7	17.3 5.4	19.3 6.0	23.0 7.2	27.3 8.5	31.1 9.7	37.7 11.7	43.2 13.5
2½"	3½"	3³/₁₆"	12.3 3.8	15.0 4.7	17.6 5.5	20.0 6.2	22.4 7.0	26.7 8.3	31.6 9.8	36.0 11.2	43.7 13.6	50.1 15.6
3"	4"	3¾"	14.5 4.5	17.7 5.5	20.7 6.4	23.6 7.3	26.3 8.2	31.4 9.8	37.2 11.6	42.4 13.2	51.4 16.0	58.9 18.4
[redacted]	5"	[redacted]	18.1 5.6	22.1 6.9	25.9 8.1	29.4 9.2	32.9 10.2	39.3 12.2	46.5 14.5	[redacted]	64.3 20.0	73.6 22.9
5"	6"	5⅝"	21.7 6.8	26.5 8.3	31.0 9.7	35.3 11.0	39.4 12.3	47.1 14.7	55.8 17.4	63.6 19.8	77.1 24.0	88.4 27.5
6"	—	6⅝"	20.4 6.3	25.0 7.8	29.4 9.2	33.6 10.5	37.7 11.7	45.4 14.1	54.3 16.9	62.4 19.4	76.8 23.8	89.2 27.7
—	8"	7½"	23.0 7.1	28.3 8.8	33.3 10.3	38.1 11.8	43.3 13.2	51.4 16.0	61.5 19.0	70.7 21.9	87.0 27.0	101.0 31.3
8"	—	8⅝"	26.5 8.2	32.5 10.1	38.3 11.9	43.8 13.6	49.8 15.2	59.1 18.4	70.7 21.9	81.3 25.2	100.0 31.0	116.1 36.0
—	10"	9½"	29.3 9.0	35.8 11.1	42.2 13.1	48.3 14.9	54.1 16.8	65.1 20.1	77.9 24.1	89.5 27.7	110.2 34.2	127.9 39.7
10"	—	10¾"	33.1 10.2	40.5 12.6	47.7 14.8	54.6 16.9	61.2 19.0	73.7 22.8	88.1 27.3	101.3 31.4	124.7 38.7	144.7 44.9
—	12"	11¼"	28.8 9.0	35.4 10.9	41.7 13.0	47.9 14.8	53.8 16.7	54.7 16.9	66.3 20.6	77.1 24.0	97.0 30.2	114.6 35.7
12"	14"	12¾"	32.6 10.2	40.1 12.4	47.3 14.7	54.3 16.8	61.0 18.9	62.0 19.2	75.1 23.4	87.4 27.2	109.9 34.2	129.9 40.5
14"	16"	14"	29.5 9.2	36.4 11.3	43.1 13.4	49.6 15.4	55.9 17.3	68.1 21.2	82.5 25.7	96.0 29.9	120.6 37.6	142.6 44.4
16"	18"	16"	33.7 10.5	41.6 12.9	49.2 15.3	56.7 17.6	[illegible]	77.8 24.2	94.2 29.4	109.7 34.2	137.9 43.0	163.0 50.8

Open Area = $\frac{12 \times \pi \times O.D. \times \text{Slot Size}}{\text{Slot Size} + \text{Wire Width}}$

Transmitting Capacity = 0.31 x Open Area
Based on Entrance Velocity of 0.1 ft./sec.

Approved
YOUNGQUIST BROTHERS, INC.
JOB # 8802-02-02
DATE 1/13/9
BY [signature]

Technical Services

- Complete sand analysis laboratory for slot size determination
- Laboratory permeability tests
- Gravel pack recommendations
- Well design recommendations
- Pumping test analysis
- Screen material selection recommendations

Pipe Size Screen	Telescope Size Screen	(Individually Crated) Estimated Shipping Weight Per Foot (lbs.)
1¼"R	—	3.5
2"R	—	4
2"	[illegible]	4.5
2½"	3½"	5
[illegible]	4"	5.5
4"	5"	7
5"	6"	9
6"	—	12
—	8"	15
8"	—	20
—	10"	22
10"	—	24
—	12"	26
12"	14"	35
14"	16"	39
16"	18"	48

INVOICE

ALL CORRESPONDENCE

HOUSTON
WELL SCREEN CO.

A Van der Horst Company
11939 Aldine-Westfield Road • Houston, Texas 77093
Phone: (713) 449-7261 • Wats: 800 237-7593
Telex: 775-280 HOU WS CO HOU
Telefax: (713) 4496010

INVOICE NO. 09097

MARKS: Verbal - Mike

240000/WB

SOLD TO:
Youngquist Bros. Well Drilling
15000 Pine Ridge Road
Ft. Meyers, Florida 33908
ATTN: Christine

SHIP TO:
Youngquist Bros. Well Drilling
1700 South Garden Road
Rockledge, Florida 32955

INVOICE DATE:	DATE SHIPPED:	SHIPPED VIA:	TERMS:	SHIPPING NO:
11-15-90	11-12-90	Watkins	(SEE BELOW)	5555

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
2	4" PS X 20 Ft. Houston Free Flow 304SS WR X WR, .030 Slot		
1	4" X 10 Ft. 304SS WR X Bottom Plate, .030 Slot.		
	"Freight PPD"		

#16032 12/10/90
000938

RECEIVED

A DISCOUNT OF $23.62 WILL BE ALLOWED IF PAID BY 11-25-90, PROVIDED NO PREVIOUS INVOICES ARE PAST DUE OR BECOME PAST DUE: NET 30 DAYS FROM DATE OF INVOICE. INVOICE NOT PAID WITHIN 30 DAYS FROM DATE OF INVOICE WILL BE CHARGED THE MAXIMUM AMOUNT OF INTEREST ALLOWED BY LAW. THIS INVOICE DUE AND PAYABLE IN HARRIS COUNTY, TEXAS.

ORIGINAL

HOUSTON WELL SCREEN CO.

A Van der Horst Company
11939 Aldine-Westfield Road • Houston, Texas 77093
Phone: (713) 449-7261 • Wats: 800 237-7593
Telex: 775-280 HOU WS CO HOU
Telefax: (713) 4496010

INVOICE NO. 09267

MARKS: Verbal - Mike

240000/WB

SOLD TO	SHIP TO
Youngquist Bros. Well Drilling	Youngquist Bros. Well Drilling
15000 Pine Ridge Road	1700 South Garden Rd.
Ft. Meyers, Florida 33908	Rockledge, Florida 32955

INVOICE DATE:	DATE SHIPPED:	SHIPPED VIA:	TERMS:	SHIPPING NO:
12/13/90	12/10/90	Watkins	(SEE BELOW)	5657

QUANTITY	DESCRIPTION	UNIT PRICE	AMOUNT
2	4" PS x 20 Ft. Houston Free Flow 304SS WR x WR, .030 slot		[illegible]
1	4" x 10 Ft. 304SS WR x Bottom Plate, .030 slot		[illegible]
	"Freight Prepaid"		

000939

Ck# 016176 1-10-91

RECEIVED DEC 17

Rock

A DISCOUNT OF $23.62 WILL BE ALLOWED IF PAID BY 12/23/90, PROVIDED NO PREVIOUS INVOICES ARE PAST DUE OR BECOME PAST DUE; NET 30 DAYS FROM DATE OF INVOICE. INVOICE NOT PAID WITHIN 30 DAYS FROM DATE OF INVOICE WILL BE CHARGED THE MAXIMUM AMOUNT OF INTEREST ALLOWED BY LAW. THIS INVOICE DUE AND PAYABLE IN HARRIS COUNTY, TEXAS.

ORIGINAL

(WWAT)

FREIGHT BI

DATE		DEST					C/L PAYABLE	WML/REV	NON REC	TRAILER		CODE	COMM CODE	C O
121090		ORL	F	1	W					28-8851		X		

YOUNGQUIST BROS WELL DRILLING
[redacted]
ROCKLEDGE FL 32955

DEL STOP # 999999

[redacted]
HOUSTON TX 77093

PU STOP # 059160

HNDL-UNIT	SHIPPER NUMBER	C/L PRO NUMBER		C/L DATE	ORIG C/L	DEST
0003	5657		121390			

PIECES	H/M	DESCRIPTION AND MARKS	KEYWORD CODE	WEIGHT	RATE	CHARG
			TRFW6155			
3		CRATES STEEL BODIED WELL SCREEN				
		CL 70 MATERIAL	N144250-02	479		
			AS WT	500		
		FUEL SURCHARGE EFFECT 10/24/90	FSC			
3		TTL	PPD	479		
		EDB RATED 90345 00.08 C 10 F			TO BE	PREF

3 3

RECEIVED ABOVE PROPERTY IN GOOD CONDITION

FIRM:

BY: Mark J. Brame

DEL DATE 12/13/90

DRIVER SIGNATURE

CONSIGNEE ORIGINAL/6

WATKINS MOTOR LINES, INC. HOU-165921

(WWAT)

P.O. Box 95002 Lakeland, Fla ... 002

FREIGHT BIL

DATE		DEST					C/L PAYABLE	WML/REV	NON REC	TRAILER		CODE	COMM CODE	C O
111290		ORL	F	1	W					28-9034		X	REVCO	

CONSIGNEE
YOUNGQUIST BROS WELL DRILLING
1700 S GARDEN ROAD
ROCKLEDGE FL 32955

DEL STOP # 999999

SHIPPER
HOUSTON WELL SCREEN COMPANY
11939 ALDINE WESTFIELD ROAD
HOUSTON TX 77093

PU STOP # 059160

HNDL-UNIT	SHIPPER NUMBER	C/L PRO NUMBER		C/L DATE	ORIG C/L	DEST C
0003	5555		[redacted]			

PIECES	H/M	DESCRIPTION AND MARKS	KEYWORD CODE	WEIGHT	RATE	CHARG
			TRFW6155			
3		CRATES CUST STEEL BODIED WELL				
		SCREEN CL 70 MATERIAL	N144250-02	440		
		FUEL SURCHARGE EFFECT 10/24/90	FSC			
3		TTL	PPD	440		
		RC PER ED/HOU TO SHOW PPD				
		PER CORR B/L. DAR 11/13				
		RATE/REVCO CORRECTED BILL				
		EDB RATED 90317 14.56 F 10 D			TO BE	PREP

3 3

RECEIVED ABOVE PROPERTY IN GOOD CONDITION

DEL. DATE 11/15/90

DRIVER SIGNATURE

TESTING DEPARTMENT

"Standard" TRADE MARK QUALITY AND SERVICE

LAB. NO.
FILE NO.

P. O. BOX 35 TELEPHONE 422-1171
DAVENPORT, FLORIDA 33837

Test # 111
Date: 06-18-91

Report For: Silica Plant
Material Tested: 6/20
Identification: Bin Test
Samples By: Keith
Tested By: Keith

Sieve Size	Cum. Wgt. Retained	Indv. % Retained	Cum. % Retained	Passing %
6	0		0	
8	.4		.3	
12	8.8		5.5	
16	60.2		37.9	
18	96.1		60.5	
20	129.2		81.3	
25	151.0		95.0	
30	156.2		98.3	
40	158.2		99.6	
50	158.5		99.7	
Pan	158.9			

This test will be representative of sand delivered [redacted] Inv. # [redacted]

Effective Size:
Uniformity Co:
AFS:
Fineness Mod:
Color Metric:
W.F.M.

Minus No. 200 Test
Raw Wgt.
Plus No. 200 Dry Wgt.
Difference
Percent Minus No. 200
Percent No. 200
Percent Loss

Approved
YOUNGQUIST BROTHERS, INC.
JOB # 88020 02 62
DATE 1 3 91
BY [signature]

Form 13- OPI-48178-12/89-4M

CASING TALLIES

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
CASING TALLY

Conductor Casing
Type: Steel Pipe (Spiral Weld Steel)
Specification: A-139 GR. B
Outside Diameter: 48.00"
Wall Thickness: 0.375"
Total Length: 159.75'
Date: 01DEC90

#	Lngth
1	39.55
2	40.05
3	40.05
4	40.10

Surface Casing
Type: Spiral Weld Steel
Specification: A 139-B
Outside Diameter: 38.00"
Wall Thickness: 0.375"
Total Length: 460.00'
Date: 10DEC90

#	Lngth	#	Lngth
1	20.35	11	40.00
2	40.00	12	39.70
3	40.00		
4	40.00		
5	40.00		
6	40.00		
7	40.00		
8	40.00		
9	40.00		
10	39.95		

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
CASING TALLY (continued)

Intermediate Casing
Type: Steel Pipe (Spiral Weld Steel)
Specification: A 139 B
Outside Diameter: 30.00"
Wall Thickness: 0.375"
Total Length: 1653.81'
Date: 18JAN91

#	Lngth	#	Lngth	#	Lngth	#	Lngth	#	Lngth
1	27.00	11	40.06	21	40.02	31	40.04	41	40.06
2	39.65	12	40.07	22	40.05	32	40.04	42	25.91
3	39.74	13	40.04	23	40.04	33	40.05		
4	40.04	14	40.04	24	40.07	34	40.05		
5	40.06	15	40.03	25	40.05	35	40.03		
6	40.05	16	40.04	26	40.03	36	40.05		
7	39.95	17	40.02	27	40.07	37	40.06		
8	39.95	18	40.02	28	40.04	38	40.05		
9	40.05	19	40.03	29	40.03	39	40.05		
10	40.04	20	40.03	30	40.03	40	40.08		

Final Injection Casing
Type: Seamless Steel Pipe
Specification: ASTM A53 89A GRB ASMES A53 GRB89
Outside Diameter: 20.00"
Wall Thickness: 0.500"
Total Length: 1955.18
Date: 14FEB91

#	Lngth	#	Lngth	#	Lngth	#	Lngth	#	Lngth	#	Lngth
1	39.65	11	40.23	21	38.33	31	40.66	41	39.72	51	21.89
2	39.19	12	41.00	22	39.66	32	39.03	42	37.84		
3	39.89	13	35.36	23	38.37	33	39.35	43	35.89		
4	41.03	14	36.88	24	39.91	34	36.70	44	39.06		
5	39.42	15	38.41	25	39.97	35	39.89	45	39.45		
6	40.55	16	40.33	26	39.61	36	39.21	46	39.23		
7	38.68	17	39.59	27	36.42	37	40.17	47	40.19		
8	39.40	18	41.30	28	36.54	38	37.78	48	39.45		
9	38.62	19	32.95	29	39.63	39	38.01	49	35.96		
10	39.84	20	33.23	30	36.36	40	38.06	50	37.29		

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
CASING TALLY

Conductor Casing
Type: E.R.W. Steel Pipe (Spiral Welded Steel)
Specification: ASTM A53B Dual/API 5LB
Outside Diameter: 16"
Wall Thickness: 0.375"
Total Length: 140.97'
Date: 26OCT90

#	Lngth
1	20.61
2	40.15
3	40.11
4	40.10

Surface Casing
Type: E.R.W. Steel Pipe (Spiral Welded Steel)
Specification: ASTM A53B/API 5L GR.B
Outside Diameter: 10.75"
Wall Thickness: 0.365"
Total Length: 250.78'
Date: 29OCT90

#	Lngth
1	40.65
2	42.10
3	42.10
4	41.80
5	42.05
6	42.08

Final Monitor Casing and Screen
Type: Seamless Steel Pipe
Specification: API SPEC 5L GR.B/ASTM A53 TYPE 5GR.B/ASTM A106GR.B
Outside Diameter: 4.50"
Wall Thickness: 0.531"
Total Length: 1393.53'
Date: 18NOV90

#	Lngth	#	Lngth	#	Lngth	#	Lngth
*1	50.00	11	39.07	21	40.10	31	39.06
2	40.07	12	39.07	22	40.07	32	39.06
3	40.10	13	40.09	23	40.07	33	38.03
4	40.10	14	39,06	24	40.06	34	39.07
5	40.09	15	40.10	25	40.07	35	40.12
6	39.07	16	40.09	26	39.07		
7	40.10	17	39.05	27	40.10		
8	39.08	18	39.05	28	38.03		
9	40.10	19	40.10	29	38.03		
10	39.07	20	39.05	30	39.08		

* - screen

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
CASING TALLY

Conductor Casing
Type: E.R.W. Steel Pipe (Spiral Welded Steel)
Specification: ASTM A53B Dual/API 5LB
Outside Diameter: 16.00"
Wall Thickness: 0.375"
Total Length: 142.26'
Date: 8DEC90

#	Lngth
1	21.91
2	40.12
3	40.13
4	40.10

Surface Casing
Type: E.R.W. Steel Pipe (Spiral Welded Steel)
Specification: ASTM A53B/API 5L GR.B
Outside Diameter: 10.75"
Wall Thickness: 0.365"
Total Length: 249.92'
Date: 12DEC90

#	Lngth
1	42.02
2	42.13
3	42.13
4	36.36
5	36.77
6	50.51

Final Monitor Casing and Screen
Type: Seamless Steel Pipe
Specifcation: API SPEC 5L GR.B/ASTM A53 TYPE 5GR.B/ASTM A106GR.B
Outside Diameter: 4.50"
Wall Thickness: 0.531"
Total Length: 951.16'
Date: 6JAN91

#	Lngth	#	Lngth	#	Lngth
*1	20.37	11	40.10	21	40.10
*2	30.65	12	39.05	22	39.03
3	38.97	13	40.10	23	31.07
4	38.90	14	39.07		
5	40.07	15	39.05		
6	40.10	16	39.04		
7	38.91	17	40.07		
8	39.07	18	40.10		
9	39.05	19	40.10		
10	40.07	20	40.07		

* - screen

LETTER OF ABANDONMENT AND LETTER OF CERTIFICATION

APPENDIX F

CITY OF ROCKLEDGE

1600 Huntington Lane
Rockledge, FL 32955-2660

P.O. Box 560488
Rockledge, FL 32956-0488

[redacted]

Telephone 407/690-3978 • Fax 407/690-3987

James P. McKnight
City Manager

August 5, 1991

Mr. Carlos Rivero-deAguilar, P.E.
Water Facilities Administrator
Florida Department of Environmental Regulation
Central District
3319 Maguire Boulevard, Suite 232
Orlando, Florida 32803-3767

Re: Financial Resources
Class I Test/Injection Well
S&G Project No. 8802-02-02
Rockledge, Florida

Dear Mr. deAguilar:

I hereby certify the financial resources are available to close, plug, or abandon the completed injection well at the City's Wastewater Treatment Facility, as required by Rule 17-28.27 (9) of the Florida Administrative Code.

If you have any questions, do not hesitate to contact us.

Sincerely,

CITY OF ROCKLEDGE

James P. McKnight
City Manager

JPM:b²

HYDRO DESIGNS
Consultants in Hydrogeology & Hydrology

1225 U.S. Highway 1, Suite 246
Juno Beach, Florida 33408
(407) 626-8250

Mr. Carlos-deAguilar, P.E
Water Facilities Administrator
Florida DER
3319 Maguire Boulevard
Suite 232
Orlando, Florida
32803-3767

August 3, 1991

Dear Mr. deAguilar,

This letter is to certify that the Rockledge Test/Injection Well and monitoring system has been completed substantially in accordance with the plans and specifications submitted to and approved by the Department of Environmental Regulation in October of 1990 (FDER Permit No. UC05-161506).

The only deviations from the plans and specifications was the performance of an additional radioactive tracer survey (RTS) just prior to the injection test and the installation of an additional surface casing in the injection well. Both of these deviations were approved by the TAC prior to implementation and neither will prevent the system from functioning in compliance with the requirements of F.A.C. Rule 17-28 when it is properly operated and maintained.

These determinations have been based upon on-site observation of the construction, scheduled and conducted by us or by a project representative under our direct supervision, for the purpose of determining if the work proceeded in compliance with the plans and specifications.

Sincerely,

Michael S. Knapp, P.G.
P.G. No. 66

George Shih

Dr. George Shih, P.E.
P.E. No. 23233

CONSTRUCTION ACTIVITIES

APPENDIX G

CONSTRUCTION ACTIVITIES

SUMMARIZED DAILY

ROCKLEDGE CLASS I INJECTION WELL PROJECT
TEST/INJECTION WELL
DAILY CONSTRUCTION SCHEDULE

112490	Mobilization and assembly of drill rig on drilling pad completed.
112890	Drill 12 1/4" pilot hole to 125 feet by the mud rotary method.
111290	Continue drilling 12 1/4" pilot hole to 152 feet. Ream pilot hole with 52 1/2" hole opener 0'- 61'.
113090	Continue reaming with 52 1/2" hole opener 61'- 141'.
120190	Ream to targeted depth of 158' bls. Set 156 feet of 48" spiral weld steel casing. Pressure grout 48" steel casing with 471 cubic feet of neat cement in one lift.
120390	Tag cement inside casing at 154 feet. Begin drilling 12 1/4" pilot hole 154'- 301'.
120490	Drill 12 1/4" pilot hole to targeted depth of 456' bls. Smith International runs gyroscopic log on 12 1/4" pilot hole.
120690	Florida Geophysical runs caliper, natural gamma, dual induction, acoustic velocity, fluid resistivity, SP and temperature logs.
120790	Ream pilot hole with 46 1/2" hole opener 154'- 184'.
120890	Ream with 46 1/2" hole opener 184'- 305'.
120990	Ream with 46 1/2" hole opener 305'- 399'.
121090	Ream with 46 1/2" hole opener 399'- 460'. Run geophysical logs on reamed hole. Florida Geophysical runs caliper log.
121190	Set 450 feet of 38" spiral weld steel casing. Florida Cement pressure grouts 38" casing with 986 cubic feet of 6% bentonite and 454 cubic feet of neat cement in one lift.
121290	Florida Geophysical runs temperature log on cemented casing. Tag cement at 244 feet inside casing. Cement in the annular space is within 2 feet of land surface. Perform pressure test on 38" casing at 125 psi.
121390	Begin drilling 12 1/4" pilot hole by reverse air drilling method (460'- 466').
121490	Drill 12 1/4" pilot hole 466'- 753'.
121590	Drill 12 1/4" pilot hole 753'- 1023'.
121690	Drill 12 1/4" pilot hole 1023'- 1264'.
121790	Drill 12 1/4" pilot hole 1264'- 1436'.
121890	Drill 12 1/4" pilot hole 1436'- 1520'.
121990	Retrieve core #1: 1520'-1530'. 30% recovery Drill 12 1/4" pilot hole 1520'- 1584'.
122090	Drill 12 1/4" pilot hole 1584'- 1624'. Retrieve core #2: 1624'- 1639'. 53% recovery.
122190	Drill 12 1/4" pilot hole 1624'- 1650. Smith International runs gyroscopic log. Florida Geophysical runs caliper, natural gamma, and sonic logs.

122290	Continue running geophysical logs. Florida Geophysical runs sonic, dual induction, fluid resistiviey, SP, temperature and flowmeter logs.
122790	Begin reaming the pilot hole (reverse air) with 36 1/2" hole opener (453'- 456').
122890	Ream pilot hole with 36 1/2" hole opener 456'- 591'.
122990	Ream pilot hole with 36 1/2" hole opener 591'- 672'.
123090	Ream pilot hole with 36 1/2" hole opener 672'- 834'.
123190	Ream pilot hole with 36 1/2" hole opener 834'- 917'.
010191	Ream pilot hole with 36 1/2" hole opener 917'- 950'.
010291	Ream pilot hole with 36 1/2" hole opener 950'- 979'.
010391	Ream pilot hole with 36 1/2" hole opener 979'- 1018'.
010491	Ream pilot hole with 36 1/2" hole opener 1018'- 1113'.
010591	Ream pilot hole with 36 1/2" hole opener 1113'- 1155'.
010691	Ream pilot hole with 36 1/2" hole opener 1155'- 1181'.
010791	Ream pilot hole with 36 1/2" hole opener 1181'- 1277'.
010891	Ream pilot hole with 36 1/2" hole opener 1277'- 1327'.
010991	Ream pilot hole with 36 1/2" hole opener 1327'- 1348'.
011091	Ream pilot hole with 36 1/2" hole opener 1348'- 1369'.
011191	Ream pilot hole with 36 1/2" hole opener 1369'- 1439'.
011291	Ream pilot hole with 36 1/2" hole opener 1439'- 1463'.
011391	Ream pilot hole with 36 1/2" hole opener 1463'- 1475'.
011491	Ream pilot hole with 36 1/2" hole opener 1475'- 1530'.
101591	Ream pilot hole with 36 1/2" hole opener 1530'- 1600'.
011691	Ream pilot hole with 36 1/2" hole opener 1600'- 1657'. Total Depth.
011791	Superior Survey Systems runs gyroscopic log. Florida Geophysical runs caliper log.
011891	Run 42 sections of 30" steel casing into hole.
011991	Cement 30" casing. Florida Cement pumps 739 cubic feet of neat cement (pressure grout). Let set for 16 hours. STAGE ONE. Tag top of cement at 1484 feet. Florida Cement pumps 157 cubic feet of neat cement. Let set for 7 hours. STAGE TWO.
012091	Tag top of cement at 1446 feet. Florida Cement pumps 560 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours. STAGE THREE. Tag top of cement at 1349 feet. Florida Cement pumps 560 cubic feet of neat with 12% bentonite mixture. Let set for 22 hours. STAGE FOUR.
012191	Tag top of cement at 1262 feet. Florida Cement pumps 476 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours. STAGE FIVE.
012191	Tag top of cement at 1120 feet. Florida Cement pumps 672 cubic feet of neat with 12% bentonite mixture. Let set for 12 hours.
012291	Tag top of cement at 961 feet. Florida Cement pumps 550 cubic feet of neat with 12% bentonite mixture. Let set for 12 hours.

	Tag top of cement at 817 feet.
	Florida Cement pumps 420 cubic feet of neat with 12% bentonite mixture. Let set for 14 hours.
012391	Tag top of cement at 709 feet.
	Florida Cement pumps 567 cubic feet of neat with 12% bentonite mixture. Let set for 12 hours.
012491	Tag top of cement at 565 feet.
	Florida Cement pumps 84 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours.
	Tag top of cement at 542 feet.
	Florida Cement pumps 683 cubic feet of neat with 12% bentonite mixture. Let set for 13 hours.
012591	Tag top of cement at 450 feet.
	Florida Cement pumps 521 cubic feet of neat with 12% bentonite mixture. Let set for 11 hours.
	Tag top of cement at 270 feet.
012691	Florida Cement pumps 694 cubic feet of neat with 12% bentonite mixture. Let set for 48 hours.
012791	Perform pressure test on 30" casing at 105 psi.
012891	Drill 12 1/4" pilot hole 1657'- 1715'.
012991	Drill 12 1/4" pilot hole 1715'- 1755'.
	Retrieve CORE # 3 - 1755'- 1770'. 66% recovery.
013091	Drill 12 1/4" pilot hole 1755'- 1790'.
	Retrieve CORE # 4 - 1790'- 1805'. 55% recovery.
013191	Drill 12 1/4" pilot hole 1790'- 1835'.
	Retrieve CORE # 5 - 1835'- 1846'. 72% recovery.
020191	Drill 12 1/4" pilot hole 1835'- 1893'.
020291	Retrieve CORE # 6 - 1893'-1908'. Zero recovery.
	Drill 12 1/4" pilot hole 1893'- 1908'.
	Retrieve CORE # 7 - 1908'-1926'. 11% recovery.
020391	Drill 12 1/4" pilot hole 1908'- 1990'.
020491	Drill 12 1/4" pilot hole 1990'- 2014'.
	Run geophysical logs.
	Smith International runs gyroscopic log.
	Florida Geophysical runs caliper, natural gamma, SP, fluid resistivity, dual induction, acoustic velocity, temperature and flowmeter logs.
020591	Complete geophysical logs.
	Florida Geophysical runs sonic and VDL logs.
020691	Ream pilot hole with 28" hole opener 1651'- 1716'.
020791	Ream pilot hole with 28" hole opener 1716'- 1806'.
020891	Ream pilot hole with 28" hole opener 1806'- 1930'.
020991	Ream pilot hole with 28" hole opener 1930'- 1960'.
	Total Depth.
	Run geophysical logs.
	Smith International runs gyro log.
	Florida Geophysical runs caliper log.
201091	Standby for TAC concurrence for injection string depth.
021391	Receive TAC approval for 20" casing depth.
	Run 20" O.D. steel casing into hole.

021491 Run 20" O.D. steel casing to 1955' BLS.
Florida Cement pressure grouts 20" casing with 784 cubic feet of neat cement. STAGE #1.
021591 Tag top of cement at 1728 feet.
Florida Cement pumps 320 cubic feet of neat cement. STAGE #2.
021691 Tag top of cement at 1630 feet.
Florida Cement pumps 875 cubic feet of neat with 8% bentonite mixture. STAGE #3.
Tag top of cement at 1278 feet.
Florida Cement pumps 897 cubic feet of neat with 4% bentonite mixture. STAGE #4.
021791 Tag top of cement at 907 feet.
Florida Cement pumps 897 cubic feet of neat with 4% bentonite mixture. STAGE #5.
Tag top of cement at 546 feet.
Florida Cement pumps 723 cubic feet of neat with 4% bentonite mixture. STAGE #6.
021891 Tag top of cement at 255 feet. Schlumberger runs CBL survey on injection string. Florida Cement pumps 448 cubic feet of neat cement. STAGE #7. Tag top of cement at 74 feet. Florida Cement pressure grouts to surface with 185 cubic feet of neat cement.
022191 Hook up drill string and circulate inside 20" casing.
022291 Run pressure test on 20" casing at 100 psi.
Drill through cement plug inside 20" casing with 12 1/4" bit.
022391 Drill 12 1/4" pilot hole 2014'- 2079'.
022491 Drill 12 1/4" pilot hole 2079'- 2101'.
022591 Retrieve CORE #8 - 2101'- 2112'. Zero recovery.
Drill 12 1/4" pilot hole 2101'- 2105'.
022691 Drill 12 1/4" pilot hole 2108'- 2195'.
022791 Drill 12 1/4" pilot hole 2195'- 2227'.
022891 Drill 12 1/4" pilot hole 2227'- 2255'.
030191 Drill 12 1/4" pilot hole 2255'- 2340'.
030291 Drill 12 1/4" pilot hole 2340'- 2406'.
030391 Retrieve CORE #9 - 2406'- 2460'; 92% recovery.
Drill 12 1/4" pilot hole 2406'- 2460'.
030491 Drill 12 1/4" pilot hole 2460'- 2650'.
030591 Drill 12 1/4" pilot hole 2650'- 2720'. Total Depth.
030591 Superior Survey Systems runs gyroscopic log.
030691 Run geophysical logs.
Florida Geophysical runs natural gamma, caliper, acoustic velocity, temperature, dual induction, sp and resistivity logs.
Ream pilot hole with 17 1/2" hole opener 1922'- 1925'.
030791 Ream pilot hole with 17 1/2" hole opener 1925'- 1936'.
030891 Ream pilot hole with 17 1/2" hole opener 1936'- 2006'.
030991 Ream pilot hole with 17 1/2" hole opener 2006'- 2135'.
031091 Ream pilot hole with 17 1/2" hole opener 2135'- 2208'.

031191	Ream pilot hole with 17 1/2" hole opener 2208'- 2326'.
031291	Ream pilot hole with 17 1/2" hole opener 2236'- 2459'.
031391	Ream pilot hole with 17 1/2" hole opener 2459'- 2705'.
031491	Ream pilot hole with 17 1/2" hole opener 2705'- 2720'; Total Depth. Ream 17 1/2" reamed hole with 18 1/2" hole opener 1922'- 2930'.
031591	Ream 17 1/2" reamed hole with 18 1/2" hole opener 2030'- 2465'.
031691	Ream 17 1/2" reamed hole with 18 1/2" hole opener 2465'- 2720'. Total Depth.
031791	Run geophysical logs. Superior Survey Systems runs gyroscopic log. Florida Geophysical runs caliper and temperature logs and point water samples each 100 feet of open hole 1970'- 2700'.
031891	Remove drill pipe from rig.
031991	Begin fresh water flush prior to TV survey.
032191	Florida Geophysical runs TV survey of injection well casing and open hole to 2094 feet. Blacked out to bottom.
032291	Schlumberger runs radioactive element tracer survey using I-131. Continue fresh water flush.
032391	Stop flush. 247,900 gallons of fresh water utilized.
032791	Begin positioning and assembling pumps and piping for injection test.
040991	Drilling rig moved off pad.
041491	Test pumps and lines constructed for injection test. Pumped 180,000 gallons of effluent water.
041691	Florida Geophysical begins 48 hour logging of temperature and pressure at depth of 1940 feet prior to injection test.
041891	Injection test. Pumped 8 hours at rates of 3000 - 4000 gallons per minute and one hour at rates of 7600 - 8200 gallons per minute using effluent water from sewage treatment plant. Total of 2,154,000 pumped for test.
042691	Schlumberger runs post injection radioactive element tracer survey.

ROCKLEDGE CLASS I INJECTION WELL PROJECT
DEEP FLORIDAN MONITOR WELL
DAILY CONSTRUCTION SCHEDULE

101590	Drill pad completed. Water table monitor wells installed at each corner of pad.
102490	PreConstruction meeting.
102590	Drill pilot hole by mud rotary drilling process Drill 7 7/8" pilot hole to 142 feet below land surface. Florida Geophysical runs natural gamma, temperature, sonic, dual induction, fluid resistivity, caliper, and SP.
102690	Ream pilot hole with 24" carbide button bit to 145 feet using mud rotary drilling process. Florida Geophysical runs caliper log (0'-140'). Install 16" conductor casing to the top of the Floridan Aquifer System at 140 feet below land surface. Florida Cement grouts casing in one stage with 532 cubic feet of neat cement.
102790	Florida Geophysical runs temperature survey while cement cures for 48 hours.
102890	Perform pressure test on conductor casing at 125 psi.
102990	Top of cement inside casing tagged at 130 feet below land surface. Drill 7 7/8" pilot hole from 130 feet to 245 feet using mud rotary process.
103090	Florida Geophysical runs caliper, natural gamma, dual induction, acoustic velocity, temperature, fluid resistivity and SP logs. Ream hole with 14 3/4" button bit (mud rotary) from 146 to 216 feet.
103190	Continue reaming from 216 feet to targeted depth of 245 feet b.l.s. Florida Geophysical runs caliper log on reamed hole. Install 10 3/4" steel surface casing to 240 feet below land surface. Florida Cement pressure grouts surface casing in two lifts with 393 cubic feet of neat cement. Wait for cement to cure 48 hours before pressure test.
110390	Perform pressure test at 125 psi. Start drilling pilot hole to 1500 feet with 9 5/8" carbide button bit using reverse air drilling process. Drill 9 5/8" pilot hole 240'- 266'.
110490	Drill 9 5/8" pilot hole 266'- 461'.
110590	Drill 9 5/8" pilot hole 461'- 804'.
110690	Drill 9 5/8" pilot hole 804'- 1054'.
110790	Drill 9 5/8" pilot hole 1054' 1131'. CORE # 1 - 1131'- 1146'.
110890	Retrieve core # 1 - 1131'- 1146'. Drill 9 5/8" pilot hole 1131'- 1300'.
110990	Drill 9 5/8" pilot hole 1300'- 1361'.
111090	Drill 9 5/8" pilot hole 1361'- 1463'.

111190 CORE # 2 - 1463'- 1473'.
Retrieve core #2 1463 feet - 1473 feet.
Drill 9 5/8" pilot hole 1463'- 1500'.

111290 Drill 9 5/8" pilot hole 1500'- 1505'. Total Depth.
Superior Survey Systems runs gyroscopic survey
Florida Geophysical runs sonic, caliper and dual induction logs under static conditions. Logs performed while pumping the well include fluid resistivity, temperature, flowmeter, point samples and T.V.survey. Approximately two well volumes developed during logging.

111490 TAC meeting held on site.
Based on data collected, it was decided to move screened interval up the hole from the originally planned interval of 1400'- 1450' to a depth of 1340'- 1390'.

111590 Conduct straddle packer test #1: 1148.5'- 1202.5'.
Start straddle packer test #2: 1125'- 1133'.

111690 Complete straddle packer test #2.
Base of USDW determined to be between 1133 feet and 1200 feet.
Florida Cement Company begins grouting lower portion of hole (beneath monitor screen) with neat cement.

111790 Complete grouting from 1506' to 1396' in 5 stages and 238 cubic feet of neat cement.

111890 Tag cement at 1396 feet.
Install 4 1/2" monitoring casing, with 50 foot screened interval on bottom, to 1388 feet. Set stainless steel (30,000 slot) screen from 1338 feet to 1388 feet below land surface and gravel pack to 1326 feet below land surface with 93 cubic feet of quartz gravel.
Florida Cement pumps 6 cubic feet of neat cement on top of gravel pack. Let set for 6 hours.

111990 Tag top of cement at 1321 feet.
Florida Cement pumps 101 cubic feet of neat cement. Let set for 8 hours. STAGE ONE.
Tag top of cement at 1265 feet.
Florida Cement pumps 112 cubic feet of neat cement. Let set for 8 hours. STAGE TWO.
Tag top of cement at 1217 feet.

112090 Florida Cement pumps 78 cubic feet of neat cement. Let set for 8 hours. STAGE THREE.
Tag cement at 1140 feet.
Florida Cement pumps 168 cubic feet of neat with six percent bentonite mixture. Let set for 8 hours.
STAGE FOUR.
Tag top of cement at 988 feet.

112090 Florida Cement pumps 196 cubic feet of neat with six percent bentonite mixture. Let set for 8 hours.
STAGE FIVE.

Tag top of cement at 819 feet.
Florida Cement pumps 90 cubic feet of neat with six percent bentonite mixture. Let set for 15 hours.
STAGE SIX.
112190 Two loads of cement received and loaded into silos.
Tag cement at 770 feet.
Florida Cement pumps 224 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours.
STAGE SEVEN.
112290 Tag top of cement at 653 feet.
Florida Cement pumps 168 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours.
STAGE EIGHT.
Tag top of cement at 540 feet.
Florida Cement pumps 224 cubic feet of neat and six percent bentonite mixture. Let set for 6 hours.
STAGE NINE.
Tag cement at 521 feet.
Florida Cement pumps 168 cubic feet of neat and six percent bentonite mixture. Let set for 7 hours.
STAGE TEN.
112390 Tag top of cement at 428 feet.
Florida Cement pumps 196 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours.
STAGE ELEVEN.
Tag top of cement at 349 feet.
Florida Cement pumps 112 cubic feet of neat and six percent bentonite mixture. Let set for 12 hours.
STAGE TWELVE.
112490 Tag top of cement at 315 feet.
Florida Cement pumps 224 cubic feet of neat and six percent bentonite mixture. Let set for 8 hours.
STAGE THIRTEEN.
Tag top of cement at 157 feet in annular of 10 3/4" casing.
Annulus between the 10 3/4" and 4 1/2" casings left open from 157 feet to land sufrace so that Schlumberger can accurately calibrate tools used for cement bond and cement evaluation surveys.

SUMMARY: 2061 cubic feet of cement was pumped to pressure grout the 4 1/2" casing from 1326 feet to 157 feet below land surface and 238 cubic feet was pumped for the bottom plug. Ninety three (93) cubic feet of quartz gravel was utilized for packing around the screen for a total volume of 2392 cubic feet, which is 136% of theoretical volume.
021891 Schlumberger runs CBL and temp logs.
022091 Florida Cement pressure grouts 4 1/2" casing to surface with 51 cubic feet of neat cement.

022491	Develop well for 18 hours. Approximately 18 well volumes pumped.
022791	Develop well at 10 GPM for 3 hours. Bionomics Lab. takes samples.
030191	Develop well a 10 GPM for 1 hour. Bionomics Lab. takes sample.
031791	Begin 48 hour water level monitor prior to T/I well flush.
031991	Monitor water level during injection well flush for T. V. survey.
032191	Install casing and T-valve to 5.30 feet above pad level.
032391	Begin water level monitoring prior to injection test of T/I well.
041891	Monitor water level during injection test. Begin post injection monitoring of water level.
042091	End post injection monitoring of water level.

ROCKLEDGE CLASS I INJECTION WELL PROJECT
SHALLOW FLORIDAN MONITOR WELL
DAILY CONSTRUCTION SCHEDULE

112990	Skid monitor well rig from deep monitor well to proposed shallow monitor well location.
120490	Begin drilling 7 7/8" pilot hole (mud rotary) 0'- 28'.
120590	Drill 7 7/8" pilot hole 28'- 90'.
120690	Drill 7 7/8" pilot hole 90'- 145'.
120790	Florida Geophysical runs caliper, gamma, dual induction, SP, fluid resistivity, sonic and temperature logs.
120890	Ream pilot hole (mud rotary) with 24" hole opener 0'- 145'. Florida Geophysical runs caliper log on 24" reamed hole. Set 140 feet of 16" seamless steel casing.
120990	Florida cement pressure grouts 16" casing with 364 cubic feet of neat cement in one lift. Let cement cure for 48 hours.
121190	Tag cement inside casing at 130 feet. Drill 7 7/8" pilot hole 145'- 242'. Florida Geophysical runs caliper, gamma, fluid resistivity, temperature, SP, long-short normal and sonic logs.
121290	Ream pilot hole with 14 3/4" bit 145'- 243'. Set 240 feet of 10 3/4" steel casing. Florida Cement pressure grouts 10 3/4" casing to surface with 174 cubic feet of neat cement in one lift.
121390	Florida Geophysical runs temperature log on cemented casing. Tag cement plug inside casing at 204 feet, annular tag at 19 feet BLS. Wait on approval for screened interval.
121990	Perform pressure test on 10 3/4" casing at 125 psi.
123190	Receive approval for screened interval of 900'- 950'. Start drilling through cement plug 204'- 243'.
010191	Drill 9 7/8" hole 243'- 584' (reverse air).
010291	Drill 9 7/8" hole 584'- 959', total depth. Superior Survey Systems runs gyro log. Florida Geophysical begins caliper log and experiences equipment malfunction.
010391	Wait on parts to repair geophysical logging equipment.
010591	Florida Geophysical's logging equipment repaired. Run caliper, gamma, fluid resistivity, temperature, sonic, dual induction and E-logs.
010691	Run 4 1/2" screen and steel casing into hole - 51 feet of 4 1/2" stainless steel (30,000 slot) screen and 900 feet of 4 1/2" steel casing (23 sections). Screened interval set 899 feet - 950 feet. Pack 39 cubic feet of quartz gravel around screened interval of 4 1/2" casing. Develop well for two hours. Tag top of gravel pack at 883 feet. Florida Cement pumps 17 cubic feet of neat cement on top of gravel pack. Let set for 5 hours. STAGE ONE.

	Tag top of cement at 853 feet.
	Florida Cement pumps 146 cubic feet of neat cement. Let set for 6 hours. STAGE TWO.
	Tag cement at 720 feet.
	Florida cement pumps 146 cubic feet of neat cement. Let set for 5 hours. STAGE THREE.
010791	Tag cement at 590 feet.
	Florida Cement pumps 146 cubic feet of neat cement. Let set for 5 hours. STAGE FOUR.
	Tag cement at 488 feet.
	Florida Cement pumps 146 cubic feet of neat cement. Let set for 5 hours. STAGE FIVE.
	Tag cement at 373 feet.
	Florida cement pumps 280 cubic feet of neat cement. Let set for 6 hours. STAGE SIX.
	Tag cement at 220 feet inside annular of 10 3/4" casing. Total cement pumped: 881 cubic feet.
021991	Schlumberger runs CBL and temp logs.
022091	Florida Cement pressure grouts casing to surface with 90 cubic feet of neat cement.
022591	Begin developing well at a rate of 8 gpm.
022691	Stop developing well at 0806 after 24 hours, 9900 gallons and 22 well volumes. Begin pumping again 3 hours later. Collect hourly water quality. At 1545 shut off pump. Water level in well is 2'6" above pad level. Measure water level throughout night.
022791	Pump well for 5 hours for final development. Take hourly readings. Bionomics Lab samples well for full suite of chemical constituents.
030191	Develop well for 2 hours. Bionomics samples well again.
031791	Begin hourly water level readings for 48 hours.
031991	Begin 10 minute water level readings during fresh water flush for injection well T.V. survey.
032091	Continue measure water levels while pumping into injection well.
032191	Stop pumping fresh water flush into injection well. Continue uninterrupted water level readings.
032291	Pump fresh water into injection well for RTS survey. Continue water level readings through RTS survey.
032391	Stop pumping water into injection well for RTS survey. Continue uninterrupted half hour water level readings for post RTS and also background readings for injection test.
032591	Meeting on site. RE: injection test.
041691	Continue water level readings but at 15 minute intervals 48 hours before injection test.
041891	Start injection test at 1010. Begin recovery water level readings at 1910.
042091	Stop recording water level readings. Recorded continuously since 031991. No other activity on shallow Floridan monitor well.

CONSTRUCTION ACTIVITIES

SUMMARIZED WEEKLY

Weekly Summary #1 (October 20 thru October 26)

The drilling contractor selected to construct the Test/Injection Well and associated monitor wells for the City of Rockledge is Youngquist Brothers, Incorporated. As required in the permit, an initial meeting was held with the contractor prior to construction start up. This meeting was held on October 24th at the job site in Rockledge and was attended by FDER, HydroDesigns, Inc. and Youngquist Brothers, Inc. The major items covered in the meeting were:

1) **The use of salt during construction of wells** - It is not anticipated that salt will be needed, due mainly to the rotating head used during drilling operations and the flange that will be assembled to the well head. However, salt is acceptable to use on the T/I well only after both monitor wells have been constructed and background water quality has been established.

2) **Cutting Disposal** - Two dump sites (Melbourne Sand and Brevard County) have been approved.

3) **Monitor Wells Water Quality** - For better determination of water quality an attempt will be made to run the flowmeter tool at static and then while pumping the well(s). Also, the fluid resistivity, point samples and T.V. survey will be run while pumping the well(s). Nutrient levels need to be established in the monitor wells prior to any effluent injection.

4) **Development of Monitor Wells** - Formation fluid from development of monitor wells can be pumped into the T/I well <u>only</u> after the final injection string has been installed.

5) **Deep Exploratory/Monitor Well** - Screened interval to be determined by TAC after completion of borehole to 1500 feet.

6) **Treated Effluent during Injection Test** - To be addressed at TAC Meeting.

Prior to the meeting, the drill pad had been completed on October 15th and allowed to cure for seven (7) days before drilling equipment for the deep exploratory/monitor well was mobilized onto the pad. The dimensions of the pad are 116 feet by 94 feet. The pad thickness grades from 6 inches in the areas of least load and increases to 12 inches where the drill rig for the injection well will be situated. A concrete block wall (24" in height) has been constructed on the perimeter of the pad to allow for water storage during testing of wells.

The Surficial Monitor Wells were installed around the pad. These wells are situated next to each corner of the drill pad. The wells were cased with 2" schedule 40 PVC casing and screen. The screens were gravel packed with 820 silica sand up to one foot above the screen and then cemented to land surface. The wells were air developed for one (1) hour. Monitor well #1 and #4 are cased to 18 feet below land surface with three (3) feet of screen extending to 21 feet below land surface. The water table in both wells was recorded at three (3) feet below land surface. Monitor well #2 and #3 are cased to 19 feet below land surface with three (3) feet of screen extending to 22 feet below land surface. The water table in these two wells was recorded at six (6) feet below land surface. The Surficial monitor wells have been sampled three (3) times to establish background water quality prior to well construction. Water quality analysis will be done by Bionomics Laboratory in Orlando.

Drilling of the pilot hole for the Deep Exploratory/Monitor Well commenced on October 25th. A 7 7/8 inch bit was used to drill mud rotary to a depth of 142 feet below land surface. No lost circulation zones were encountered during the drilling operations. The hole was logged on the same day by Florida Geophysical of Ft. Myers. Specified logs included; natural gamma, temperature, sonic, dual induction, fluid resistivity, caliper, and SP. Gyroscopic surveys will commence at 240 feet to the total depth of the well.

The pilot hole was then reamed with a 24" carbide button bit to a depth of 145 feet. A caliper log was then run to determine hole volume and size prior to setting casing. On October 26th, the 16" conductor casing was set to the top of the Floridan Aquifer System at 140 feet below land surface and cemented in one stage with 95 barrels of neat cement. A temperature log was run inside the casing within 10 hours while the cement cured for 48 hours.

The lithologic samples and geophysical logs showed the Surficial Aquifer System extending to 115 feet below land surface. Undifferentiated Deposits (quartz sand and shell beds) were encountered in this sequence to a depth of 55 feet below land surface. The largest diameter of the hole occurred in the base of the unconsolidated sand and shell with the caliper log recording an maximum hole diameter of 40". The Tamiami Formation was encountered from the base of these beds extending to 115 feet below land surface.

The Intermediate Aquifer System (Hawthorn Group) was penetrated at 115 feet below land surface. This formation is composed of varying amounts of silty sand and phosphatic, clayey limestone and is easily detected on the gamma ray log due to the high radioactivity emissions from the phosphate. It extends to 130 feet below land surface to the top of the Floridan Aquifer System.

The top of the Floridan is composed of slightly sandy and phosphatic limestones (probably lower Miocene). These beds are immediately underlain by the Ocala Group. The Ocala was penetrated during reaming of the pilot hole to 145 feet. It is located 145 feet below land surface. The top of the Ocala was easily detected due to the nature of the formation and also by the benthonic foraminifera Operculinoides sp., and Lepidocyclina sp.. Lost circulation is anticipated during drilling through this zone therefore the conductor casing was set just above the Ocala at 140 feet below land surface while the surface casing will case to the bottom of this formation.

A TAC meeting has been scheduled on November 14th at the Rockledge site. The purpose of this meeting will be to determine length and depth of the screened interval for the Deep Monitor Well. Pilot hole drilling and testing should be complete at this time therefore all pertinent information will be available for the determination of the monitoring interval.

Weekly Summary #2 (October 27 thru November 2)

A temperature log was run on the 16" casing (140 feet) of the deep monitor well after the casing was grouted to surface. The log showed a temperature range from six (6) degrees F at the bottom of the hole to 176 degrees F located 45 feet below land surface. According to the caliper log of the reamed hole, the largest diameter of the well was recorded in this interval (45 feet) therefore this portion of the hole would have a higher temperature due to the amount of cement.

A pressure test was performed on the conductor casing. This test was not required by DER but we felt it would be beneficial to the overall mechanical integrity of the deep monitor well. The casing was pressured up to 130 psi and then bled back to 125 psi. The test lasted for one hour with a total change in pressure of 2 psi (from 125 psi to 123 psi).

Pilot hole drilling on the Deep Exploratory/Monitor well (mud rotary) resumed on October 29th with a 7 7/8" bit. The borehole was drilled from the base of the casing to a depth of 245 feet. Mud loss was expected while drilling and therefore a light weight/high viscosity mud was mixed (8.9 to 9.0 lb/gal and 45-50 sec). This method was effective as there was negligible mud loss to the formation. Borehole geophysical logs were performed on the 100 feet of open hole then the hole was reamed with a 14 3/4" button bit. The reamed hole did encounter lost circulation even with the light weight mud. The caliper log of the reamed hole displayed washout and an overall large hole diameter (29" to 45").

Surface casing (10 3/4" O.D.) was installed to 240 feet below land surface and grouted to surface with neat cement. Theoretical volume was calculated at 201 cubic feet. Total volume of cement required to grout the casing to surface was 393 cubic feet (almost twice theoretical volume).

The drill cuttings through this interval indicate the Ocala Group from 145 feet below land surface to the total depth of the borehole at 245 feet below land surface. Lithologically, the Ocala was identified as a micritic, porous, fossiliferous limestone. Faunally, the group is marked by the presence of large foraminifera including Lepidocyclina sp., Gypsina globula sp. and Operculinoides sp.. The caliper log of the pilot hole indicates nominal hole size of nine (9) inches while the caliper log of the reamed hole shows much washout due to the long amount of time spent in the hole.

As of this writing we expect to have the deep monitor well drilled and tested to 1500 feet below land surface prior to the scheduled TAC meeting on November 14th.

Weekly Summary #3 (November 3 thru November 9)

Prior to drilling out the cement plug in the Deep Exploratory/ Monitor Well, a pressure test was conducted on the 10 3/4" surface casing. The casing was pressured up to 140 psi and then bled back to 125 psi for the test. Pressure was recorded for one hour with a total change in pressure of 5 psi (from 125 psi to 120 psi).

The drillers rigged up for reverse air circulation and resumed pilot hole drilling of the Deep Exploratory/Monitor well that same day (Saturday November 3rd). During reverse air drilling, water quality is measured regularly. Fluid samples are collected from the discharge stream every ten feet and analyzed in the field for temperature, conductivity, TDS, chlorides, salinity and pH. An additional fluid sample is being collected every sixty feet and stored. Three sets of drill cuttings are also being collected in ten foot intervals. Lag time is measured regularly and sample collection varies accordingly to ensure that accurate formation and fluid intervals are being collected.

Pilot hole drilling continues and as of Friday, Nov 9th, 12:00 noon the pilot hole has been drilled to a depth of 1332 feet below land surface. The lithology has been predominantly dolomite with interbeds of limestone. Cuttings from the lower portion of the hole have coincided fairly consistantly with the Merritt Island injection well. One core was taken in a dense dolmite interval above the 10,000 TDS boundary. The section cored was from 1131 to 1146 feet with recovery of 100 percent. Another core will be retrieved from the base of the borehole.

Water quality samples collected during reverse air drilling have given us an indication of water quality trends with depth and not actual water quality due to recirculation of fluids. However, these field parameters have indicated that the base of the USDW (10,000 TDS) is located between 1200 and 1220 feet below land surface. The 10,000 TDS level will be determined with the straddle packer settings.

The pilot hole will be drilled to total depth and geophysical logs should be completed by the end of the weekend. The screened monitoring interval for the deep monitor well will be determined after this data is collected and analyzed. This data will be available at the TAC meeting next week (November 14th).

Surficial monitor wells have been sampled weekly. Water quality parameters are now being analyzed in the field (turbidity is still being analyzed by Bionomics Laboratory).

Weekly Summary #4 (November 10 thru November 16)

The Deep Exploratory/Monitor well was drilled to a total depth of 1505 feet below land surface by November 12th. The second and final core was cut in the lower portion of the well (1463'-1473'). Retrieval was recorded at 80% and consisted of a dense low permeability dolomite.

Geophysical logs were conducted during the next two days on the open hole portion of the well under static and dynamic conditions. Logs run under static conditions include gyroscopic survey, sonic, caliper and dual induction. Logs that were performed while pumping the well include fluid resistivity, temperature, flowmeter, point samples and T.V. survey. The well was pumped during the latter logs for better water quality representation. However, storage capacity was limited and we were only able to develop approximately two well volumes.

The geophysical and lithologic logs indicate a confining dolomite sequence from 900 feet to 1150 feet below land surface. Beneath this dolomite is a cavernous interval (1150' to 1200 feet). It appears from the T.V. survey that there is some lateral flow through this interval. Also, a three (3) degree temperature difference is evident at 1170 feet. (Straddle packer tests conducted later in the week confirm that the base of the USDW occurs between 1133 feet and 1200 feet below land surface.) A sucrosic dolomite (moderate to good permeability) is present from 1345 feet to 1375 feet below land surface and appears to be a good interval to screen for the deep monitor well.

A TAC meeting was held on November 14th to discuss screen placement, straddle packer settings and construction on the test/injection well.

Straddle packer tests were conducted for the basis of determining the lower boundary of the USDW. Straddle packer placement was limited to hole size conditions and were set in two intervals (1125'-1133' and 1145'-1200'). Water Quality field parameters during the lower packer setting stabilized at: Conductivity- 31,000 umhos/cm, Chlorides- >10,000 mg/l, Temp.- 27.2 C and water quality field parameters during the upper packer test were recorded at Conductivity- 10,000 umhos/cm, Salinity- 6.0 ppt, Temp.- 26.0 C. Based on the packer tests the base of the USDW is between 1133 feet and 1200 feet.

Weekly Summary #5 (November 17 thru November 24)

Prior to installing the monitor screen for the deep monitor well, the borehole was backfilled with 238 cubic feet of neat cement from 1505 feet up to a depth of 1396 feet below land surface. By Sunday afternoon the stainless steel (30,000 slot) screen was set from 1338 feet to 1388 feet below land surface and gravel packed to 1326 feet below land surface.

Cementing the 4 1/2" monitor casing continued through the rest of the week. As of Saturday, the annulus was filled with 2061 cubic feet of cement up to 157 feet below land surface. This required 13 cement stages and 136% of theoretical hole volume. Neat cement (291 cubic feet) was pumped around the lower portion of the casing (from 1140 feet to 1321 feet) while the rest of the casing was grouted with the neat and six (6) percent bentonite. The annulus between the 10 3/4" and 4 1/2" casings was left open from 157 feet to land surface so that Schlumberger can accurately calibrate their tools used for the cement bond and cement evaluation surveys.

The deep monitor well is basically complete with the exception of the CET and CBL logs and also final development. Presently, the logs are being scheduled. Development of the deep monitor well will take place after the final casing string has been installed in the injection well and then all water will be pumped into the injection well.

Mobilization is nearly complete for the injection well rig and drilling should commence soon. Youngquist plans to install 140 feet of conductor casing due to the unconsolidated material in the upper portion of the hole.

The surficial monitor wells water quality continue to be measured on a weekly basis. Conductivity and TDS are now being analyzed with a Hach meter that reads slightly higher values compared to the YSI meter that was previously used. Water quality has remained consistent in the shallow wells.

Weekly Summary #6 (November 25 thru November 30)

Due to the unconsolidated nature of the surficial sediments a protective pit casing (48") is being installed in the Test/ Injection Well at the contractors option. Pilot hole drilling for this pit casing commenced in the evening of November 28th. A 12 1/4 inch steel tooth bit was used to drill mud rotary to a depth of 152 feet below land surface. The pilot hole is now being reamed with a 52 1/2" hole opener. This process is very slow due to the large amount of material being cut from the hole. As of this writing (Friday, Nov. 30th) the hole has been reamed to a depth of 98 feet below land surface.

The contractor has arranged for Schlumberger to perform the Cement Bond Log on the Deep Exploratory/ Monitor Well. Schlumberger can run the CBL with a special `slimline' cement bond tool however the narrowest Cement Evaluation Tool has an outside diameter of 3 3/8" (the inside diameter of the monitor well is 3 1/2"). Youngquist believes that attempting to run the CET tool down the well is too much of a gamble with a high probability of sticking the tool in the well and thus risking the entire well. Temperature logs were conducted on individual cement lifts during the grouting of the monitor casing and the Cement Bond Log will be run on the well. However, a CET log will not be performed on either of the monitor wells due well diameter.

The surficial monitor wells water quality continue to be measured on a weekly basis. Conductivity and TDS continue to be analyzed with a Hach meter.

Weekly Summary #7 (December 1 thru December 7)

On Saturday December 2nd, the 48" O.D. conductor casing was set to 150 feet below land surface and pressure grouted with 471 cubic feet of neat cement. Pilot hole drilling then proceeded (mud rotary) from the bottom of this casing to a depth of 456 feet below land surface. By Thursday December 6th, a multi-shot gyroscopic survey and geophysical logs were run on this section of pilot hole and include: gamma, caliper, dual induction, SP, fluid resistivity, long-short normal, temperature, sonic and VDL. The drillers had begun reaming the well with a 46 1/2" O.D. hole opener to a target depth of 450 feet by Friday.

Construction has begun on the shallow monitor well. Youngquist plans to install the conductor (16" to 140') and surface (10 3/4" to 240') casings within the next two weeks and then wait on approval for the screened interval prior to drilling out the cement plug in the surface casing. Construction thus far has entailed pilot hole drilling to 145 feet and geophysically logging the pilot hole.

The geophysical and lithologic logs of the Test/Injection Well to 450 feet verified the formations and contacts that were picked on the deep monitor well. The cuttings closely parallel the deep monitor well with minor lithologic contrasts within the Hawthorn interval (110' - 135'). These differences are solely in phosphate content and silt percentages.

The surficial monitor wells water quality continue to be measured on a weekly basis. Conductivity and TDS continue to be measured with a Hach meter. Water quality has remained consistent in the shallow wells.

Weekly Summary #8 (December 8 thru December 14)

The pilot hole of the Test/Injection Well was reamed to a total depth of 460 feet by Monday, December 10th. Superior Survey Systems of Houston, Texas performed a gyroscopic survey and Florida Geophysical performed a caliper log on the reamed hole. The 38" O.D. steel casing was installed to 450 feet below pad level and grouted to land surface in one lift (pressure grout) with 1441 cubic feet of cement. The heavy mud and wall cake influenced the amount of cement required because only 84% of calculated theoretical fill was needed. Theoretical fill was calculated at 1720 cubic feet. On December 12th, a temperature log was run inside the casing. A pressure test was performed on the casing at a pressure of 125 psi. The test lasted for one hour with a total change in pressure of 5 psi. Pilot hole drilling (reverse air) is now in progress. By Friday, the pilot hole had been drilled to a depth of 693 feet. The target depth for this interval is 1650 feet.

The 16" O.D. and 10 3/4" O.D. casings have both been installed in the shallow monitor well. The 16" casing was set to 140 feet below pad level and grouted with 364 cubic feet of neat cement. The 10 3/4" casing was set to 240 feet below pad level and grouted with 174 cubic feet of neat cement. During the pilot hole drilling, circulation was lost at 179 feet to 240 feet below pad level. The driller could not circulate to surface and therefore drilled blind (pumped mud down hole while drilling) to the total depth at 240 feet below land surface. To reduce loss of mud to the formation while reaming the pilot hole, the driller lightened the weight of the mud (from 9.4 to 8.9 lbs/gal) and never lost circulation. Therefore cuttings from 180 feet to 240 feet were collected on the reamed hole and not the pilot hole. Presently there is no activity on the shallow monitor well.

Weekly Summary #9 (December 15 thru December 21)

Drilling the Test/Injection Well pilot hole for the intermediate casing to a depth of 1650 feet was completed today. Florida Geophysical is on site and will begin logging this evening. Two cores were retrieved from the lower portion of the pilot hole and have a combined recovery of 11 feet. The first core (1523'-1533') consists of a dense dolomite with one half foot of chert in the bottom section. The second core (1624'-1639') consists of a dolomitic limestone. The cuttings have been analyzed and the lithologic logs will be compared and discussed once the geophysical logs have been performed on this portion of the well.

Weekly Summary #10 (December 22 thru December 28)

On Saturday, December 22nd, geophysical logs were run in the open hole portion (450' - 1650') of the Test/Injection Well. These logs include natural gamma, x-y caliper, sonic, VDL, dual induction, SP, flowmeter, fluid resistivity, single point and long-short normal. Reaming the pilot hole with a 36 1/2" x 17" hole opener commenced on the evening of Thursday, December 27th and continues at a depth of 510 below land surface as of Friday, December 28th.

The lithologic logs and geophysical logs of the open hole indicate a foraminiferous limestone from 1205 feet to 1290 feet below land surface. The largest diameter of the pilot hole (20") is in this limestone sequence. Beneath this limestone from 1290 feet to 1370 feet is a moderately altered dolomite. Some cavities are present in this interval and are verified by the caliper, sonic and VDL logs. The flowmeter does not detect any flow into the borehole within this interval. A small limestone interval is present from 1370 feet to 1390 feet. Directly beneath the limestone is a 100 foot thick dolomite sequence (1390'-1490') that is moderately altered at the top and highly altered at the base of the section. A gauged hole is present through the more dense lower section on the caliper log, fast and slow transit times are depicted on the sonic log and there is a slight increase in resistivity on the dual induction log through this section.

The bottom portion of the pilot hole (1490'-1650') is predominantly a dolomitic limestone with small beds of dolomite and occasional beds of chert. According to the cuttings, logs and cores retrieved from this section, it appears to be confining. The sonic, caliper and dual induction logs indicate slow transit times coupled with faster transit times in the small dolomite intervals, a gauged hole (12 1/4"), and lower resistivity, respectively. The flowmeter, SP, temperature, natural gamma and fluid resistivity show very little response throughout the entire open hole with the exception of a one degree temperature change at 1170 feet. The borehole fluid is slightly less resistive at this depth also.

Weekly Summary #11 (December 29 thru January 4)

The pilot hole of the Test/Injection Well continues to be reamed with the 36 1/2 inch hole opener. By Friday, January 11th the well has been reamed to <u>xxxx</u> feet below land surface. Reaming the pilot hole has been a slow process primarily because of the large amount of material being removed and also because of the hard dolomite layers being cut with such a large diameter bit.

After our phone conversation on December 31st, construction continued on the Shallow Monitor Well as originally proposed. The well was drilled to a total depth of 959 feet below land surface and awaits geophysical logging prior to setting the screen.

As you know, the screened interval (900'-950') will be contained in the upper dolomite sequence of the Lake City Limestone and is overlain by a thick limestone unit. This dolomite sequence is semi-permeable and lies just above the base of the USDW.

Weekly Summary #12 (January 5 thru January 11)

The pilot hole of the Test/Injection well continues to be reamed with the 36 1/2 inch hole opener. By Friday, January 11th the well has been reamed to 1430 feet below land surface. Reaming of the pilot hole has been a slow process, because of the predominance of dense dolomite layers in this section and the quantity of rock being removed.

Construction of the Shallow Monitor Well was completed this week. The 4 1/2 inch O.D. stainless steel continuous slot screen was set from 899 feet to 950 feet bls and gravel packed to 888 feet bls. The gravel pack is capped with bentonite up to 883 feet bls. Neat cement was pumped in six stages and totalled 859 cubic feet. Both monitor wells are essentially complete except for final development and CBL logging.

Weekly Summary #13 (January 12 thru January 18)

The pilot hole of the Test/Injection Well was reamed to a targeted depth of 1657 feet below land surface by Wednesday, January 16th. A gyroscopic directional survey and a caliper log were run on the open hole section of the 38 inch nominal hole. The 30 inch diameter intermediate steel casing was installed on Friday, January 18th to a depth of 1653 feet below land surface and is currently being grouted to surface.

Weekly Summary #14 (January 19 thru January 25)

The entire week has been devoted to cementing the 30 inch steel casing in the Test/Injection well. Twelve stages have been pumped and total 5988 cubic feet of cement. Each lift has been allowed to cure for 12 hours before an additional lift has been pumped above it. A temperature survey has been run after each lift followed by a manual tag with the cementing tremie.

The last tag as of this writing was at 450 feet bls. At this point, theoretical fill totalled 4023 cubic feet while actual fill is 5467 cubic feet. This calculates to 136% of theoretical volume. The top of cement is now inside the 38" casing so there should be no more loss to formation. A pressure test is scheduled over the weekend.

Weekly Summary #15 (January 26 thru February 1)

Earlier in the week, the last cement lift (#13) was pumped around the 30 inch casing to complete the cement program for that string. Cement volumes pumped for the 30" casing were 28% over calculated theoretical fill and totaled 6,682 cubic feet. A pressure test was conducted on this string for one hour at 105 psi.

The pilot hole of the Test/Injection Well has been drilled from 1650 feet to 1835 feet below land surface. The target depth for this interval is 2000 feet below land surface. Three cores have been retrieved from this interval:

- Core #3 (1755' to 1770'), limestone, 66% recovery
- Core #4 (1790' to 1805'), limestone, 55% recovery
- Core #5 (1835' to 1846'), limestone, 72% recovery

Lithologic descriptions of the pilot hole to 1835 feet have been included with this summary and include water quality field analysis. Fresh water has been introduced to the formation during the three coring operations. Therefore, water quality trends that are noted on the sample description sheets are not indicative of formation fluids but are much lower than actual water quality trends in this interval.

All of the cores are composed predominently of limestone and dolomitic limestone with occasional beds of dolomite, lignite and chert. The cores exhibit little visible porosity. An additional core will be taken at the base of this interval.

As you know, we intend to have an on-site TAC meeting on February 20th to obtain approval for the depth of our proposed injection string. A proposed depth of 1950 feet below land surface is written in the plan of study.

Weekly Summary #16 (February 2 thru February 8)

The pilot hole of the Test/Injection Well was drilled and logged to a depth of 2014 feet below land surface by Tuesday, February 5th. During the drilling, cores #6 and #7 were attempted with recovery from core #7. The intervals that were cored are:

- Core #6 (1893' to 1907'), no recovery, 0% recovery
- Core #7 (1908' to 1926'), biomicrite, 11% recovery

Presently the drillers are reaming the pilot hole to a depth of 1955 feet with a 28" hole opener for the final 20" injection string. This should continue through the first of the week.

To recap the site visitation by yourself and Duane Watruba on Thursday, February 7th, the cores, cuttings and geophysical logs were examined and reviewed. HydroDesigns concurred with you on a setting depth of 1955 feet below land surface for the 20" injection string. At this point, there is no need for the scheduled on-site TAC meeting because the injection string should be cemented to surface, therefore the meeting has been cancelled.

Lithologic and geophysical logs of the open hole (1650' - 2014') document the predominance of limestone. The section from 1650 feet to 1710 feet below land surface is a micritic limestone with interbeds of crystalline dolomite. The dolomite interbeds vary in thickness from 2" to 2' and possess occasional evaporite veinlets. Directly beneath this interval (1710' - 1770'), dolomite is more prevalent although it is still bedded with micritic and dolomitic limestones. This interval has a higher resistivity on the dual induction log and slightly faster transit times on the sonic log. The long-short normal also peaks in this interval.

The section from 1770 feet to 1930 feet is a limestone interval that is chalky, rather pure, foraminiferous and slightly dolomitic. This limestone contains horizontal lignite veins throughout and occasional lenses of chert. This sequence shows little activity on the geophysical logs due to its overall micritic nature. The lowermost interval (1930' - 2014') is composed of crystalline dolomites with interbeds of micritic and dolomitic limestone. This interval has faster transit times and higher resistivity on the sonic and dual induction logs, respectively.

While drilling the pilot hole to 1980 feet, the open hole would not take any of the drilling fluids but circulated all fluid pumped down the well during the drilling and coring. Even with a pump hooked up to the wellhead and pumping down the well, it would not take fluid. At a depth of 1980 feet, the well began taking water and continued taking water and losing circulation to the present depth of the well at 2014 feet below land surface.

Weekly Summary #17 (February 9 thru February 15)

The pilot hole was reamed (28" hole opener) to a depth of 1960 feet by Saturday, February 9th. Florida Geophysical performed a caliper log on the open hole and S.S.S. ran a gyroscopic survey. The caliper log shows an average hole size of 29" and no visible cavities. After concurring with TAC members by telephone, the 20" seamless steel injection casing was set at a depth of 1955 feet. As of Thursday, February 14th, cementing of the injection string has begun. Two cement lifts have brought the cement up to 1630 feet. This is inside the intermediate string so theoretical lifts will be pumped from here on out. Neat cement was pumped in the first two cement lifts for a combined total of 1104 cubic feet. Loss of cement to the formation is calculated at 34% for this interval.

Weekly Summary #18 (February 16 thru February 22)

The 20" injection casing (set at 1955') was cemented to surface by the middle of the week. Total amount of cement pumped was 5,128 cubic feet which calculates to 105% of theoretical fill. Prior to topping off the test/injection and two monitor wells with neat cement, Schlumberger ran a CBL and temperature survey on all of the wells by Monday, February 18th.

As you know, a pressure test was conducted on the injection casing (Friday, February 22nd) and witnessed by three DER representatives including yourself, Duane Watruba and Marian Fugitt. The casing was pressured up to 110 psi then bled back to 100 psi. The test lasted for one hour with a total change in pressure of one psi (from 100 psi to 101 psi). By Friday evening the drilling crew was rigged up and drilling out the cement plug.

Weekly Summary #19 (February 22 to March 1)

The drillers have reached a total depth of 2255 feet below land surface with their pilot hole (12 1/4 inch). A major cavity was encountered at approximately 2065 feet below land surface that caused the formation to take much water. An attempt was made at retrieving a core from 2101 feet to 2112 feet below land surface. There was no recovery and the driller will make another attempt at core retrieval deeper in the pilot hole. The deep and shallow monitor wells are being developed alternately with a 2 inch pump. The discharge is allowed to flow into the T/I well circulation pit. We are sampling the discharge stream for conductivity, salinity, pH, and temperature at hourly intervals. We have also had Bionomics Lab sample for a full suite of chemical parameters.

Weekly Summary #20 (March 1 thru March 7)

The pilot hole of the Test/Injection well was drilled to 2720 feet below land surface on Tuesday March 5th. Core #9 was obtained from the injection zones from a depth of 2406 feet to 2419 feet. There was 92% recovery of the core and it was composed of a dense dolomite. On March 6th a complete set of geophysical logs were made of the pilot hole. These logs will be supplied to the TAC members as they become available to us. The pilot hole is currently being reamed with a 17 1/2" hole opener. The hole will be reamed again with a 18 1/4" hole opener after completion of the current reaming (17 1/2").

Weekly Summary #21 (March 8 thru March 15)

The pilot hole of the Test/Injection well was reamed from the base of the injection casing (1955') to the base of the well (2720') with a 17 1/2" reaming bit. This was completed on Thursday morning, March 14th.

The 18 1/2" reaming operation is now in progress from the base of the injection casing to the bottom of the well. This reaming is expected to be completed tomorrow (March 18).

Weekly Summary #22 (March 15 thru March 21)

The pilot hole of the Test/Injection well was reamed from the base of the injection casing (1955') to the base of the well (2720') with a 18 1/2" reaming bit. The reaming operation finished on Saturday, March 16, 1991. This completed the drilling on all wells required for the injection well system.

Gyroscopic, caliper and temperature logs were performed on the 18 1/2" reamed hole from 1955' to 2720'. Point samples were taken at 100 foot intervals from 1970' to 2700' for laboratory analysis.

The injection well was flushed with 182,500 gallons of fresh water from the City of Cocoa in order to create a fresh water plume for the initial radioactive tracer survey and clear water for the television log. Water levels in the deep and shallow monitor wells were recorded hourly for 48 hours prior to the injection of the fresh water to determine background fluctuations (primarily tidal). Water levels in the monitor wells were taken at 10 minute intervals during the injection of fresh water. Water levels in the monitor wells were not affected by the fresh water injection in the test/injection well.

The TV survey had good resolution through the cased interval and showed no abnormalities. The TV log of the open hole (1955' to 2720') was only visible to a depth of 2094 feet. A highly transmissive zone in this interval was accepting the injected fresh water. The interval between 2094' and 2720' was logged but the water remained murky to black and the walls of the hole were not visible.

We are currently recording water level data from the monitor wells and preparing for the first radioactive tracer survey.

Weekly Summary #23 (March 22 thru March 28)

On Friday, March 22, Schlumberger conducted the radioactive tracer survey and a temperature log. As you know, the RTS showed no apparent upward migration of the potable water that was injected into the well (March 23, 1991 correspondence to the TAC). The successful tracer survey supports our other mechanical integrity data on the test/injection well that also show no evidence of a well construction problem that may cause interaquifer migration of injected fluids. However, we will be conducting an additional RTS after injecting approximatedly 2.5 million gallons of treated effluent (as per one of the TAC's requirements for the use of treated effluent during an injection test) to further verify the mechanical integrity of the well and competence of the confining beds..

The contractor is currently mobilizing his equipment for the the injection test and should be ready . We are recording water levels in the monitor wells for background fluctuations or any affects of the previous fresh water injection.

Weekly Summary #24 (March 28 thru April 5)

The injection well has been fitted with pumps and valves in anticipation of the upcoming pump (injection) test. Pipelines have been installed between the effluent storage tanks and the injection well. The pipelines will be installed on the injection well after leak tests have been completed on the newly constructed storage tanks. The procedure for the injection test is included with this correspondence.

The contractor is currently demobilizing the drilling equipment and restoring the site. We are continuing the background measurements of water levels on the monitor wells and will start taking them at 15 minute intervals when the pressure transducers are installed in the injection well 48 hours prior to the injection test.

Weekly Summary #25 (April 5 thru April 11)

The contractor began pumping effluent to the storage tank next to the pad on Tuesday, April 9th. Their was a delay in pumping the effluent, because of logistical problems associated with the sewage treatment plant. Pumping began at 12:00 pm and the progress of filling the storage tanks is included in the daily reports. Youngquist Brothers, Inc. took advantage of the delay and removed the drilling rig from the pad. The pad is now clear of all drilling equipment. The injection test will commence next week after the storage tanks have been inspected for leaks.

We are continuing the background measurements of water levels on the monitor wells and will start taking them at 15 minute intervals when the pressure transducers are installed in the injection well 48 hours prior to the injection test.

Weekly Summary #26 (April 12 thru April 18)

The final preparations for the injection test were completed this week and the test was performed on Thursday, April 18th. We are currently measuring recovery data in all of the wells.

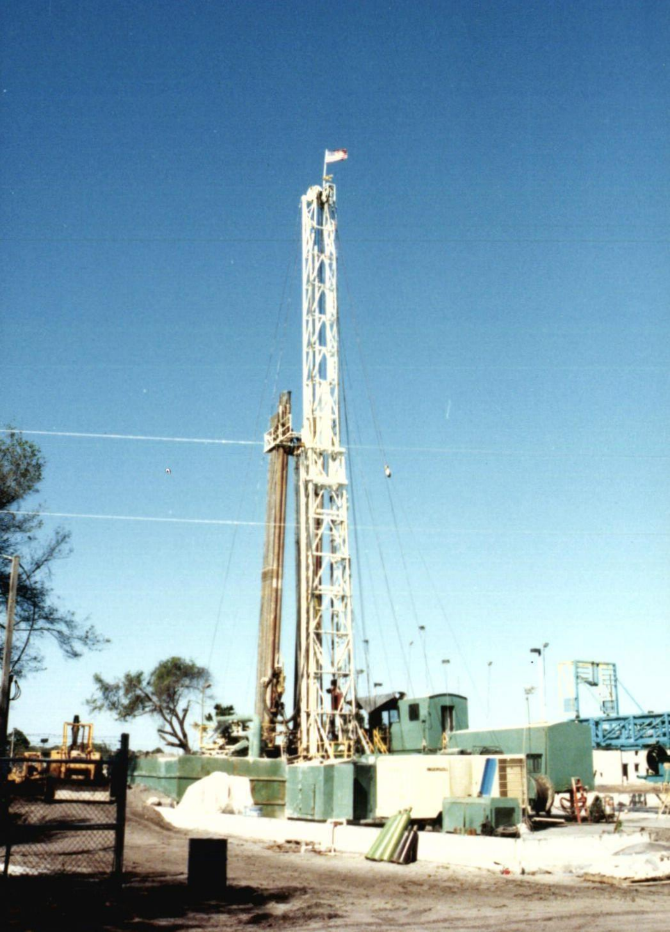
The storage tanks for the injected effluent were filled by Friday, April 12th and leak tested immediately thereafter. On Sunday, April 14th the contractor tested their pumping equipment to check for leaks and set pumping rates. The treated effluent storage facilities were topped off after the pre test of equipment.

Florida Geophysical (logger) installed a transducer in the injection well on Tuesday, April 16th. The transducer measured downhole pressure for 48 hours prior to the injection test (background), during the test and will be running for 24 hours after the test. Water levels in the monitor wells were being measured at 15 minute intervals for three days prior to the injection test and 30 minute intervals prior to this time and the first radioactive tracer survey.

The injection test was conducted on Thursday. The test lasted for nine hours and consisted of two steps. The first step lasted for eight hours and the pumpage rate varied between 3500 gpm and 4000 gpm. The second step lasted one hour at a rate of 8000 gpm. The total quantity of treated effluent pumped during the test was 2,154,000 gallons. The pumpage had no effect on the water levels in the monitor wells. The monitor wells fluctuated primarily due to tidal influences.

Water quality sampling of the surficial aquifer (water table) monitor wells was discontinued after consultation with FDER.

PHOTOGRAPHS DURING THE PRESSURE TEST OF THE INJECTION CASING

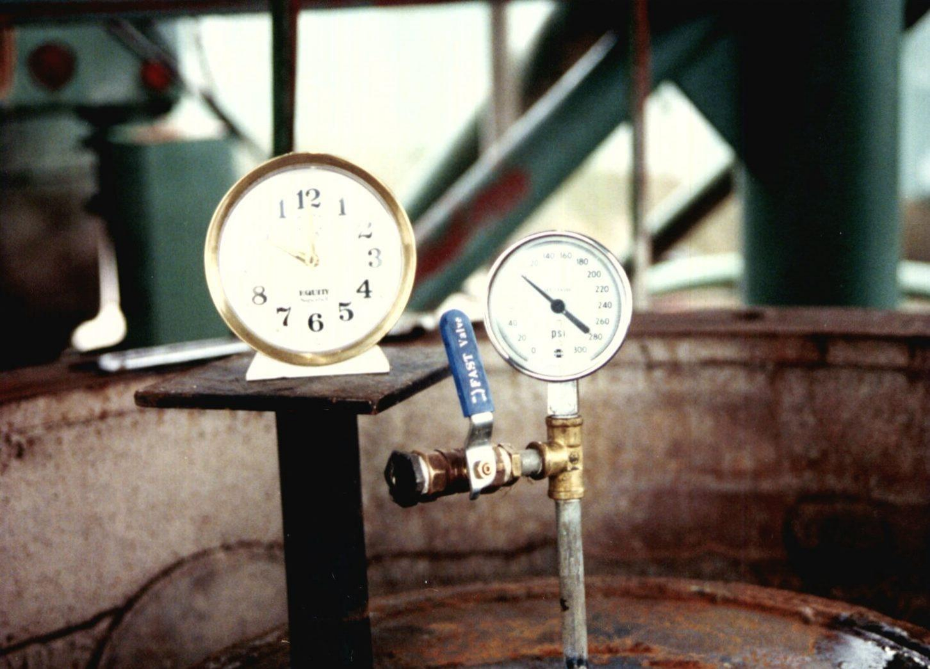



psi


FAST Valve
psi
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300


EQUITY
12 11 10 9 8 7 6 5 4 3 2
TEST GAUGE
psi
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280 300
FAST Valve


EQUITY
psi


FAST Valve
psi
0
20
40
140
160
180
200
220
240
260
280
300

DEVIATION SURVEYS

APPENDIX H

DEVIATION SURVEYS

TOTCO DISK SURVEYS

ROCKLEDGE CLASS I TEST/INJECTION WELL

TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

PILOT HOLE (12 1/4" BIT DIAMETER)

90 feet
1/4 degree
28 Nov 90

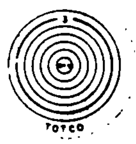
180 feet
1/4 degree
3 Dec 90

270 feet
1/8 degree
3 Dec 90

360 feet
1/4 degree
4 Dec 90

450 feet
1/8 degree
4 Dec 90

510 feet
1/4 degree
13 Dec 90

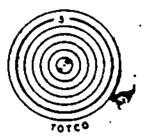


600 feet
1/4 degree
14 Dec 90

690 feet
1/8 degree
14 Dec 90

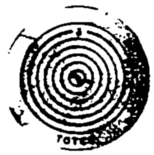
780 feet
1/4 degree
15 Dec 90

870 feet
1/4 degree
15 Dec 90



960 feet
1/8 degree
15 Dec 90

1050 feet
1/4 degree
16 Dec 90



1140 feet
1/4 degree
16 Dec 90

1230 feet
1/8 degree
17 Dec 90

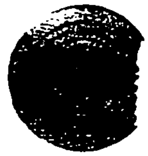
1320 feet
1/4 degree
17 Dec 90

1410 feet
1/4 degree
18 Dec 90

1500 feet
1/2 degree
19 Dec 90

1590 feet
1/8 degree
20 Dec 90

1740 feet
1/8 degree
30 Jan 91



1830 feet
1/8 degree
1 Feb 91

TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

PILOT HOLE (12 1/4" BIT DIAMETER)

1920 feet
1/4 degree
3 Feb 91

2010 feet
1/4 degree
23 Feb 91

2100 feet
1/8 degree
26 Feb 91

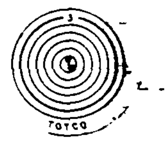
2190 feet
1/4 degree
27 Feb 91

2280 feet
1/4 degree
1 Mar 91

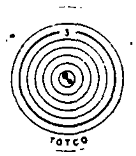
2370 feet
1/4 degree
2 Mar 91

2460 feet
1/4 degree
4 Mar 91

2550 feet
60 minutes
4 Mar 91



2640 feet
1/4 degree
5 Mar 91



TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

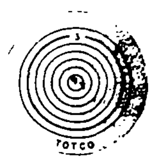
REAMED HOLE (36 1/2" HOLE OPENER DIAMETER)

540 feet
1/8 degree
28 Dec 90

630 feet
1/4 degree
29 Dec 90

720 feet
1/4 degree
30 Dec 90

810 feet
1/8 degree
31 Dec 90

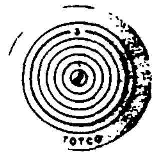


900 feet
1/4 degree
1 Jan 91

990 feet
1/8 degree
4 Jan 91

1080 feet
1/degree
5 Jan 91

1170 feet
1/4 degree
7 Jan 91

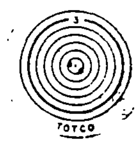


TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (36 1/2" HOLE OPENER DIAMETER)

1260 feet 1/8 degree 8 Jan 91	1350 feet 1/8 degree 11 Jan 91	1440 feet 1/4 degree 14 Jan 91	1530 feet 1/4 degree 15 Jan 91






TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (52 1/2" HOLE OPENER DIAMETER)

90 feet
1/4 degree
30 Nov 90

TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (46 1/2" HOLE OPENER DIAMETER)

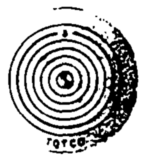
180 feet 1/4 degree 8 Dec 90	270 feet 1/4 degree 9 Dec 90	360 feet 1/4 degree 9 Dec 90



TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (28 1/2" HOLE OPENER DIAMETER)

1740 feet 1/4 degree 7 Feb 91	1830 feet 1/4 degree 8 Feb 91

TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (17 1/2" HOLE OPENER DIAMETER)

2045 feet
1/4 degree
9 Mar 91

2100 feet
1/4 degree
10 Mar 91

2225 feet
1/8 degree
11 Mar 91

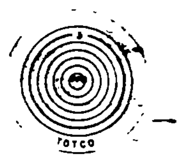
2315 feet
1/8 degree
12 Mar 91

2405 feet
1/4 degree
13 Mar 91

2495 feet
1/8 degree
13 Mar 91

2585 feet
1/4 degree
13 Mar 91

2675 feet
1/4 degree
13 Mar 91



TEST/INJECTION WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (18 1/2" HOLE OPENER DIAMETER)

2045 feet
1/4 degree
15 Mar 91

2135 feet
1/4 degree
15 Mar 91

2225 feet
1/4 degree
15 Mar 91

2315 feet
1/4 degree
15 Mar 91

2405 feet
1/4 degree
15 Mar 91

2495 feet
1/4 degree
16 Mar 91

2585 feet
1/4 degree
16 Mar 91

2675 feet
1/8 degree
16 Mar 9

DEEP FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS

PILOT HOLE (7 7/8" BIT DIAMETER)

90 feet
1/8 degree
25 Oct 90

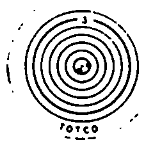
180 feet
1/4 degree
29 Oct 90

DEEP FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS

PILOT HOLE (9 5/8" BIT DIAMETER)

270 feet
1/8 degree
4 Nov 90

360 feet
1/4 degree
4 Nov 90

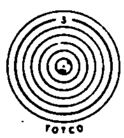


420 feet
1/4 degree
4 Nov 90

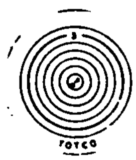
510 feet
1/4 degree
5 Nov 90

600 feet
1/4 degree
5 Nov 90

690 feet
1/4 degree
5 Nov 90



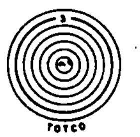
780 feet
1/4 degree
5 Nov 90



870 feet
1/4 degree
6 Nov 90

960 feet
1/4 degree
6 Nov 90

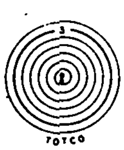
1050 feet
1/4 degree
6 Nov 90



1150 feet
1/8 degree
8 Nov 90

1240 feet
1/4 degree
8 Nov 90

1340 feet
1/4 degree
11 Nov 90



1430 feet
3/8 degree
11 Nov 90

DEEP FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (24" HOLE OPENER DIAMETER)

90 feet
1/8 degree
26 Oct 90

DEEP FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS)

REAMED HOLE (14 3/4" BIT DIAMETER)

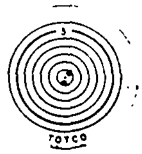
180 feet
1/8 degree
30 Oct 90

SHALLOW FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS

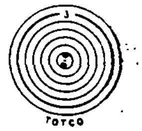
PILOT HOLE (9 5/8" BIT DIAMETER)

270 feet
1/4 degree
1 Jan 91

360 feet
1/4 degree
1 Jan 91



450 feet
1/4 degree
1 Jan 91



540 feet
1/4 degree
1 Jan 91

630 feet
1/4 degree
2 Jan 91

720 feet
1/4 degree
2 Jan 91

810 feet
1/4 degree
2 Jan 91

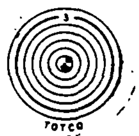
900 feet
1/4 degree
2 Jan 91

SHALLOW FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS

PILOT HOLE (7 7/8" BIT DIAMETER)

90 feet
1/8 degree
6 Dec 90

180 feet
1/4 degree
11 Dec 90



SHALLOW FLORIDAN MONITOR WELL - "TOTCO" DISK DEVIATION RECORDS

REAMED HOLE (24" HOLE OPENER DIAMETER)

90 feet
1/8 degree
6 Dec 90

DEVIATION SURVEYS

GYROSCOPIC DIRECTIONAL SURVEYS

SSS DATA ***************1-713-580-0762

YOUNGQUIST BROTHERS
ROCKLEDGE

INJECTION WELL PILOT HOLE
YOUNGQUIST RIG 1
K.B.E.=10 FT

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
0	0.00	0.00	* 0.00 *	0.00 N	0.00 E	0.0
30	30.00	.25	S 1.00 E	.07 S	.00 E	.8
60	60.00	.25	S 39.00 W	.19 S	.04 W	.6
90	90.00	.25	S 6.00 E	.31 S	.08 W	.7
120	120.00	.25	S 24.00 W	.44 S	.10 W	.4
150	150.00	.50	S 17.00 E	.63 S	.11 W	1.2
180	180.00	.50	S 13.00 W	.89 S	.10 W	.9
210	210.00	.50	S 27.00 W	1.13 S	.19 W	.4
240	240.00	.25	S 7.00 W	1.32 S	.25 W	.9
270	269.99	.50	S 2.00 W	1.52 S	.26 W	.8
300	299.99	.50	S 14.00 E	1.77 S	.23 W	.5
330	329.99	.25	S 12.00 E	1.97 S	.19 W	.8
360	359.99	.50	S 2.00 E	2.16 S	.17 W	.9
390	389.99	.25	S 17.00 E	2.35 S	.13 W	.9
420	419.99	.25	S 5.00 W	2.48 S	.12 W	.3
450	449.99	.25	S 19.00 W	2.61 S	.15 W	.2

CLOSURE IS 2.62 FEET AT S 3.23 W

SSS DATA ***************1-713-580-0762

YOUNGQUIST BROTHERS — INJECTION WELL REEMED HOLE
ROCKLEDGE — YOUNGQUIST RIG 1
K.B.E.=10 FEET

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
0	0.00	0.00	* 0.00 *	0.00 N	0.00 E	0.0
30	30.00	.25	S 2.00 W	.07 S	.00 W	.8
60	60.00	.25	S 55.00 W	.18 S	.06 W	.8
90	90.00	.25	S 0.00 W	.29 S	.12 W	.8
120	120.00	.50	S 30.00 W	.48 S	.17 W	1.1
150	150.00	.25	S 16.00 E	.67 S	.19 W	1.3
180	180.00	.25	S 20.00 W	.79 S	.20 W	.5
210	210.00	.50	S 32.00 W	.97 S	.28 W	.9
240	240.00	.50	S 9.00 W	1.21 S	.38 W	.7
270	270.00	.25	S 12.00 W	1.41 S	.41 W	.8
300	299.99	.25	S 20.00 E	1.54 S	.40 W	.5
330	329.99	.25	S 24.00 E	1.66 S	.35 W	.1
360	359.99	.25	S 14.00 W	1.78 S	.34 W	.6
390	389.99	.25	S 22.00 E	1.91 S	.33 W	.5
420	419.99	.25	S 14.00 W	2.04 S	.32 W	.5
450	449.99	.50	S 40.00 W	2.22 S	.41 W	1.0

CLOSURE IS 2.25 FEET AT S 10.55 W

YOUNGQUIST BROTHERS — INJECTION WELL PILOT HOLE
ROCKLEDGE — YOUNGQUIST RIG 1
K.B.E.=10 FEET

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	TOTAL-COORDINATES E/W COOR	DOG LEG
TIED-IN TO SiiDATADRIL SURVEY AT 450 FT						
450	449.99	.25	S 19.00 W	2.61 S	.15 W	0.0
480	479.99	.25	N 70.00 W	2.66 S	.26 W	1.3
510	509.99	.25	N 5.00 W	2.56 S	.33 W	.9
540	539.99	.25	N 40.00 E	2.44 S	.29 W	.7
570	569.99	.25	N 38.00 E	2.34 S	.21 W	.0
600	599.99	.50	N 48.00 E	2.20 S	.08 W	.9
630	629.99	.50	N 80.00 E	2.08 S	.16 E	.9
660	659.99	.50	S 50.00 E	2.15 S	.40 E	1.5
690	689.98	.50	S 63.00 E	2.29 S	.62 E	.4
720	719.98	.50	S 2.00 W	2.51 S	.74 E	1.9
750	749.98	.50	S 45.00 W	2.74 S	.64 E	1.3
780	779.98	.25	S 54.00 W	2.87 S	.49 E	.9
810	809.98	.25	N 80.00 W	2.90 S	.37 E	.7
840	839.98	.25	N 14.00 W	2.81 S	.28 E	1.0
870	869.98	.25	N 10.00 E	2.68 S	.27 E	.3
900	899.98	.25	N 20.00 E	2.56 S	.31 E	.1
930	929.98	.50	N 50.00 E	2.40 S	.42 E	1.1
960	959.98	.25	N 73.00 E	2.30 S	.59 E	1.0
990	989.98	.25	S 90.00 E	2.28 S	.72 E	.2
1020	1019.98	.25	S 30.00 E	2.35 S	.83 E	.9
1050	1049.98	.50	S 17.00 W	2.54 S	.85 E	1.3
1080	1079.98	.50	S 20.00 W	2.78 S	.77 E	.1
1110	1109.98	.50	S 32.00 W	3.02 S	.65 E	.3
1140	1139.97	.50	S 73.00 W	3.18 S	.45 E	1.2
1170	1169.97	.50	S 18.00 E	3.38 S	.34 E	2.6
1200	1199.97	.50	S 38.00 E	3.61 S	.46 E	.6
1230	1229.97	.25	N 40.00 E	3.62 S	.63 E	2.4
1260	1259.97	.25	N 0.00 W	3.50 S	.68 E	.6
1290	1289.97	.25	N 63.00 W	3.39 S	.61 E	.9
1320	1319.97	.25	N 62.00 W	3.33 S	.50 E	.0
1350	1349.97	.25	N 58.00 W	3.26 S	.38 E	.1
1380	1379.97	.25	N 2.00 W	3.16 S	.32 E	.8
1410	1409.97	.25	N 10.00 W	3.03 S	.31 E	.1
1440	1439.97	.25	N 55.00 W	2.92 S	.24 E	.7
1470	1469.97	.25	N 40.00 W	2.83 S	.14 E	.2
1500	1499.97	.25	N 10.00 W	2.71 S	.09 E	.4
1530	1529.97	.50	N 50.00 W	2.55 S	.01 W	1.2
1560	1559.97	.50	S 50.00 W	2.55 S	.25 W	2.3
1590	1589.97	.50	S 70.00 W	2.68 S	.48 W	.6

SSS DATA ***************1-713-580-0762

YOUNGQUIST BROTHERS INJECTION WELL PILOT HOLE
ROCKLEDGE YOUNGQUIST RIG 1
K.B.E.=10 FEET

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
1620	1619.97	.50	N 80.00 W	2.70 S	.73 W	.9

CLOSURE IS 2.80 FEET AT S 15.22 W

YOUNGQUIST BROTHERS
ROCKLEDGE

INJECTION WELL REEMED HOLE
YOUNGQUIST BROTHERS RIG 1
K.B.E.=9 FEET

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
TIED-IN TO SUPERIOR SURVEY SYSTEMS SURVEY AT 450 FT						
450	449.99	.50	S 40.00 W	2.22 S	.41 W	0.0
480	479.99	.25	N 62.00 W	2.25 S	.59 W	1.9
510	509.99	.25	N 15.00 E	2.14 S	.64 W	1.1
540	539.99	.25	N 73.00 E	2.05 S	.55 W	.8
570	569.99	.25	N 52.00 E	1.99 S	.43 W	.3
600	599.99	.50	N 22.00 E	1.84 S	.32 W	1.1
630	629.99	.50	N 61.00 E	1.65 S	.15 W	1.1
660	659.99	.25	S 10.00 E	1.72 S	.00 E	.5
690	689.99	.25	S 4.00 E	1.85 S	.02 E	.1
720	719.99	.50	S 10.00 E	2.04 S	.04 E	.8
750	749.98	.50	S 19.00 W	2.30 S	.02 E	.8
780	779.98	.25	S 83.00 W	2.42 S	.12 W	1.6
810	809.98	.25	S 85.00 W	2.43 S	.25 W	.0
840	839.98	.25	N 10.00 E	2.35 S	.33 W	1.5
870	869.98	.25	N 28.00 E	2.23 S	.28 W	.3
900	899.98	.25	N 52.00 E	2.13 S	.20 W	.3
930	929.98	.50	N 12.00 E	1.96 S	.10 W	1.2
960	959.98	.25	N 22.00 E	1.77 S	.04 W	.9
990	989.98	.25	N 18.00 E	1.65 S	.00 E	.1
1020	1019.98	.25	S 50.00 E	1.62 S	.11 E	1.6
1050	1049.98	.50	S 0.00 W	1.79 S	.19 E	1.4
1080	1079.98	.25	S 5.00 E	1.99 S	.20 E	.8
1110	1109.98	.25	S 8.00 E	2.12 S	.21 E	.0
1140	1139.98	.25	S 56.00 W	2.23 S	.16 E	.9
1170	1169.98	.50	S 6.00 W	2.40 S	.06 E	1.4
1200	1199.98	.50	S 40.00 E	2.64 S	.14 E	1.3
1230	1229.98	.25	N 45.00 E	2.65 S	.31 E	.2
1260	1259.98	.25	N 15.00 E	2.54 S	.38 E	.4
1290	1289.98	.25	N 70.00 W	2.43 S	.32 E	1.2
1320	1319.97	.50	N 50.00 W	2.33 S	.15 E	.9
1350	1349.97	.50	N 38.00 W	2.14 S	.03 W	.3
1380	1379.97	.50	N 12.00 W	1.91 S	.14 W	.8
1410	1409.97	.25	N 16.00 E	1.71 S	.13 W	1.0
1440	1439.97	.25	N 45.00 W	1.59 S	.16 W	.9
1470	1469.97	.25	N 36.00 W	1.49 S	.25 W	.1
1500	1499.97	.25	N 19.00 W	1.38 S	.31 W	.2
1530	1529.97	.50	N 41.00 W	1.21 S	.40 W	1.0
1560	1559.97	.50	S 18.00 W	1.25 S	.62 W	.5
1590	1589.97	.25	S 43.00 W	1.42 S	.71 W	1.0

SSS DATA ***************1-512-851-0715

YOUNGQUIST BROTHERS INJECTION WELL REEMED HOLE
ROCKLEDGE YOUNGQUIST BROTHERS RIG 1
DECL= K.B.E.=9 FEET
RADIUS OF CURVATURE CALCULATION PROPOSED DIRECTION=

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
1620	1619.97	.50	N 63.00 W	1.45 S	.89 W	1.8

CLOSURE IS 1.71 FEET AT S 31.64 W

SSS DATA ***************1-512-851-0715

YOUNGQUIST BROTHERS INJECTION WELL REEMED HOLE
ROCKLEDGE YOUNGQUIST RIG 1
K.B.E.=10 FEET
RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
TIED-IN TO SUPERIOR SURVEY SYSTEMS SURVEY AT 1620 FT						
1620	1619.97	.50	N 63.00 W	1.45 S	.89 W	0.0
1650	1649.97	.25	N 31.00 W	1.32 S	1.03 W	1.1
1680	1679.97	.25	N 55.00 E	1.20 S	1.01 W	1.3
1710	1709.97	.25	N 55.00 E	1.13 S	.90 W	.0
1740	1739.97	.25	S 15.00 W	1.18 S	.82 W	2.0
1770	1769.97	.50	N 40.00 E	1.25 S	.69 W	3.5
1800	1799.97	.50	N 49.00 E	1.06 S	.51 W	.3
1830	1829.97	.25	S 40.00 E	1.08 S	.33 W	2.2
1860	1859.97	.25	N 26.00 E	1.06 S	.22 W	1.7
1890	1889.97	.25	S 20.00 E	1.07 S	.12 W	1.9
1920	1919.97	.25	S 3.00 W	1.20 S	.10 W	.3
1950	1949.96	.25	S 50.00 E	1.31 S	.05 W	.8
1980	1979.96	.25	S 31.00 E	1.41 S	.03 E	.3
2010	2009.96	.25	S 80.00 E	1.48 S	.14 E	.7

CLOSURE IS 1.49 FEET AT S 5.34 E

SSS DATA **************1-512-851-0715

YOUNGQUIST BROTHERS
ROCKLEDGE

INJECTION WELL REEMED HOLE
YOUNGQUIST RIG 1
K.B.E.=10 FEET

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
TIED-IN TO SUPERIOR SURVEY SYSTEMS SURVEY AT 1620 FT						
1620	1619.97	.50	N 63.00 W	1.45 S	.89 W	0.0
1650	1649.97	.25	N 31.00 W	1.32 S	1.03 W	1.1
1680	1679.97	.25	N 55.00 E	1.20 S	1.01 W	1.3
1710	1709.97	.25	N 55.00 E	1.13 S	.90 W	.0
1740	1739.97	.25	S 15.00 W	1.18 S	.82 W	2.0
1770	1769.97	.50	N 40.00 E	1.25 S	.69 W	3.5
1800	1799.97	.50	N 49.00 E	1.06 S	.51 W	.3
1830	1829.97	.25	S 40.00 E	1.08 S	.33 W	2.2
1860	1859.97	.25	N 26.00 E	1.06 S	.22 W	1.7
1890	1889.97	.25	S 20.00 E	1.07 S	.12 W	1.9
1920	1919.97	.25	S 3.00 W	1.20 S	.10 W	.3
1950	1949.96	.25	S 50.00 E	1.31 S	.05 W	.8
1980	1979.96	.25	S 31.00 E	1.41 S	.03 E	.3
2010	2009.96	.25	S 80.00 E	1.48 S	.14 E	.7

CLOSURE IS 1.49 FEET AT S 5.34 E

SSS DATA **************1-512-851-0715

YOUNGQUIST BROTHERS INJECTION WELL PILOT HOLE
ROCKLEDGE YOUNGQUIST RIG 1
K.B.E.=10 FEET
RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
TIED-IN TO SUPERIOR SURVEY SYSTEMS SURVEY AT 2010 FT						
2010	2009.96	.25	S 45.00 E	3.29 S	.18 W	0.0
2040	2039.96	.50	S 75.00 E	3.39 S	.01 W	1.1
2070	2069.96	.50	S 0.00 W	3.58 S	.14 E	2.2
2100	2099.96	.75	S 78.00 W	3.82 S	.05 W	3.0
2130	2129.95	.75	S 50.00 W	3.99 S	.40 W	1.2
2160	2159.95	.75	S 45.00 W	4.25 S	.69 W	.2
2190	2189.95	.75	S 60.00 W	4.49 S	1.00 W	.7
2220	2219.95	.50	S 50.00 W	4.68 S	1.27 W	.9
2250	2249.95	.75	S 35.00 W	4.92 S	1.49 W	1.0
2280	2279.94	.75	S 32.00 W	5.24 S	1.71 W	.1
2310	2309.94	.75	S 30.00 W	5.58 S	1.91 W	.1
2340	2339.94	.75	S 40.00 W	5.90 S	2.14 W	.4
2400	2399.93	.50	S 76.00 W	6.24 S	2.68 W	.8
2430	2429.93	.75	N 90.00 W	6.28 S	3.01 W	1.0
2460	2459.93	.50	N 25.00 W	6.12 S	3.27 W	2.5
2490	2489.93	.50	N 40.00 W	5.90 S	3.41 W	.4
2520	2519.93	.50	N 30.00 W	5.68 S	3.56 W	.3
2550	2549.93	.25	N 15.00 W	5.50 S	3.63 W	.9
2580	2579.93	.50	N 5.00 W	5.31 S	3.67 W	.9
2610	2609.93	.50	N 10.00 W	5.05 S	3.70 W	.1
2640	2639.92	.50	N 0.00 W	4.79 S	3.72 W	.3
2670	2669.92	.50	N 35.00 W	4.54 S	3.80 W	1.0
2700	2699.92	.50	N 10.00 W	4.30 S	3.90 W	.7
	CLOSURE IS		5.81 FEET AT S 42.19 W			
PROJECTED SURVEY AT 2720 FT						
2720	2719.92	.50	N 10.00 W	4.13 S	3.93 W	.0
	CLOSURE IS		5.70 FEET AT S 43.57 W			

SSS DATA ****************1-512-880-5079

YOUNGQUIST BROTHERS WW INJECTION REEMED
ROCKLEDGE YOUNGQUIST BROTHERS RIG 1
K.B.E.=10 FEET
RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
TIED-IN TO SUPERIOR SURVEY SYSTEMS SURVEY AT 2010 FT						
2010	2009.96	.25	S 80.00 E	1.48 S	.14 E	0.0
2040	2039.96	.50	S 40.00 W	1.63 S	.20 E	2.7
2070	2069.96	.50	S 60.00 W	1.80 S	.00 W	.6
2100	2099.96	.75	S 51.00 W	1.99 S	.27 W	.9
2130	2129.95	.50	S 52.00 W	2.19 S	.53 W	.8
2160	2159.95	.50	S 60.00 W	2.34 S	.75 W	.2
2190	2189.95	.50	S 45.00 W	2.49 S	.95 W	.4
2220	2219.95	.75	S 55.00 W	2.70 S	1.20 W	.9
2250	2249.95	.75	S 60.00 W	2.92 S	1.53 W	.2
2280	2279.95	.50	N 10.00 W	2.80 S	1.79 W	.1
2310	2309.94	.50	N 11.00 W	2.54 S	1.84 W	.0
2340	2339.94	.50	N 60.00 W	2.33 S	1.98 W	1.4
2370	2369.94	.25	N 30.00 W	2.20 S	2.12 W	1.1
2400	2399.94	.25	N 15.00 W	2.08 S	2.17 W	.2
2430	2429.94	.25	N 1.00 E	1.95 S	2.19 W	.2
2460	2459.94	.25	S 90.00 E	1.86 S	2.10 W	1.3
2490	2489.94	.50	S 0.00 W	1.99 S	1.98 W	2.1
2520	2519.94	.50	S 10.00 E	2.25 S	1.95 W	.3
2550	2549.94	.50	S 15.00 E	2.50 S	1.90 W	.1
2580	2579.94	.50	S 10.00 E	2.76 S	1.84 W	.1
2610	2609.94	.75	S 5.00 W	3.09 S	1.83 W	1.0
2640	2639.93	.75	S 40.00 W	3.44 S	1.97 W	1.5
2670	2669.93	.50	S 35.00 W	3.70 S	2.17 W	.9
2700	2699.93	.50	S 10.00 E	3.95 S	2.23 W	1.3

CLOSURE IS 4.54 FEET AT S 29.43 W

PROJECTED SURVEY AT 2720 FT

2720	2719.93	.50	S 10.00 E	4.12 S	2.20 W	.0

CLOSURE IS 4.67 FEET AT S 28.07 W

SURVEY WELLSITE COMPUTATION

SSS DATA **************713-580-0762

YOUNGQUIST BROTHERS — WASTE WATER DEEP MON.
ROCKLEDGE FLA — YOUNGQUIST RIG 1
K.B.E.=10

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	VERTICAL SECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
0	0.00	0.00	* 0.00 *	0.00	0.00 N	0.00 E	0.0
30	30.00	.25	S 60.00 W	-.03	.03 S	.06 W	.8
60	60.00	.50	S 55.00 W	-.14	.14 S	.22 W	.8
90	90.00	.50	S 15.00 W	-.35	.35 S	.37 W	1.2
120	120.00	.50	S 43.00 E	-.59	.59 S	.31 W	1.7
150	150.00	.50	S 22.00 E	-.81	.81 S	.17 W	.6
180	180.00	.25	S 11.00 E	-1.00	1.00 S	.11 W	.9
210	209.99	.50	S 37.00 W	-1.18	1.18 S	.16 W	1.3
240	239.99	.50	S 45.00 E	-1.42	1.42 S	.14 W	2.4
270	269.99	.50	S 17.00 W	-1.67	1.67 S	.08 W	1.8
300	299.99	.50	S 11.00 E	-1.93	1.93 S	.09 W	.8
330	329.99	.25	S 5.00 E	-2.12	2.12 S	.07 W	.8
360	359.99	.25	S 1.00 E	-2.25	2.25 S	.06 W	.1
390	389.99	.50	S 20.00 E	-2.44	2.44 S	.02 W	.9
420	419.99	.50	S 19.00 E	-2.69	2.69 S	.06 E	.0
460	459.99	.50	S 10.00 E	-3.03	3.03 S	.15 E	.2
480	479.99	.50	S 0.00 W	-3.20	3.20 S	.17 E	.4
510	509.98	.50	S 5.00 W	-3.46	3.46 S	.16 E	.1
540	539.98	.50	S 7.00 W	-3.72	3.72 S	.13 E	.1
570	569.98	.50	S 9.00 E	-3.98	3.98 S	.13 E	.5
600	599.98	.25	S 19.00 E	-4.17	4.17 S	.18 E	.9
630	629.98	.25	S 21.00 W	-4.30	4.30 S	.18 E	.6
660	659.98	.25	S 12.00 E	-4.43	4.43 S	.17 E	.5
690	689.98	.25	S 8.00 E	-4.56	4.56 S	.19 E	.1
720	719.98	.25	S 28.00 E	-4.68	4.68 S	.23 E	.3
750	749.98	.50	S 42.00 E	-4.84	4.84 S	.34 E	.9
780	779.98	.50	S 47.00 E	-5.03	5.03 S	.53 E	.1
810	809.98	.50	S 53.00 E	-5.20	5.20 S	.73 E	.2
840	839.98	.50	S 34.00 E	-5.39	5.39 S	.91 E	.6
870	869.98	.50	S 44.00 E	-5.59	5.59 S	1.07 E	.3
900	899.97	.50	S 34.00 E	-5.79	5.79 S	1.24 E	.3
930	929.97	.50	S 55.00 E	-5.98	5.98 S	1.42 E	.6
960	959.97	.50	S 78.00 E	-6.08	6.08 S	1.66 E	.7
990	989.97	.50	N 78.00 E	-6.08	6.08 S	1.92 E	.7
1020	1019.97	.50	S 65.00 E	-6.11	6.11 S	2.17 E	1.1
1050	1049.97	.25	S 35.00 E	-6.24	6.24 S	2.32 E	1.1
1080	1079.97	.25	S 45.00 E	-6.34	6.34 S	2.40 E	.1
1110	1109.97	.25	S 48.00 E	-6.43	6.43 S	2.50 E	.0
1140	1139.97	.50	S 36.00 E	-6.57	6.57 S	2.63 E	.9
1170	1169.97	.50	S 24.00 E	-6.80	6.80 S	2.76 E	.3

SSS DATA ***************713-580-0762

YOUNGQUIST BROTHERS WASTE WATER DEEP MON.
ROCKLEDGE FLA YOUNGQUIST RIG 1
K.B.E.=10

RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	VERTICAL SECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
1200	1199.97	.50	S 46.00 E	-7.01	7.01 S	2.91 E	.6
1230	1229.96	.50	S 43.00 E	-7.20	7.20 S	3.09 E	.1
1260	1259.96	.50	S 46.00 E	-7.39	7.39 S	3.28 E	.1
1290	1289.96	.75	S 38.00 E	-7.63	7.63 S	3.50 E	.9
1320	1319.96	.75	S 59.00 E	-7.89	7.89 S	3.79 E	.9
1350	1349.96	.50	S 41.00 E	-8.10	8.10 S	4.04 E	1.1
1380	1379.96	.50	S 39.00 E	-8.30	8.30 S	4.21 E	.1
1410	1409.95	.50	S 46.00 E	-8.49	8.49 S	4.38 E	.2
1440	1439.95	.75	S 47.00 E	-8.72	8.72 S	4.62 E	.8
1470	1469.95	.50	S 43.00 E	-8.95	8.95 S	4.85 E	.8

CLOSURE IS 10.18 FEET AT S 28.47 E

PROJECTED SURVEY AT 1503 FT

1503	1502.95	.50	S 43.00 E	-9.16	9.16 S	5.05 E	.0

CLOSURE IS 10.46 FEET AT S 28.87 E

SSS DATA ****************1-713-580-0762

YOUNGQUIST BROTHERS   WASTE WATER SHALLOW MON
ROCKLEDGE   YOUNGQUIST BROTHERS RIG 2
K.B.E.=9 FEET
RADIUS OF CURVATURE CALCULATION

MEASURED DEPTH	VERTICAL DEPTH	DRIFT ANGLE	DRIFT DIRECTION	TOTAL-COORDINATES N/S COOR	E/W COOR	DOG LEG
0	0.00	0.00	* 0.00 *	0.00 N	0.00 E	0.0
30	30.00	.50	S 75.00 E	.03 S	.13 E	1.7
60	60.00	.50	S 55.00 E	.14 S	.36 E	.6
90	90.00	.75	S 13.00 W	.43 S	.47 E	.6
120	119.99	.50	S 20.00 E	.75 S	.49 E	1.5
150	149.99	.50	S 70.00 E	.93 S	.67 E	1.5
180	179.99	.50	S 24.00 E	1.11 S	.86 E	1.3
210	209.99	.50	S 33.00 E	1.34 S	.98 E	.3
240	239.99	.50	S 17.00 E	1.57 S	1.09 E	.5
270	269.99	.50	S 12.00 W	1.83 S	1.10 E	.8
300	299.99	.75	S 25.00 W	2.14 S	1.00 E	1.0
330	329.98	.75	S 0.00 W	2.52 S	.92 E	1.1
360	359.98	.50	S 42.00 E	2.82 S	1.03 E	1.7
390	389.98	.50	S 42.00 E	3.02 S	1.21 E	.0
420	419.98	.75	S 54.00 E	3.23 S	1.45 E	.9
450	449.98	.50	S 40.00 E	3.46 S	1.69 E	1.0
480	479.98	.50	S 62.00 E	3.62 S	1.89 E	.6
510	509.98	.50	S 60.00 E	3.75 S	2.12 E	.1
540	539.97	.75	S 50.00 E	3.93 S	2.39 E	.9
570	569.97	.50	S 22.00 E	4.20 S	2.58 E	1.3
600	599.97	.50	S 8.00 E	4.45 S	2.65 E	.4
630	629.97	.50	S 10.00 W	4.71 S	2.64 E	.5
660	659.97	.50	S 3.00 E	4.97 S	2.62 E	.4
690	689.97	.50	S 14.00 W	5.23 S	2.60 E	.5
720	719.97	.75	S 17.00 W	5.55 S	2.51 E	.8
750	749.96	.50	S 35.00 E	5.86 S	2.56 E	.1
780	779.96	.50	S 43.00 E	6.06 S	2.73 E	.2
810	809.96	.75	S 20.00 E	6.34 S	2.90 E	1.2
840	839.96	.50	S 22.00 E	6.64 S	3.01 E	.8
870	869.96	.50	S 43.00 E	6.86 S	3.15 E	.6
900	899.96	.50	S 20.00 E	7.08 S	3.29 E	.7

CLOSURE IS 7.81 FEET AT S 24.90 E

PROJECTED SURVEY AT 920 FT

920	919.96	.50	S 20.00 E	7.25 S	3.35 E	.0

CLOSURE IS 7.99 FEET AT S 24.80 E