PSLWPT-IW1 PSLWPT - MW1

Operational Testing Request

Westport Class I Injection-Well System Construction Program City of Port St. Lucie, Florida Permit No. 188679-001-UC

189146-001-UC

PREPARED FOR

City of Port St. Lucie



Infrastructure, buildings, environment, communications

OPERATIONAL TESTING REQUEST CITY OF PORT ST. LUCIE CLASS I INJECTION WELL SYSTEM

WESTPORT INJECTION WELL SYSTEM PORT ST. LUCIE, FLORIDA

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Operational Testing Request

Westport Class I Injection-Well System Construction Program City of Port St. Lucie, Florida Permit No. 189145-001-UC

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Our Ref.: RF001121.0001

Date: August 2003 ARCADIS Table of Contents

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- E Injection Well System Sampling and Monitoring Plan and Plugging and Abandonment Plan
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Background

In compliance with specific condition 6.c. of the Florida Department of Environmental Protection (FDEP), Underground Injection Control (UIC) Permit No. 189145-001-UC, this is a request, made on behalf of the City of Port St. Lucie to conduct operational testing at the Class I Westport injection well system in Port St. Lucie, Florida. The Class I injection well (Injection Well No. 1 [IW1]) and associated Floridan aquifer, dual-zone monitor well (Deep Monitor Well No. 1 [MW1]) are located in Section 20, Township 37 South, Range 40 East at the Westport Wastewater Treatment Plant (WWTP) in the City of Port St. Lucie, St. Lucie County, Florida. A site map is included as Figure 1.

Injection Well IW1 has been designed and constructed as a tubing-and packer injection well with a fluid-filled annulus monitoring system, with the capacity to accept up to 12 million gallons per day (mgd) of injectate. The well has been permitted to accept secondarily-treated domestic wastewater from the Westport WWTP facility.

Submittal Requirements and References

The information required by the UIC Permit is contained in the individual sections of this request in the order listed within the UIC Permit; previously submitted data are referenced by the report or applicable correspondence in which the data were provided. This document has been sent to the UIC Section of the Southeast District office of the FDEP and to the UIC-Technical Advisory Committee (TAC) members for review and comment. A distribution list and an Owner's Certification are attached to this document.

If questions or comments arise which do not significantly alter the proposed injection procedures or the UIC permit conditions, or lessen the impact of the UIC permit, the permittee would appreciate the opportunity to immediately provide any required supplemental data upon request without a formal FDEP Request for Additional Information.

Primary Disposal Method

The City intends to expand the Westport WWTP; the WWTP ultimately will have a domestic effluent volume of 12 mgd to be disposed by deep well (Class I) injection as the primary disposal method. Initially, through the end of 2008, the average daily effluent flow to be disposed using the proposed injection well system will be 3.19 mgd.

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Well Completion Certifications and Hydro-Stratigraphic Sections

The UIC Permit requires a certification of completion of well construction and well construction drawings. In addition, drawings shall include a geologic, stratigraphic cross section depicting the corresponding formations, the base of the USDW (at 1,790 feet below pad level [bpl]), and the boundaries of the confining and injection zone intervals. The following required items are included as Figures and in Appendix A as follows.

Figure 2 - Injection Well IW1 Construction Detail

Figure 3 - Deep Monitor Well MW1 Construction Detail

Figure 4 - North-South Hydro-Stratigraphic Cross Section

Figure 5 - West-East Hydro-Stratigraphic Cross Section

Figure 6 - Injection Well Diagram with Geologic and Hydrogeologic Columns

Figure 7 - Deep Monitor Well Diagram with Geologic and Hydrogeologic Columns

Appendix A: Certification of Well Completion for Injection Well No. 1 (IW1)

Certification of Well Completion for Dual-Zone

Deep Monitor Well No. 1 (MW1) on DEP Form 62-529.900 (10).

Signed and sealed well drawings for IW1 and MW1 are included as Figures 2 and 3, respectively. Hydro-stratigraphic cross sections are presented as Figures 4 and 5. Well construction diagrams with geologic and hydrogeologic columns are presented for IW1 and MW1 as Figures 6 and 7. A graphical summary of the relationships between the geologic and hydrogeologic units illustrated on Figures 6 and 7 is presented below. Note that, based on the most current data and findings, some of the contact depths have been revised from those presented in the (May 20, 2003) ARCADIS report entitled "Request for Final Casing-SettingDepth Approval".

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Formation/Group	Geologic Age	Hydrogeologic Unit	
Undifferentiated Sediments (0-100 feet bpl)	Pliocene and Pleistocene (0-100 feet bpl)	Surficial Aquifer (0-100 feet bpl)	
Hawthorn Group (100-750 feet bpl)	Miocene (100-750 feet bpl)	Intermediate Confining Unit (100-750 feet bpl)	
Undifferentiated Suwannee Limestone and Ocala Group (750-1260 feet bpl)	Oligocene to Upper Eocene (750-1260 feet bpl)	Upper Floridan Aquifer	
Avon Park Formation (1260–2520 feet bpl)	Upper to Middle Eocene (1260-2520 feet bpl)	(750-2030 feet bpl) Middle and Lower Floridan	
Oldsmar Formation (2520->3450 feet bpl)	Lower Eocene (2520->3450 feet bpl)	Confining Units (2030-2900 feet bpl) Injection Zone (2900-3350 feet bpl)	

The depths of formation and hydrogeologic units are approximate. The Lake City Limestone is not uniformly recognized as a distinct formation (Miller, 1986), and has been incorporated here into the Avon Park (Limestone) Formation.

Injection Well Construction and Casing Depths

Construction and testing details for the Westport IW1 construction and testing were reported in the weekly Construction Progress Reports #9 through #32 (ARCADIS correspondence) and in reports for intermediate- and final-casing setting depth and injection-test requests. Depths of casings referenced below and on the well detail illustrations have be adjusted from drilling pad level during construction (approximately +16.7 feet, referenced to North American Vertical Datum [NAVD] 1988) to the proposed finished grade of the concrete containment pad at the well locations (+19.20 feet at IW1 and +19.10 feet at MW1). Depths are referenced from pad level, which typically serves as the point of reference for depth confirmation, not from the top of the well casing or a flange installed above grade.

The 34-inch outside-diameter, 0.375-inch wall thickness, steel intermediate casing was set and cemented in place to a depth of 1,832.5 feet bpl. The 24-inch outside-diameter, 0.500-inch wall thickness seamless steel final (injection) casing was set and cemented in place to 2,908.5 feet bpl. The final casing then was lined to 2,884.5 feet bpl (as

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measured from the proposed final pad level) with 20-inch outside-diameter, 0.438-inch wall thickness, API 5CT, seamless steel (buttress-end) tubing, which was internally coated with Permox glass-flake epoxy pipe coating (PCS-9043 Type II) manufactured by Permite. The internal tubing diameter will allow for injection of 12 mgd at a velocity of 9.3 feet per second within the tubing. The internal coating meets or exceeds SSPC-PT-16 requirements. Additional information on the tubing coating is included in Appendix B. The liner tubing was sealed using stainless-steel inner and outer packer mandrels patented by Youngquist Brothers, Inc. (YBI Positive-Seal PackerTM). The annular space was filled with a one percent solution of a commercially-available corrosion inhibitor (Baracor-100TM) and water. Mill certificates for IW final casing and the injection tubing are included in Appendix B.

Deep Monitor Well Construction and Casing Depths

MW1 construction was documented in the weekly Construction Progress Reports #1 through #11, #16 and #24 (ARCADIS correspondence). In addition, details of the construction and testing of MW1 were described in the ARCADIS report entitled "Dual-Zone Deep Monitor Well (MW-1) Monitoring Zones Recommendation" (dated January 23, 2003). As previously reported, the lower monitor zone of MW1 has a 50-foot-long, nominal 15-inch diameter open-hole section from 1,922.4 feet to 1,972.4 feet bpl, below 1,922.4 feet of 6.46-inch outside-diameter, Fiberglass Reinforced Plastic (FRP) tubing. Mill certificates for the MW1 intermediate casing and product cut sheets for the FRP tubing are included in Appendix B.

The lower monitor zone FRP tubing was set at 1,922.4 feet bpl using Halliburton-type cement baskets and cemented in place up to 1,757.4 feet bpl. The upper monitor zone is completed as an annular open-hole zone located below the 16-inch outside-diameter steel intermediate casing (installed to a depth of 1,732.4 feet bpl) and above the top of the cemented section of the lower monitor zone FRP tubing (at a depth of 1,757.4 feet bpl). After development, water samples were collected from both the upper monitor zone (1,732.4 feet to 1,757.4 feet bpl) and the lower monitor zone (1,922.4 feet to 1,972.4 feet bpl) of MW1 for analysis of Primary and Secondary Drinking Water Standards and municipal minimum-criteria parameters (Appendix A of the Technical Specifications, Reese, Macon and Associates, Inc., February 2002). The water samples were collected and analyzed by Envirodyne, Inc. (Boca Raton, Florida). The MW1 water-sample results confirm that the upper monitor zone is installed above the lowermost regional Underground Source of Drinking Water (USDW) and the lower monitor zone is installed below the lowermost regional USDW at the project site. The

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analytical laboratory report for the upper and lower zone water samples is discussed and referenced in a subsequent section of this submittal.

Results of Short-Term Injection Testing

The UIC Permit requires presentation and interpretation of the data from the short-term injection testing conducted pursuant to Rules 62 528.405(3)(a)2., F.A.C. The short-term injection test is required to be of such duration to allow for the prediction of the operating pressure.

Prior to beginning the injection test, the source water was sampled. A state-certified analytical laboratory collected a water sample from the onsite lake. Analyses of the lake-water supply for the test previously were submitted in the ARCADIS *Injection Test Request* (dated July 21, 2003) and are provided in an appendix to a subsequent section of this document. A temporary, 20-inch outside-diameter steel pipeline was constructed between the onsite lake and the intake of a pair of high-capacity, diesel-powered pumps capable of pumping water at the specified test rate (of at least 8,334 gallons per minute). A 20-inch outside-diameter steel discharge line also had been constructed from the discharge side of the pumps to the injection wellhead. Just prior to beginning the injection portion of the test, it was verified that the appropriate valves have been opened to allow injection into the well.

Pre-Test and Initial Test Conditions

The actual monitoring periods recorded for the injection test were greater than the FDEP-required total of 56 hours of monitoring data (24 hours prior to injection, 8 hours during injection and 24 hours after injection) and the additional data are included on some of the following figures for comparison of pre-injection, injection and post-injection monitoring results for IW1. The Injection Well IW1 wellhead pressure and (dual-zone) Deep Monitor Well MW1 wellhead pressures were monitored from approximately 8:23 a. m. on July 22, 2003 to 5:49 p. m. on July 24, 2003 (approximately 57.5 hours) prior to the initiation of injection into IW1. Static wellhead pressure at IW1 gradually decreased from 23.5 pounds per square inch (psi) to 22.8 psi at a relatively steady rate during pre-injection monitoring. The pre-injection monitoring data for IW1 and the MW1 monitor zones with the barometric pressure are presented on a graph of the combined background data as Figure 8. The MW1 upper monitor-zone pressure was monitored with a wellhead-mounted transducer and was relatively steady, varying from 9.69 to 9.84 psi during pre-injection monitoring. The MW1 lower monitor-zone pressure was monitored using a downhole transducer (installed into the

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lower zone tubing) and was relatively steady, varying from 4.67 to 4.82 psi during preinjection monitoring (Figure 8). The injection rate was measured using a 20-inch diameter in-line, impeller-type flowmeter. Calibration certificates for the flowmeter and pressure transducers are included in Appendix C. Injection Well IW1 and MW1 Upper Monitor Zone wellhead pressures and flow rates were collected by an ARCADIS representative during the injection period and those data are summarized in Table 1.

Monitoring data for the MW1 monitor zones during background monitoring, injection test and post-injection monitoring were graphed and are presented as Figure 9 with the barometric pressure. For this graph, the MW1 monitor zone pressures are shown with more than 33 hours of post-injection monitoring data and the required 8-hour injection period.

Injection Well Data

The injection phase of the test began when the injection pumps began to inject water from the onsite lake at approximately 5:51 p. m. on July 24, 2003 and continued until approximately 2:00 a. m. on January 25, 2003 (more than 8 hours). The average injection rate was estimated from periodic monitoring of flowmeter readings at approximately 8,880 gallons per minute (gpm).

Injection Well IW1 wellhead pressure and injection flow versus time are presented as Figure 10 with approximately 56 hours of monitoring data for comparison of preinjection, injection and post-injection monitoring results for IW1. Upon initiation of injection into IW1, the IW1 wellhead pressure increased from approximately 22.9 psi to between approximately 46 and 49 psi within 10 minutes, as the injection pump rate was adjusted to about 8,500 gpm (the flowmeter was vibrating and the flow volume and average rate were calculated from the totalizer readings).

The Contractor then collected approximately 33 hours of post-injection (recovery) pressure data until 7:51 a. m. on July 26, 2003. Barometric pressures were recorded using the onsite HermitTM data loggers during the test. The results of the injection testing were monitored by an ARCADIS representative during the injection period and during the post-injection period. Those data are presented on Table 1. The electronic data have been included on a compact disk in Appendix C.

The injection test data for the FDEP-required monitoring periods (24 hours prior to injection, the 8 hours of injection, and the 24 hours immediately after injection) are

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plotted on Figure 10. A plot with more detail of the injection-period pressure and flow rate data is presented as Figure 11. The injection test IW1 wellhead pressure and barometric pressure for the 12 hours immediately prior to injection, the 8 hours of injection, and the 12 hours immediately after injection are plotted on Figure 12.

Within an hour of the initiation of injection, the IW1 wellhead injection pressure stabilized at between 46.5 and 48 psi (as recorded by the IW1 wellhead transducer and HermitTM data logger). The average injection rate was approximately 8,880 gpm (Table 1), equivalent to an average velocity of 9.94 feet per second. Based on the flowmeter totalizer, 4,264,000 gallons were pumped during the 8-hour injection period (a rate of approximately 12.79 mgd).

Conclusions

During injection, no noticeable changes in pressure from the "background" levels were observed in the upper and lower monitor zone data (comparing Figure 8 with Figure 9), indicating that the injection of more than 12 mgd does not affect the pressures of the MW1, Floridan-aquifer monitor zones. This supports the interpretation that the monitor zones are isolated from the injection zone by one or more suitable, overlying confining intervals, per Chapter 62-528, FAC requirements.

Injection-Zone Formation Pressure

The wellhead injection pressure is the sum of the friction loss in the tubing, the static potentiometric head of the injection formation at the wellhead, the formation back-pressure in the injection zone and a fluid-density differential between the water in the injection zone and the injected fluids. Based on the static wellhead pressure a few minutes after the end of the injection period (approximately 26 psi), the average injection pressure (about 48 psi) and a calculated friction loss of approximately 17.7 psi (using a Hazen-Williams roughness factor of 140), the pressure increase in the injection zone is estimated at 4.3 psi. This injection-zone pressure is consistent with the formation back-pressure observed at several other Class I injection well systems in south Florida.

Injection-Zone Transmissivity Estimate

The transmissivity of the injection zone was approximated using a method outlined by Turcan (1963) for partially penetrating wells. Based on the estimated formation (back-) pressure increase of 4.3 psi (and assuming an injection-fluid pressure gradient of

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approximately 2.30 feet per psi), the average pumping rate of 8,880 gpm, a specific capacity of 897 gpm/foot was estimated for IW1. The Turcan method used a ratio of the "production" interval (utilized portion of the injection zone) to the aquifer thickness (open-borehole length, equal to 441 feet) which was estimated at 100 percent, and calculates a specific capacity for a fully penetrating well. Multiplying that result by 2250 (factor for classic confined aquifer) yields an estimation of the transmissivity, in this case approximately 2,018,250 gallons per day per foot. Assuming an aquifer thickness of 441 feet, the horizontal hydraulic conductivity of the injection zone can be estimated at 4,575 feet per day.

Conclusions

The collected data demonstrate that the section of the "Boulder Zone" tapped by the open hole of IW1 (from 2,909 feet to 3,350 feet bpl) is sufficiently transmissive to accept the anticipated buildout volume of 12 mgd (at a velocity of approximately 9.3 feet per second).

Final Television Survey with Interpretation

A videotape copy of the TV survey of the injection tubing and visible open hole section was previously submitted (enclosed) with the ARCADIS *Injection Test Request* letter dated July 21, 2003, and a summary of the TV survey also was provided in Appendix C of that letter report. The TV survey shows no features that may adversely impact the performance of the well. The tubing and tubing coating appear to be in very good condition.

Lithologic and Geophysical Logs with Interpretation

A summary of previously submitted geophysical logs of MW1 is included as Table 2 and a summary of previously submitted geophysical logs of IW1 is included as Table 3. Copies and interpretations of the downhole logging plots have been provided in the following documents:

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Reference No.	Document Containing Geophysical Logging Results Interpretations	Date	Well & Depth Intervals Logged	Page Numbers and/or Reference to Location of Logs
1	Dual-Zone Deep Monitor Well (MW-1) Monitoring Zones Recommendation"	1/23/03	MW1 750- 2,350 feet	Ref: pp. 2-4 Enclosed with letter report
2	Injection Well IW-1 Intermediate Casing-Seat Recommendation	3/20/03	IW1 749-1900 feet	Ref: pp. 4-6 Enclosed with letter report
3	Request for Final Casing- Setting Depth Approval Westport Class I Injection Well No. 1	5/20/03	IW1 1,830-3,189 feet & 3,100-3,350 feet	Ref: pp. 6-9 Enclosed with ARCADIS Construction Progress Reports #18 and #24
4	Injection Test Request (Letter)	7/21/03	IW1 0-2,880 feet MW1 1,755-1,922 feet	Ref: pp. 1-2 Appendix A

Geologic logs of the penetrated formations, based on the drilled cuttings, were completed for the MW1 and IW1 pilot holes and previously submitted to the FDEP and TAC members. In addition, a penetration rate log was completed for both pilot holes (MW1 and IW1). The pilot-hole geologic and penetration-rate logs are resubmitted in Appendix D of this document.

Interpretations provided with the above-referenced reports include the depth of the USDW and of the top of the injection zone at the Westport WWTP facility and the degree of confinement demonstrated by the formations between the USDW and the top of the injection zone. These interpretations are updated, as necessary, and are provided in the following sections.

Certification of Mechanical Integrity

Mechanical integrity is certified in the IW1, tubing-and-packer injection well through demonstrations that no leaks are present in the tubing, packer or outer casing to provide assurance of internal mechanical integrity, and the results of formation testing (in this case, radioactive tracer surveying) to provide assurance of external mechanical integrity of the well, per Section 62-528.300 (6), FAC. Further assurance of external mechanical integrity is provided by the routine sampling, analysis and evaluation of water from Deep Monitor Well MW1 during operational testing of the injection well system. For the purpose of this Operational Testing Request, the certification of

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mechanical integrity for MW1 includes the results of hydrostatic-pressure testing of both the steel intermediate (upper monitor zone) casing and final, FRP (lower monitor zone) tubing, as submitted herein. The test conditions and results of mechanical integrity testing (MIT) at the Westport injection well system are discussed below.

Mechanical Integrity Testing of Injection Well IW1

The results of MIT procedures on IW1 were presented in the correspondence previously prepared by ARCADIS and submitted to the FDEP and TAC members (Injection Test Request, July 21, 2003). The results of the FDEP-approved injection test procedures were presented in a preceding section of this document entitled 'Results of Short-Term Injection Testing'. The collected data provide reasonable assurance of internal and external mechanical integrity for IW1. The results of the IW1 MIT demonstration are provided as an appendix to the subsection of this document entitled 'Formation Testing Results and Interpretations'.

Mechanical Integrity Testing of Deep Monitor Well MW1

Construction of MW1 began on December 26, 2002 and was completed on February 13, 2003. MW1 was constructed with an upper monitor zone from 1,730 to 1,755 feet bpl and a lower monitor zone from 1,920 to 1,970 feet bpl. It should be noted that the base of the lowermost regional USDW was identified at a depth of 1,790 feet bpl. A construction detail of MW1 is presented as Figure 3.

MW1 construction was documented in the weekly Construction Progress Reports #1 through #8, #26 and #27 (ARCADIS correspondence). The mechanical integrity of both the intermediate, 16-inch outside-diameter, 0.495-inch wall thickness steel (upper zone) casing and the 5.43-inch inside-diameter FRP, nominal 0.500-inch wall thickness (lower zone) tubing were demonstrated by hydrostatic pressure tests. The results of the testing on the MW1 intermediate casing and final tubing are discussed below.

Mechanical Integrity Testing of Upper Monitor Zone Casing

By February 3, 2003, the Contractor had completed cementing the 16-inch diameter casing over the interval from 1,730 to 216 feet below pad level (bpl) using a total of 3,604 cubic feet of cement. The upper 216 feet of casing was left uncemented for purposes of calibrating the cement bond log (CBL) to free pipe.

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On February 3, 2003, the Contractor "topped off" the MW1 intermediate casing (previously installed and cemented in place to 1,730 feet bpl) with potable water from the City of Port St. Lucie supply, pressurized the casing water column to approximately 110 pounds per square inch (psi) and began preliminary hydrostatic-pressure testing of the upper monitor-zone, 16-inch outside-diameter casing.

On February 4, 2003, a formal, one-hour hydrostatic pressure test was performed. The 16-inch outside-diameter, intermediate casing was pressurized to 122 psi. During the one-hour monitoring period, the hydrostatic pressure in the casing decreased from 122 psi to 119.3 psi, a decline of 2.7 and approximately 2.2 percent of the initial pressure. This change is within the allowable 5 percent, as referenced under Florida Administrative Code Chapter 62-528 (as reported in ARCADIS 'Construction Progress Report #7' dated February 17, 2003). On February 7, 2003, the Contractor performed a CBL (with a variable-density log display) on the 16-inch outside-diameter intermediate casing. The CBL indicates the intermediate casing is fully cemented over the interval from 1,730 to 216 feet bpl. The CBL plot was submitted to the FDEP and TAC members in the above-referenced ARCADIS letter report.

Mechanical Integrity Testing of Lower Monitor-Zone Tubing

On February 11, 2003, the Contractor installed 1,920 feet 5.43-inch inside-diameter FRP (lower monitor zone) tubing through the intermediate casing into the borehole. Teflon tape was placed on the threads of the tubing. Each FRP tubing section was threaded together and lowered until the tubing sections reached the final depth of 1,920 feet bpl. The Contractor then performed a "baseline" CBL (with VDL display) on the FRP, lower monitor-well casing (prior to cementing) before cementing the tubing from 1,917 feet to 1,755 feet bpl. Cementing of the final tubing was completed on February 13, 2003.

On June 16, 2003, the Contractor performed a cement-evaluation survey of the final (lower-monitor zone) tubing of MW1 from 1,496 feet to 1,930 feet bpl (below the base of the FRP tubing). The log plot was merged to the CBL performed prior to the cementing operations, and the resulting log was enclosed with the ARCADIS *Injection Test Request* (correspondence dated July 21, 2003) with interpretations.

On June 26, 2003, the Contractor performed a hydrostatic-pressure test on the $6^5/_8$ -inch outside-diameter FRP tubing (deep monitor zone) of MW-1. The pressure test began at 9:10 a. m. with the casing pressurized to 80.1 psi and was completed at 10:10 a.m. with a casing pressure of 80.2 psi. The Contractor then released the pressure on the

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water column and tubing and drained approximately 0.6 gallons of water from the FRP tubing. The 0.1-psi change in casing pressure is within the 5% pressure change allowable per Rule 62-528, FAC. Copies of the pressure gauge calibration sheets and certified test results are included in an appendix to the subsection of this report entitled 'Formation Testing Results and Interpretations'.

Injection Procedures

The injection procedure will involve the injection of domestic wastewater effluent from the Westport WWTF. The effluent will be stored in two lined holding ponds, then pumped to the injection well through the effluent pump station.

The firm pumping capacity of the pump station is 4,200 gpm (6.05 mgd) with two out of the three installed pumps in operation. The maximum flow to the injection well, over the next five year period, is expected to be approximately 3,400 gpm (4.9 mgd) with an anticipated maximum injection pressure of 31 psi.

Record Drawings

Certification of completion and signed and sealed record drawings for the piping, and surface equipment are enclosed.

Operation and Maintenance Manual

A draft Operation and Maintenance (O&M) Manual is enclosed. An "Injection Well System Sampling and Monitoring Plan" and "Plugging and Abandonment Plan" are included in Appendix E of this document and are included in Section 4.3 of the draft O&M Manual. The Manual includes calibration certificates for permanent pressure gauges, pressure transmitters, pressure transducers and the injection flowmeter.

Updated Demonstration of Financial Responsibility

An updated financial responsibility demonstration has been submitted to Mr. Rich Deuerling of the FDEP Tallahassee office (ARCADIS correspondence dated July 8, 2003) for the actual well construction details. In accordance with recent FDEP requests, the updated costs estimates for that contingency provide for the removal of the IW1 injection tubing in the event that a plugging and abandonment permit application is necessary at some future time. The plugging and abandonment plan, well diagrams and costs estimates are included in Appendix E of this document.

Operational Testing Request

Westport Class I Injection-Well System Construction Program City of Port St. Lucie, Florida

Secondary (Backup) Injection and Emergency Disposal Plan

An emergency disposal plan (EDP) has been developed for the City of Port St. Lucie Westport Injection Well IW1 as part of the permitting process. The emergency disposal plan is included in the enclosed draft Operation and Maintenance Manual (Section 3.0) to provide procedures in the event of a well outage and during planned maintenance, including 5-year updated mechanical integrity testing.

Demonstration of Confinement

According to the FDEP permit for the injection well, the operational testing request must include ". . . the demonstration of confinement prepared providing confirmation of confinement and defining the injection and confining sequences utilizing data collected during the drilling, logging and testing of the injection well and deep monitor well. The report shall include the results of hydraulic testing (permeability, porosity, etc.) on the cores, and shall be reviewed and updated as appropriate after the completion of any additional injection/monitor well pairs in the future from the confining interval. This submittal shall be prepared, signed, and sealed by a Florida Registered Professional Geologist or appropriately experienced Professional Engineer."

Deep Monitor Well MW1 Packer Pumping Tests

Ten pilot-hole, packer-pumping tests were performed during the construction and testing program for IW1 and MW1. A total of five straddle-packer tests were performed on the IW1, Stage #2 pilot hole in the interval from 2,217 to 2,898 feet bpl to evaluate the confining nature of the strata intercepted by the borehole. Testing was conducted using straddle packers to isolate each test interval. Field analysis of pumped water was performed by ARCADIS during the pre-test development of each test interval, and during the pumping portion of each packer test. Each test interval was developed prior to the pumping test to ensure that, when possible, representative water samples were available during the test. A final water sample also was collected immediately before the end of the pumping test and analyzed for total dissolved solids (TDS), chloride, sulfate, conductivity, temperature, ammonia, total Kjeldahl nitrogen, and phosphorus.

Laboratory-analytical results of water samples collected immediately before the end of each of the 10 packer-pumping tests (5 from MW1) were compiled and are presented on Table 4.

Operational Testing Request

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Packer test (PT) interval PT-9 did not produce enough water to remove one work-pipe storage volume. For this reason, water-quality samples from that test are not considered to be representative. Otherwise, the packer-pumping test water-quality data (Table 4) were relatively stable from the beginning of the pumping periods to the end of the pumping periods.

Transmissivity and hydraulic conductivity estimates from packer pumping-test results are presented on Table 5. Packer-pumping test transducer readings and plots of the drawdown and recovery data are included as Appendix F. Based on the packer pumping-test data, horizontal hydraulic conductivities of tested intervals in the MW1 pilot hole (between 1,650 feet to 2,100 feet bpl) were conservatively estimated at between 5.6 gpd/ft² (or 2.6 x 10⁻⁴ centimeters per second [cm/sec]) from Straddle-Packer Test PT-3 and 129 gpd/ft² (6.1 x 10⁻³ cm/sec) from PT-5. The least permeable interval tested at MW1 was PT-3, located between 1,855 feet and 1,901 feet bpl, with a derived (horizontal) hydraulic conductivity of 5.6 gpd/ft² (2.6 x 10⁻⁴ cm/sec). Because the tested interval is between the monitor zones, but below the USDW (at 1,790 feet bpl), the rock in this interval may provide additional assurance that the USDW will not be affected by injection at the project location. The results of the first core sample collected for analysis (Core #1, 1,846.5 feet to 1,860 feet bpl) indicate that the interval from 1,853 feet to 1,858 feet bpl provides a high degree of confinement (see section below entitled 'Core Collection and Analysis').

Injection Well Packer Pumping Tests

The least permeable interval tested in the IW1 pilot hole was PT-9, located from 2,580.0 feet to 2,597.7 feet bpl, with a derived (horizontal) hydraulic conductivity of 0.18 gpd/ft² (8 x 10^{-6} cm/sec). Packer pumping-test water quality is presented on Table 4. Packer pumping-test transmissivity and hydraulic conductivity estimates are presented on Table 5.

Core Collection and Analysis

Eight rock cores were drilled in the IW1 Stage #1 pilot hole (from 749 feet to 1,900 feet bpl) and Stage #2 pilot hole at intervals determined in the field based on the drilled cutting samples. One core were collected above 1,900 feet bpl and 7 cores were collected between 1,900 feet (the base of the Stage #1 pilot hole) and 2,903 feet bpl. Core descriptions and core-analysis reports are included in Appendix D. Hydraulic conductivity estimates from conventional-plug analyses by Core Lab Petroleum Services (Houston, TX) are summarized below.

Operational Testing Request

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Core Number	Injection Well Pilot-Hole Stage No.	Cored Depth Interval (feet below pad)	Interval of Core Sections Tested (feet below pad)	Lowest Horizontal Hydraulic Conductivity (cm/sec)	Lowest Vertical Hydraulic Conductivity (cm/sec)
1	Stage #1	1,846.5 - 1,860.0	1 853 3_1 858 5	4 04F-08	2 91F-08
2	Stage #2	2,272.0 - 2,285.0	2,273.5-2,283.2	7.88E-10	5.53E-07*
3		2,341.5 - 2,355.0	2,343.2-2,349.6	4.66E-07	7.75E-08
4		2,529.0 - 2,550.0	2,529.5-2,545.0	9.67E-07	9.30E-07
5		2,602.0 - 2,618.0	2,604.8-2,613.6	3.85E-07	2.68E-07
6		2,681.0 - 2,694.8	2,681.7-2,688.7	2.30E-05	1.91E-06
7		2,758.0 - 2,769.0	2,765.5-2,767.2	1.07E-06	3.46E-06
8	otos gantinustana	2890.0 - 2,903.0	2,892.7-2,896.7	2.89E-07	1.50E-07

"cm/sec" denotes centimeters per second.

The core analysis reports are included in Appendix D. The core analytical results include electric properties test results and estimates of Archie's coefficient and exponent of cementation for Core #1 (collected between 1,846.5 to 1,860 feet bpl). The core-sample analyses indicate that the lowest hydraulic conductivity values were obtained from the dolomitic formation between 2,272 feet to 2,285 feet bpl, in an interval above the proposed injection horizon of 2,900 feet bpl.

Formation Testing Results and Interpretations

The above-referenced packer test and core analysis data were utilized to assess the potential degree and extent of confining intervals between the injection horizon (at 2,900 feet bpl) and the regional USDW at 1,790 feet bpl. Following the radioactive tracer survey (RTS) testing, interpretations were presented in the Technical Memorandum included as Appendix E of the ARCADIS *Injection Test Request* (correspondence dated July 21, 2003). The text and Attachment A from the Technical Memorandum are included here as Appendix G for reference to aid in the review of this section. Attachment A includes the hydrostatic-pressure test results (and associated pressure-gauge calibration certificates) for the IW1 final casing and tubing, and for the MW1 final (FRP) tubing.

Per Chapter 62-528, FAC, at least one confining zone above the injection zone is required. Based on the available data, the intervals from approximately 2,270 feet to 2,440 feet bpl, and 2,530 feet to 2,904 feet bpl will effectively serve as the primary

[&]quot;*" denotes that vertical hydraulic conductivity results for 2 of 3 core sections were not calculated because the vertical permeability in air for these samples was estimated at less than 0.001 millidarcy (<9.6E-10 cm/sec).

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confining units at the site and have sufficient areal extent, thickness, lithologic and hydrologic characteristics to prevent fluid migration into overlying USDWs.

The results of straddle-packer tests performed in the intervals from 2,217 to 2,898 feet bpl demonstrate that the tested strata are confining in nature (Table 3). The extent of confinement at the site has been evaluated using the available data, and those data indicate that the primary confining units at the site are located below a depth of approximately 2,030 feet bpl. Confinement at the site is relatively extensive (vertically), generally including the intervals extending from 2,050 feet to 2,175 feet bpl, 2,214 feet to 2,240 feet bpl, 2,270 feet to 2,440 feet bpl, and 2,530 feet to 2,904 feet bpl. Regarding the relative degree of confinement, the least permeable contiguous confining intervals located below the lowermost regional USDW (at 1,790 feet bpl) appear to be the sections from 2,270 feet to 2,440 feet bpl and from 2,575 feet to 2,650 feet bpl (Table 4). Based on the results of the borehole-compensated sonic log VDL display (previously submitted ARCADIS Request for Final Casing-Setting Depth Approval, Westport Class I Injection Well No. 1. May 20, 2003), similar, though much shorter, intervals exist in sections from 2,820 feet to 2,830 feet bpl and from 2,894 feet to 2,900 feet bpl.

Comparison of the IW1, Stage #2 pilot-hole sonic log plots to the IW1 packer-test interval from 2,880 feet to 2,898 feet bpl (IW1) indicates that the tested interval will provide a good casing seat and a degree of confinement between the top of the proposed injection horizon (at 2,900 feet bpl) and the overlying formations.

Radioactive Tracer Survey Results

The RTS results indicate that the cement sheath around the outer (24-inch outside-diameter) injection casing is intact and a good bond is present between the cement and the formation, as well as between the casing and the cement, above a depth of approximately 2,900 feet bpl. Based on the RTS and temperature log results, the injection zone is located at approximately 2,900 feet bpl in the immediate vicinity of IW1. The RTS logging results suggest that an adequate degree of confinement is provided by the formation (exists) above that depth.

Injection Well Casing and Cement

The RTS results indicate that the cement sheath around the IW1 outer casing is intact and a good bond is present between the cement and the formation, as well as between the outer casing and the cement. Based on the RTS results described above, the

Operational Testing Request

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available data suggest that the top of the injection zone is located at approximately 2,900 feet bpl in the immediate vicinity of IW1.

Conclusion

After thorough review of the available data, including the results of the pilot-hole lithologic summaries, geophysical logging results, packer pumping tests, core-sample lithologies and hydraulic properties analyses, and based on an evaluation of those collected data, the confining characteristics of the interval from 2,020 feet to approximately 2,900 feet bpl are adequate to prevent the upward migration of injected fluids from the injection zone (at 2,909 feet bpl) to the USDW (at 1,790 feet bpl), in accordance with the requirements of Chapter 62-528, FAC.

Background Water Quality

"Background" water-quality data, both from the proposed (dual-zone) deep monitor well and the proposed injection zone, is required as part of the UIC permit. MW1, Upper and Lower Monitor-Zone water-sample analytical reports, including constituents listed as Primary and Secondary Drinking Water Standards and municipal minimum-criteria parameters, are included in Appendix H. The analytical report (containing results of the same set of constituent analyses) for the injection-zone water sample (collected June 16, 2003) also is included in Appendix H.

As referenced above, prior to beginning the injection test, the source water was sampled. A state-certified analytical laboratory collected a water sample from the onsite lake. Analyses of the lake-water supply for the test previously were submitted as Appendix D of the ARCADIS *Injection Test Request* dated July 21, 2003.

Westport WWTP secondarily-treated effluent, including constituents listed as Primary and Secondary Drinking Water Standards and municipal minimum-criteria parameters, also are included in Appendix H.

As a condition of approval for beginning the injection testing, the FDEP requested that monitor-zone water samples from MW1 be collected after completion of the injection test for analysis of total coliform. The request for coliform sampling was based on a relatively high total coliform concentration (1,500 colonies per 100 milliliters) reported for the lake-water sample. On Monday, July 29, 2003, the Contractor purged both the MW1 upper and lower monitor zones of more than three (3) storage volumes of water and sampled each monitor zone for analysis of total coliform (in colonies per 100

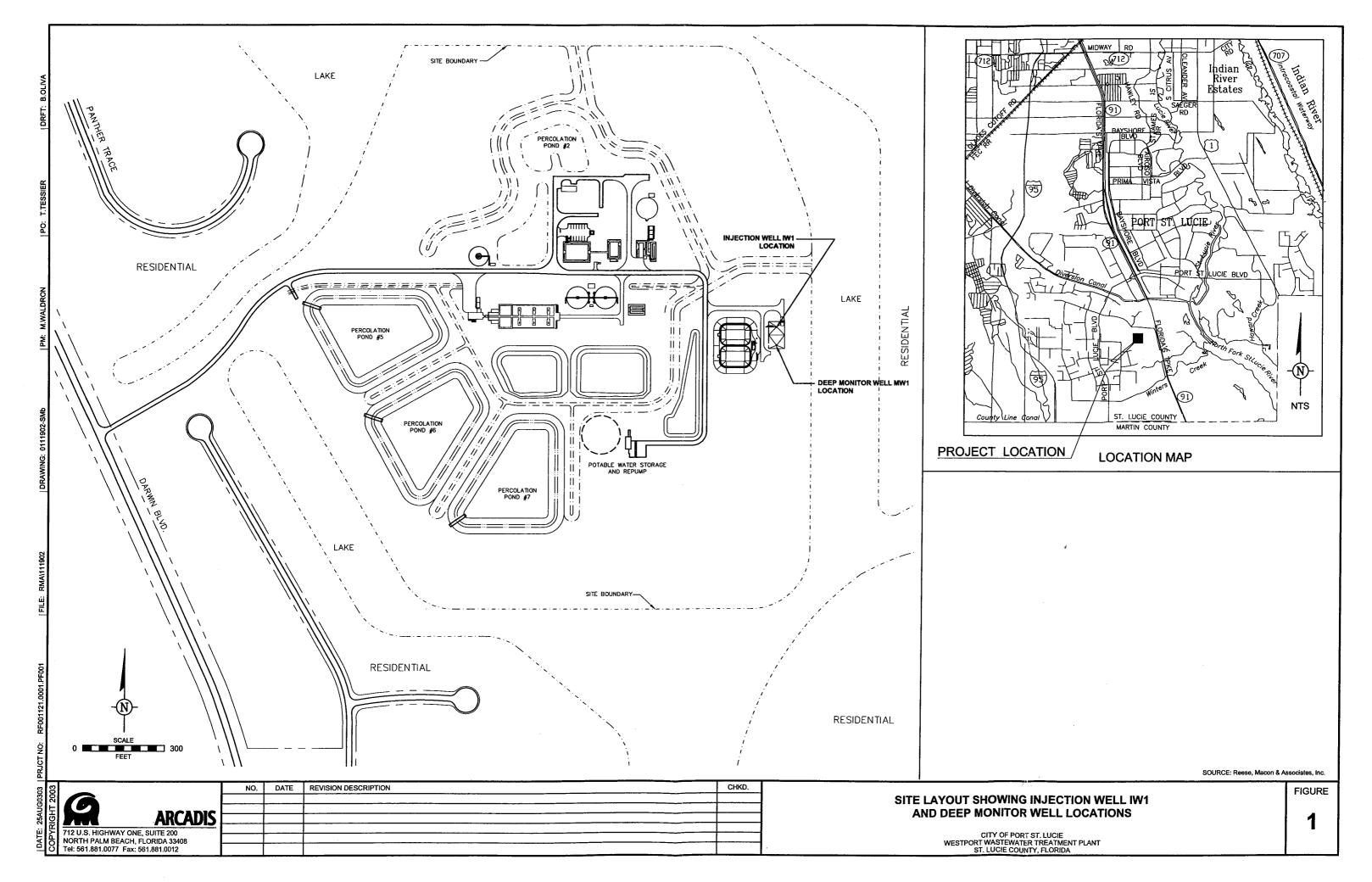
Operational Testing Request

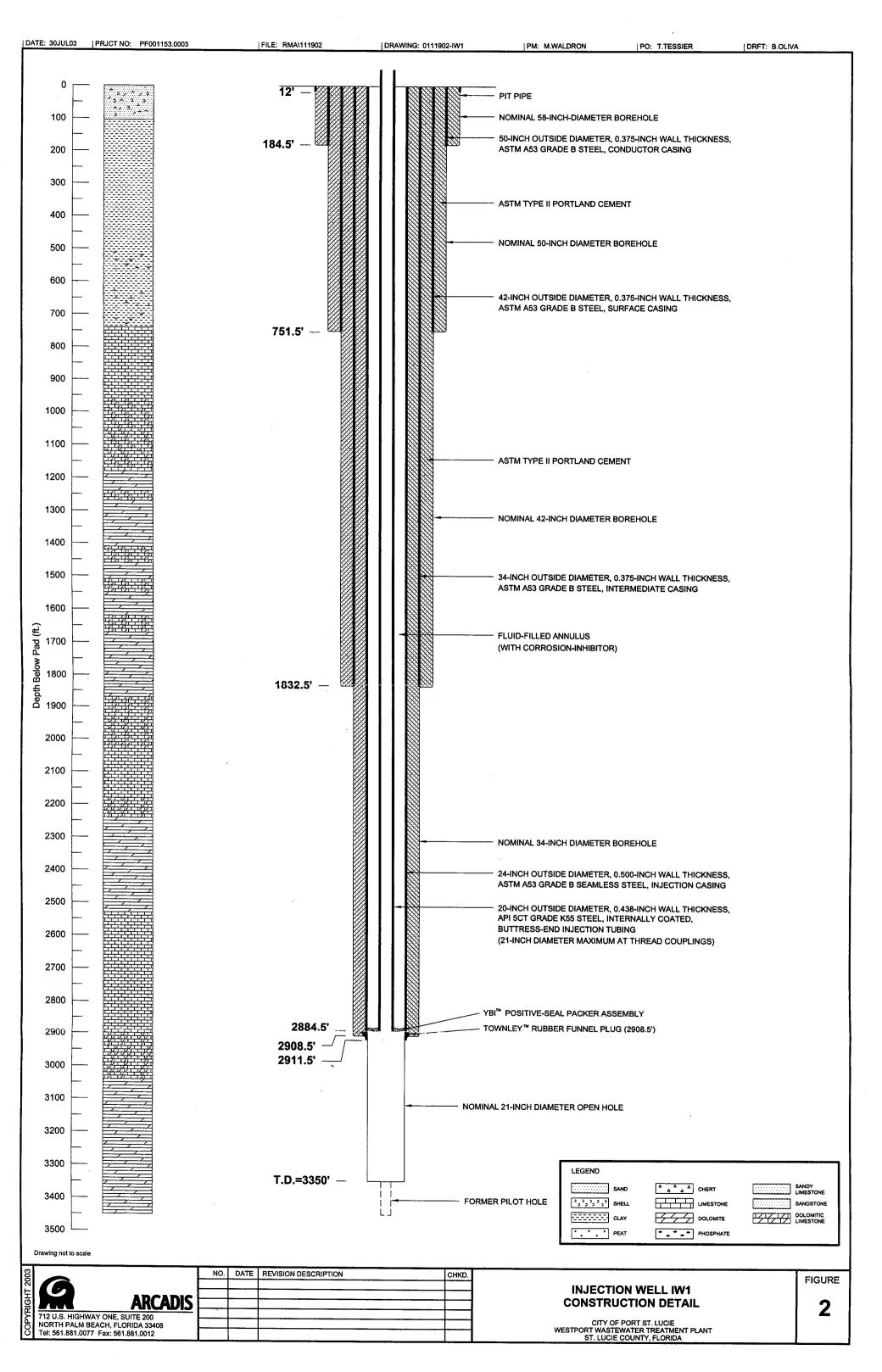
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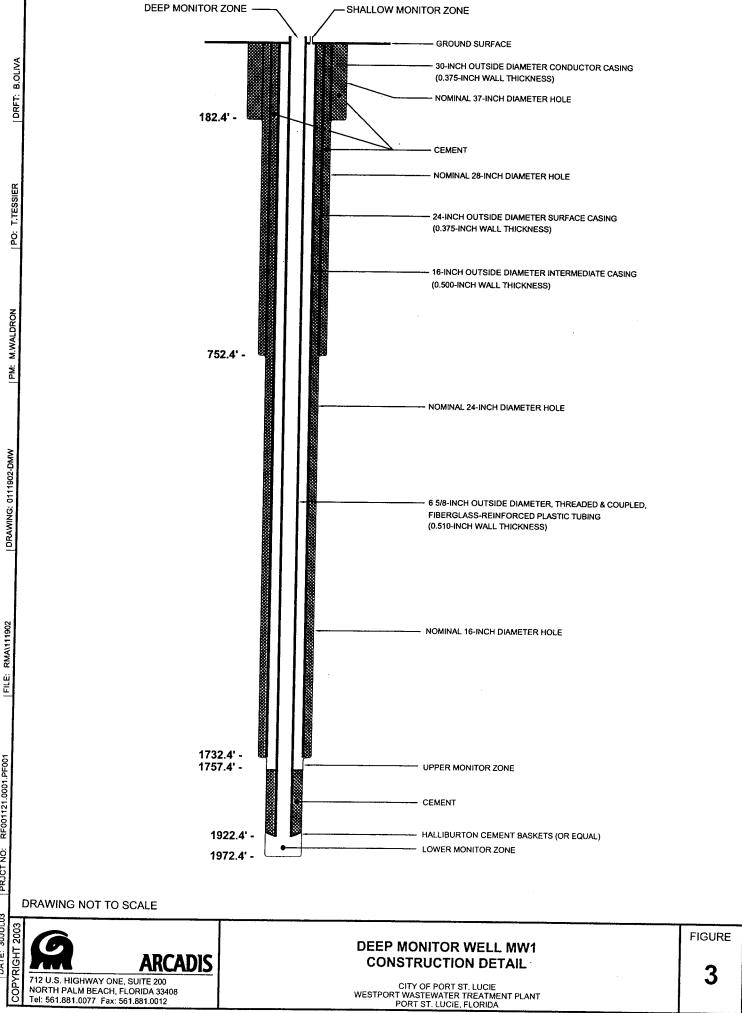
milliliters). Purged water was routed to the onsite, PVC-lined holding pond. Laboratory analytical reports from the MW1 samples (collected by Envirodyne, Inc., Boca Raton) are included in Appendix H.

Fluid-Compatibility Evaluation

Information concerning the compatibility of the injected waste with fluids and minerals in the receiving zone have been reviewed and evaluated. The chemical characteristics of the actual injection-zone fluids are not significantly different than was anticipated for the compatibility evaluation developed as part of the permitting process. Relevant water-quality data are provided as appendices to 'Background Water Quality" section of this document. The text and tabulated results of the fluid-compatibility evaluation are included in Appendix I.

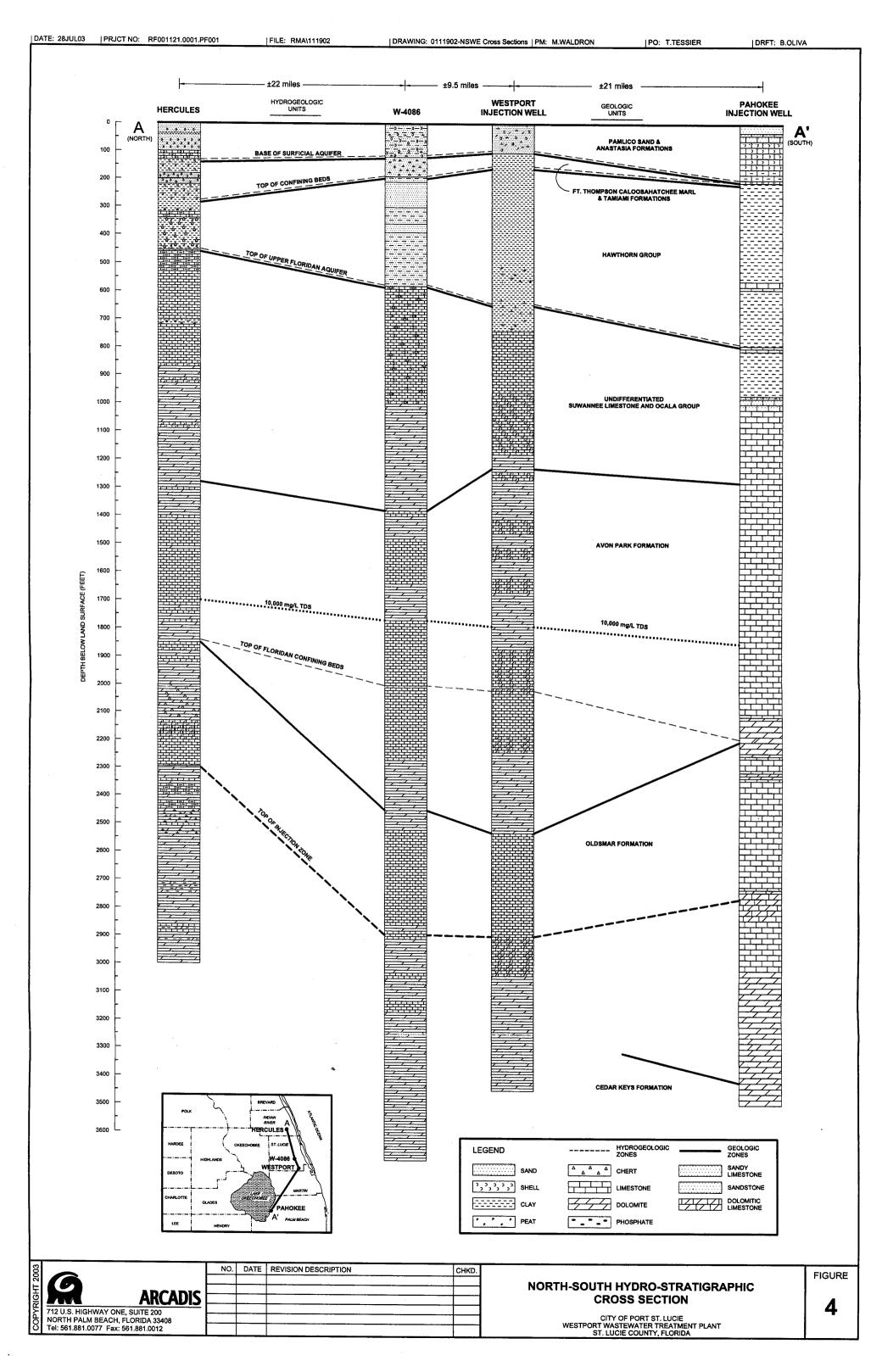


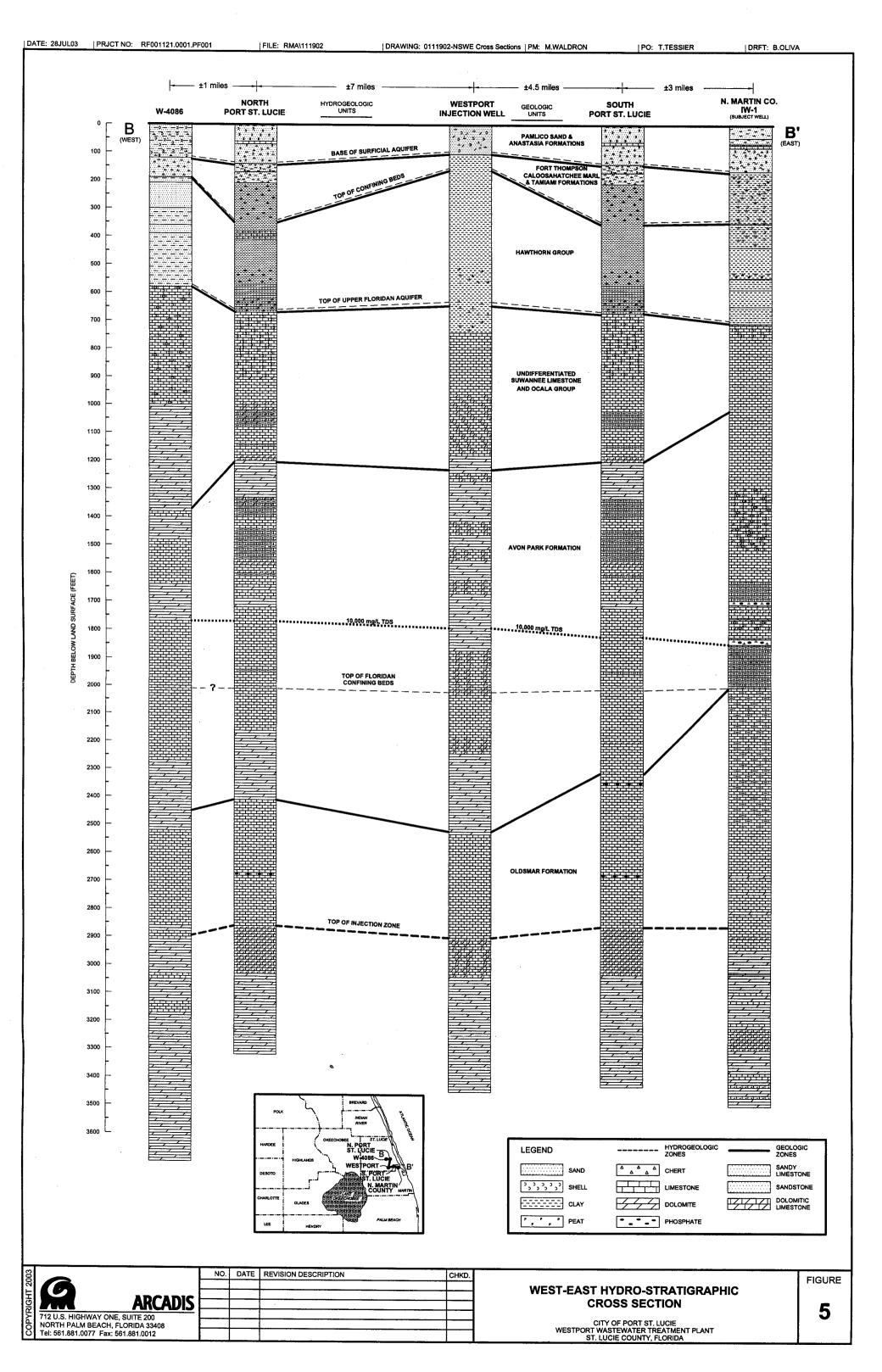


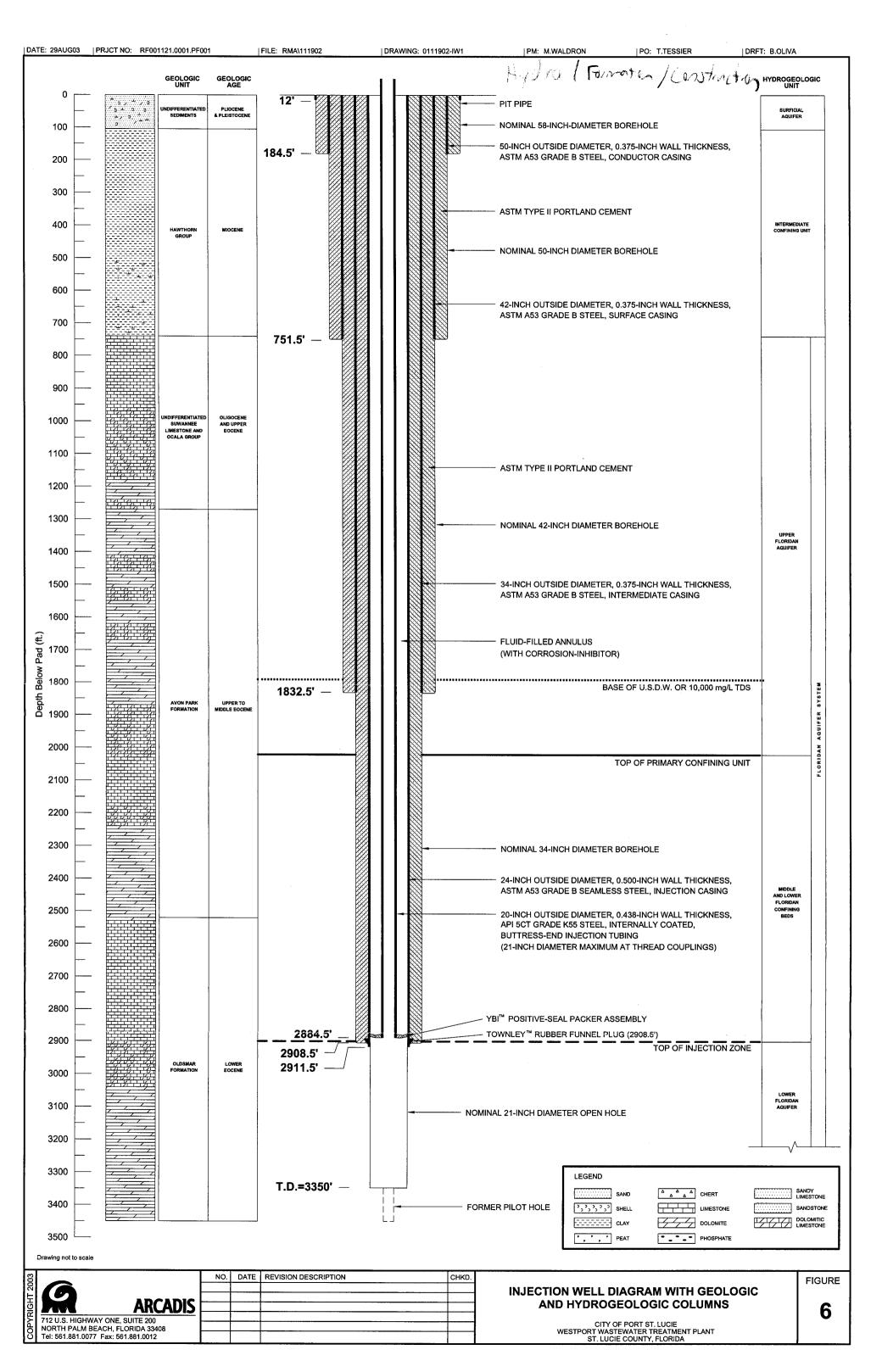


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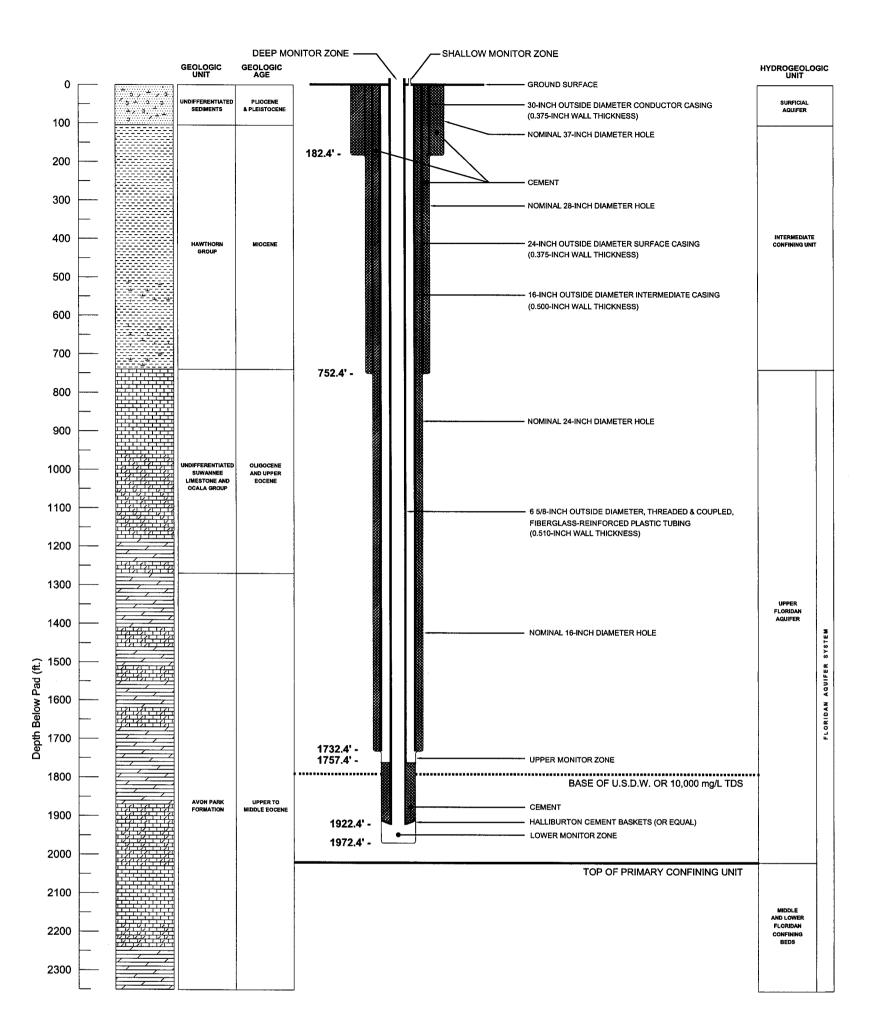






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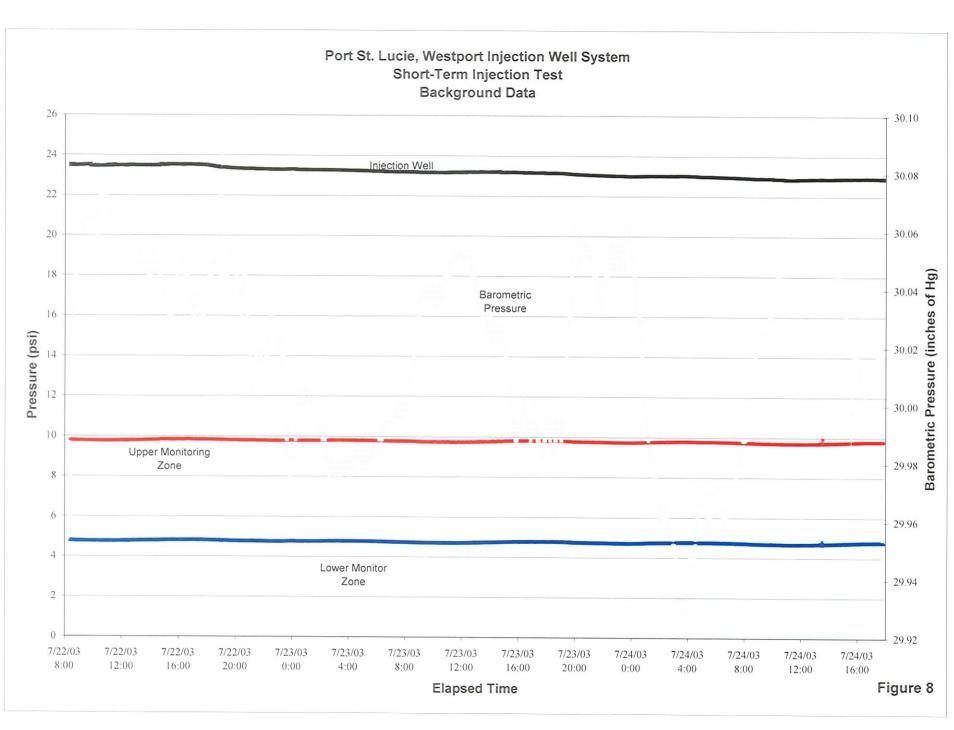
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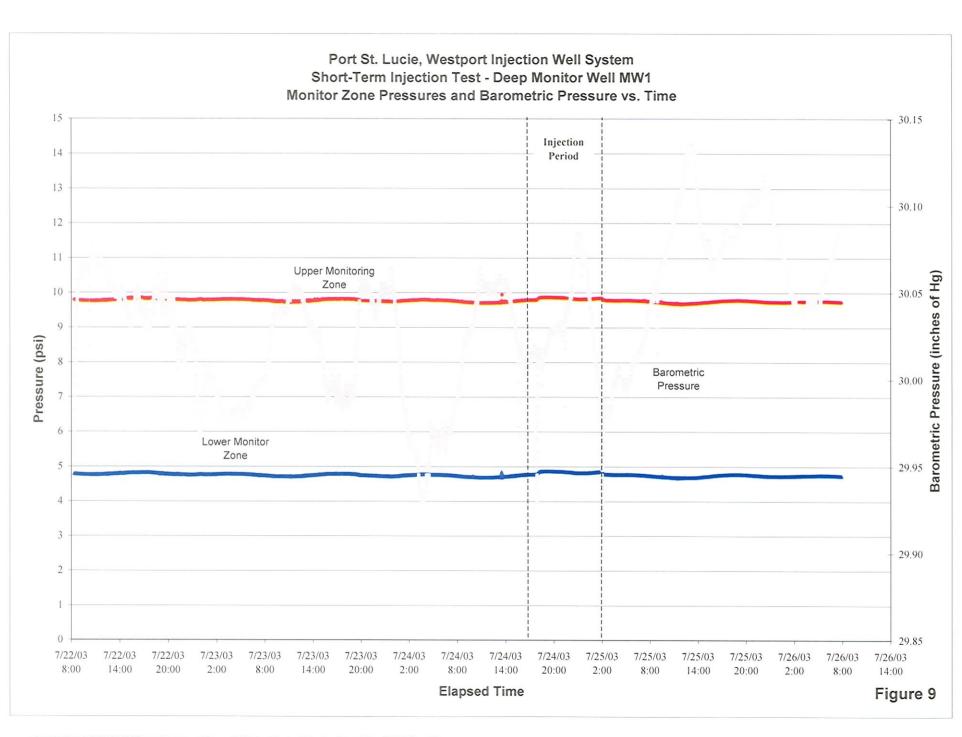


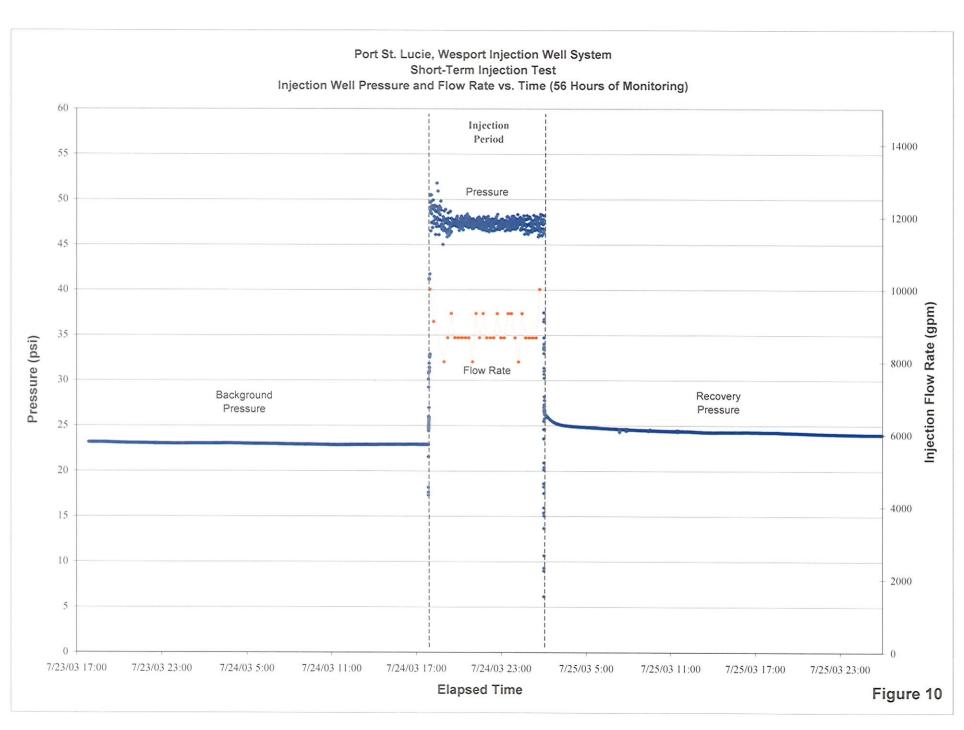
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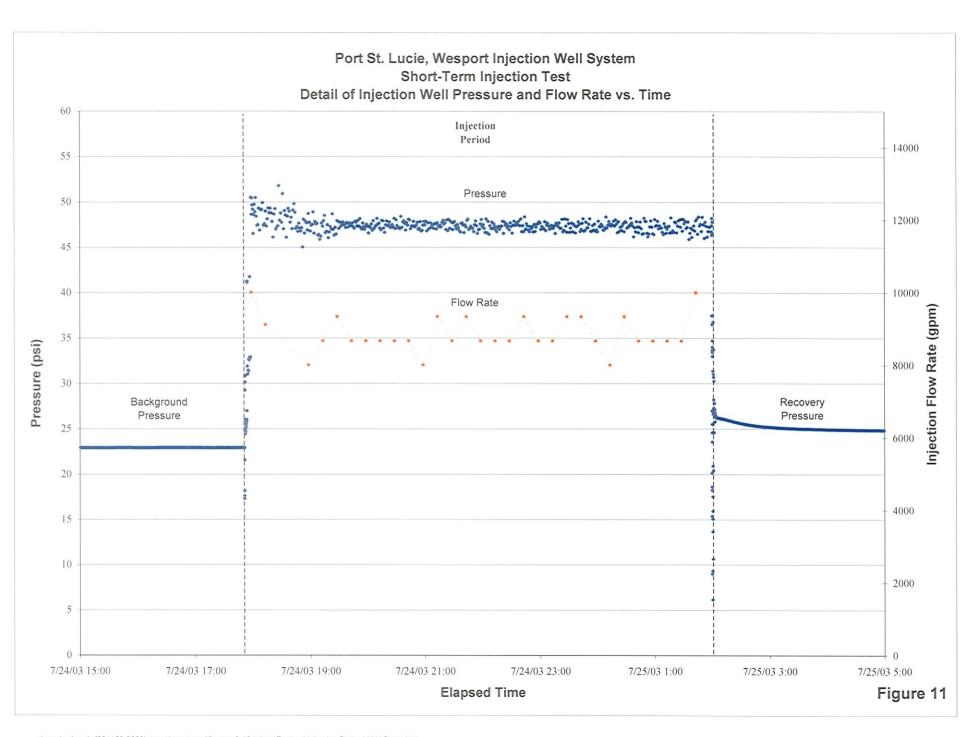
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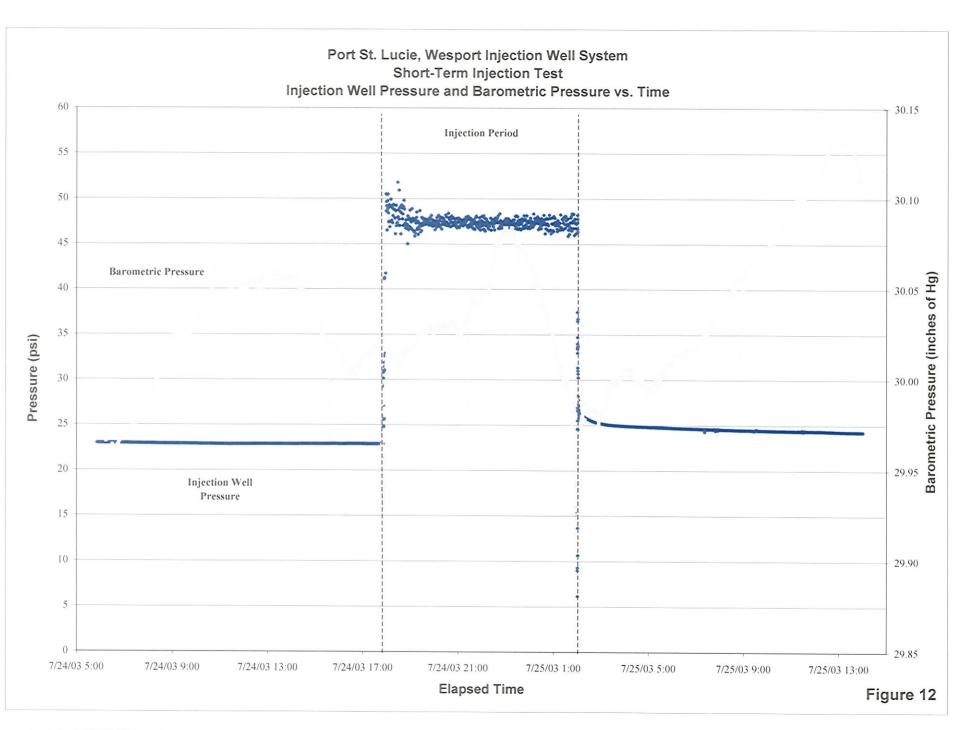


Table 1. Summary of Injection Period Pressures and Flows for Short-Term Injection Test, Westport Injection Well System, Port. St. Lucie, Florida

Data input by: N. Maska

Date: July 24, 2003

N. Maska

START - TOTALIZER READING: 7.2E+06

END: 11.46E+06

Static Well Head Pressure (PSI): 25.0 Static Upper Zone Pressure (PSI): 8.60 Static Lower Zone Pressure (PSI): 4.27

				DRAWD	OWN			er Zone Pressure (PSI): 4.2
Real Time	Elapsed Time (minutes)	Injection Rate (GPM)	IW1 Well-Head Pressure (PSI)	MW1 Upper Zone Pressure (PSI)	Flowmeter Totalizer (gallons)	Lake Temp.	IW1 Static Annular	Comments
Start: 18:00	0.0	0.0	25.0	8.60	7.20E+06	86 F	Pressure (PSI)	
18:01	1.0	8500.0	42.0	8.60	na na	86 F	0 2.4	Pump ON - Test Started
18:05	5.0	8500.0	48.0	8.60	na	86 F	4.0	
18:10	10.0	8500.0	50.0	8.60	na	86 F	6.3	
18:15	15.0	9000.0	50.0	8.60	7.35E+06	86 F	12.3	
18:30	30.0	8500.0	49.0	8.60	na	86 F	19.0	
18:45	45.0	8500.0	49.0	8.60	na	86 F	22.0	
19:00	60.0	8500.0	49.0	8.60	7.76E+06	86 F	24.0	
19:15	75.0	8500.0	49.0	8.70	7.88E+06	86 F	25.0	
19:30	90.0	8800.0	49.0	8.80	8.01E+06	86 F	25.0	D 11 12 1
19:45	105.0	8500.0	49.0	8.90	8.15E+06	86 F		Readjust Pumping Rate
20:00	120.0	8500.0	49.0	8.90	8.28E+06	86 F	25.0	
20:15	135.0	8500.0	49.0	9.00	8.41E+06		25.0	
20:30	150.0	8500.0	49.0	9.00		86 F	25.0	
20:45	165.0	8500.0	48.0	9.10	8.54E+06	86 F	25.0	
21:00	180.0	8500.0	48.0	9.20	8.67E+06	86 F	25.0	
21:15	195.0	8500.0	49.0		8.80E+06	86 F	25.0	
21:30	210.0	8500.0	49.0	9.20	8.92E+06	86 F	25.0	
21:45	225.0	8500.0		9.30	9.06E+06	86 F	25.0	
22:00	240.0		49.0	9.30	9.19E+02	86 F	24.0	
22:15		8500.0	48.0	9.20	9.33E+06	85 F	24.0	
22:30	255.0	8500.0	49.0	9.20	9.46E+06	85 F	24.0	
	270.0	8500.0	49.0	9.25	9.59E+06	85 F	23.0	Start Raining
22:45	285.0	8500.0	49.0	9.30	9.72E+06	85 F	22.5	Start Raining
23:00	300.0	8500.0	49.0	9.50	9.86E+06	85 F	21.0	
23:15	315.0	8500.0	49.0	9.50	9.99E+06	85 F	21.0	
23:30	330.0	8500.0	49.0	9.50	1.012 E+07	85 F	19.0	
23:45	345.0	8500.0	49.0	9.60	1.026 E+07	85 F		
0:00	360.0	8500.0	49.0	9.60	1.040 E+07		18.0	
0:15	375.0	8500.0	49.0	9.60	1.053 E+07	84 F 84 F	18.0 16.0	Heavy Rain

Table 1. Summary of Injection Period Pressures and Flows for Short-Term Injection Test, Westport Injection Well System, Port. St. Lucie, Florida

Data input by: N. Maska

July 24, 2003

Static Well Head Pressure (PSI): 25.0

Static Upper Zone Pressure (PSI): 8.60

Static Lower Zone Pressure (PSI): 4.27

DRAWDOWN

				DRAWD	OWN			
Real Time	Elapsed Time (minutes)	Injection Rate (GPM)	IW1 Well-Head Pressure (PSI)	MW1 Upper Zone Pressure (PSI)	Flowmeter Totalizer (gallons)	Lake Temp.	IW1 Static Annular Pressure (PSI)	Comments
0:30	390.0	8500.0	49.0	9.60	1.065 E+07	84 F	12.0	
0:45	405.0	8500.0	49.0	9.60	1.079 E+07	84 F	12.0	
1:00	420.0	8500.0	48.5	9.70	1.092 E+07	83 F	12.0	
1:15	435.0	8500.0	49.0	9.70	1.105 E+07	83 F	12.0	Q. D. I.
1:30	450.0	8500.0	49.0	9.70	1.118 E+07			Stop Raining
1:45	465.0	8500.0	49.0	9.70	1.118 E+07	83 F 83 F	10.0	
END: 2:00	480.0	8500.0	49.0	9.70	1.146 E+07	83 F	9.0 8.0	D 0775
				RECOV		0.3 F	8.0	Pump OFF - Start Recover
Start: 2:00	0.0	0.0	49.0	9.70	1.146 E+07	02 F		
2:00:30	0.5	0.0	20.0	9.70		83 F	8.0	
2:01	1.0	0.0	30.0	9.70	1.146 E+07	83 F	3.0	
2:02	2.0	0.0	36.0	9.70	1.146 E+07	83 F	2.0	
2:03	3.0	0.0	28.0	9.70	1.146 E+07	83 F	2.0	
2:04	4.0	0.0	27.0	9.70	1.146 E+07	83 F	2.0	
2:05	5.0	0.0	27.0	9.70	1.146 E+07	83 F	1.5	
2:06	6.0	0.0	28.0	9.70	1.146 E+07	83 F	1.5	
2:07	7.0	0.0	28.0	9.70	1.146 E+07	83 F	1.5	
2:08	8.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
2:09	9.0	0.0	28.0		1.146 E+07	83 F	1.0	
2:10	10.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
2:12	12.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
2:14	14.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
2:16	16.0	0.0		9.70	1.146 E+07	83 F	1.0	
2:18	18.0	0.0	28.0 28.0	9.70	1.146 E+07	83 F	1.0	
2:20	20.0	0.0		9.70	1.146 E+07	83 F	1.0	
2:25	25.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
2:30	30.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
		U.U	28.0 meter and probe in the lake	9.70	1.146 E+07	83 F	1.0	Stop Data Collection

Lake 1 cmp. Terers to temperature of lake water (measured using a meter and probe in the lake) in degrees Fahrenheit.

[&]quot;gpm" denotes injection rate in "gallons per minute".

[&]quot;PSI" denotes wellhead and/or downhole transducer readings in "pounds per square inch".

Injection rate flowmeter values shown are + or - 500 gpm.

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Table 2. Summary of Geophysical Logs for Deep Monitor Well No. 1 (MW1)
Westport Injection Well System, Port. St. Lucie, Florida

Date	Geophysical Survey Performed	Casing Depth (feet bpl)	Open Hole Depth (feet bpl)	Casing/Pilot Hole Diameter (inches)
12/27/02	XY Caliper, Gamma Ray		185	36.50
12/30/02	XY Caliper, Gamma Ray	180	760	12.25
01/02/03	XY Caliper, Gamma Ray	180	760	28.50
01/10/03	Fluid Conductivity, Temperature (Static)	760	2350	12.25
01/10/03	XY Caliper, Gamma Ray	760	2350	12.25
01/10/03	Dual Induction, LL3/SP	760	2350	12.25
01/10/03	Flowmeter (Static and Dynamic)	760	2350	12.25
01/10/03	Borehole Compensated Sonic with VDL	760	2350	12.25
01/10/03	Borehole Televiewer	760	2350	12.25
01/11/03	Flowmeter (Dynamic)	760	2350	12.25
01/11/03	Fluid Conductivity and Temperature (Dynamic)	760	2350	12.25
01/11/03	Log Derived Water Quality (Total Dissolved Solids)	760	2350	12.25
01/30/03	XY Caliper, Gamma Ray	760	1735	22.50
02/01/03	16" Casing Cement Top Temperature (Stages 1-3)	1730	1735	16.00
02/02/03	16" Casing Cement Top Temperature (Stage 4)	1730	1735	16.00
02/06/03	XY Caliper, Gamma Ray	1730	1915	14.75
02/06/03	XY Caliper, Gamma Ray	1915	1970	12.25
02/07/03	16" Casing Cement Bond Variable Density	1730	1970	16.00
02/11/03	6.625" Tubing Cement Bond w/ Variable Density (background)	1923	1970	6.625
02/13/03	Cement TopTemperature (6.625" FRP, Stages 1-2)	1923	1970	6.625
06/16/03	Merged Cement Bond Variable w/ Density (6.625" FRP)	1923	1970	6.625

bpl' denotes 'below pad level'.

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Table 3. Summary of Geophysical Logs for Injection Well No. 1 (IW1) Westport Injection Well System, Port St. Lucie, Florida

Date	Geophysical Survey Performed	Casing Depth (feet bpl)	Open Hole Depth (feet bpl)	Casing/Pilot Hole Diameter (inches)
02/26/03	XY Caliper, Gamma Ray		186	58.5
02/28/03	XY Caliper, Gamma Ray	182	750	30.25
03/04/03	XY Caliper, Gamma Ray	182	755	48.50
03/16/03	XY Caliper, Gamma Ray	749	1900	12.25
03/16/03	Off-Set Gamma Ray	749	1900	12.25
03/16/03	Dual Induction, LL3/SP	749	1900	12.25
03/16/03	Flowmeter (Static and Dynamic)	749	1900	12.25
03/16/03	Fluid Conductivity, Temperature (Static and Dynamic)	749	1900	12.25
03/16/03	Borehole Compensated Sonic with VDL	749	1900	12.25
03/16/03	Log Derived Water Quality (Total Dissolved Solids)	749	1900	12.25
03/16/03	Borehole Televiewer	749	1900	12.25
03/29/03	XY Caliper, Gamma Ray	749	1835	40.50
04/02/03	34" Casing Cement Top (Stages 1- 6)	1830	1835	34.00
04/23/03	XY Caliper, Gamma Ray	1830	3450*	12.25
04/23/03	Dual Induction, LL3/SP	1830	3450*	12.25
04/24/03	Borehole Compensated Sonic/ VDL	1830	3450*	12.25
04/24/03	Fluid Conductivity, Temperature (Static and Dynamic)	1830	3450*	12.25
04/24/03	Flowmeter (Static and Dynamic)	1830	3450*	12.25
04/24/03	Vid∞ Survey	1830	3450*	12.25
05/04/03	XY Caliper, Gamma Ray	1830	3450**	12.25
06/05/03	XY Caliper, Gamma Ray	1830	3350	22.00
06/05/03	Dual Induction, LL3/SP	1830	3350	22.00
06/05/03	Borehole Compensated Sonic/ VDL	1830	3350	22.00
06/05/03	Flowmeter (Static and Dynamic)	1830	3350	22.00
06/05/03	Fluid Conductivity, Temperature (Static and Dynamic)	1830	3350	22.00
06/06/03	TV Survey (reamed borehole)	1830	3350	34 & 22
06/10/03	24" Casing Cement Top Temperature (Stages 1-9)	2903	3350	32.50
06/16/03	Cement Bond Log	2903	3350	24.00
06/17/03	Video Survey (20" diameter tubing and open hole)	2764	3350	32.50
07/10/03	Video Survey (24"diameter casing only).	2764	3350	32.50

bpl' denotes 'below pad level'.

^{*} pilot hole logging limited to a depth of 3186 ft bpl due to an obstruction in the borehole.
** pilot hole logging limited to a depth of 3179 ft bpl due to an obstruction in the borehole.

Table 4. Summary of Packer-Pumping Test - Final Water Sample Analytical Results for Deep Monitor Well MW1 and Injection Well IW1 Pilot Holes Westport Injection Well System, Port St. Lucie, Florida

Test	Test Date	Packer Pumping-Test Depth Interval	Ammonia Nitrogen	Specific Conductance	Chloride	Total Phosphorus	Sulfate	Total Dissolved Solids	Total Kjeldahl Nitrogen	pH Field Result	Temperatur Field Resul
		(feet below pad level)	(mg/L)	(umhos/cm)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(mg/L)	(pH units)	(°C)
PT-1	13-Jan-03	2,054 - 2,100	0.71	50000	20000	0.23	1600	34000	1.1	0.70	
PT-2	14-Jan-03	1,922 - 1,968	1.00	44000	18000	0.23	1500	31000	1.2	6.85	25.0
PŢ-3	15-Jan-03	1,855 - 1,901	1.30	43000	16000	0.20	1100	26000	1.5	6.45	25.3
PT-4	17-Jan-03	1,750 - 1,796	1.20	16000	5000	0.03	530	8800	3.7	7.04	25.7
PT-5	17-Jan-03	1,650 - 1,696	0.49	7500	2500	0.25	390	4600	1.3	7.19	25.2
PT-6	26-Apr-03	2,880.0 - 2,897.7	0.52	47000	21000	0.73	3200	34000	0.58	7.44	25.0 25.9
PT-7	3-May-03	2,830.0 - 2,880.7	0.18	47000	22000	0.46	2600	32000	0.61	6.93	27.3
PT-8	27-Apr-03	2,636.0 - 2,653.7	0.46	49000	22000	0.49	2800	35000	0.50	6.65	
PT-9	29-Apr-03	2,580.0 - 2,597.7	1.70*	7400*	2900*	0.77*	350*	4400*	1.20*	6.59	27.7
PT-10	2-May-03	2,217.0 - 2,234.7 tion in units of milligrams per	0.73	36000	16000	0.52	1800	26000	0.68	6.88	26.3 26.8

Packer pumping tests #1 through 5 were conducted on the Deep Monitor Well MW1 pilot hole.

Packer pumping-test depth intervals for straddle-packer intervals are measured from inflation-element centerlines.

^{* * &}quot; Sample collected from Test Interval #9 was not representative because formation did not yield enough water to purge one work-pipe storage volume.

Table 5. Summary of Packer Pumping-Test Data and Estimated Hydraulic Conductivity from Deep Monitor Well MW1 and Injection Well IW1 Pilot Holes Westport Injection Well System, Port St. Lucie, Florida

Test	Date	Packer Pumping-Test Depth Interval (feet below pad level)	Tested Aquifer Thickness	Pumping Rate (gpm)	Estimated Transmissivity dd/rec (gpd/ft)	Horizontal Hydraulic Conductivity dd/rec (gpd/sq ft)	Horizontal Hydraulic Conductivity dd/rec (cm/sec)	Method of Interpretation	Well/Location
1	13-Jan-03	2,054 - 2,100	46	24.2	317.1 295.6	6.9 6.4	0.000325 0.000303	Turcan (1963) Papadopulos-Cooper (1967)	78/7
2	14-Jan-03	1 922 - 1,968	46	77.0	4709.5 4743.2	102.4 103.1	0.004829 0.004863	Turcan (1963) Papadopulos-Cooper (1967)	o Montor Well WW1
3	15-Jan-03	1,855 - 1,901	46	9.54	257.0 257.2	5.6 5.6	0.000263 0.000264	Turcan (1963) Papadopulos-Cooper (1967)	intor We
4	17-Jan-03	1,750 - 1,796	46	82.7	5596.1 5294.2	121.7 115.1	0.005738 0.005428	Turcan (1963) Papadopulos-Cooper (1967)	Deep Mc
5	17-Jan-03	1,650 - 1,696	46	82	5952.5 5051.2	129.4 109.8	0.006103 0.005179	Turcan (1963) Papadopulos-Cooper (1967)	
6	26-Apr-03	2,880.0 - 2,897.7	17.7	8.8	100 82.6 / 84.0	5.6 4.7 / 4.7	0.000264 0.000220 / 0.000224	Turcan (1963) Papadopulos-Cooper (1967)	or safe
7	3-May-03	2,830.0 - 2,880.7	50.7	33.1	760 729.3 / 729.3	15.0 14.4 / 14.4	0.000707 0.000678 / 0.000678	Turcan (1963) Papadopulos-Cooper (1967)	
8	27-Apr-03	2,636.0 - 2,653.7	17.7	6.6	68.0 60.0 / 62.0	3.8 3.4 / 3.5	0.000179 0.000160 / 0.000165	Turcan (1963) Papadopulos-Cooper (1967)	injection Well 1W3
9	29-Apr-03	2,580.0 - 2,597.7	17.7	2.0	3.14	0.18	0.000008	Cooper-Jacob (1946)	, tillie
10 "gpd/ft" deno	2-May-03	2,217.0 - 2,234.7	17.7	2.6	28 20.5 / 24.2	1.6 1.2 / 1.4	0.000075 0.000055 / 0.000065	Turcan (1963) Papadopulos-Cooper (1967)	

^{*}gpd/sq ft* denotes horizontal hydraulic conductivity in *gallons per day per square foot* calculated by Turcan and Papadopulos-Cooper methods. "cm/sec" denotes hydraulic conductivity in units of "centimeters per second".

Calculations containing one value were dervied using recovery data; where two values are shown (ex. 60.0 / 62.0), values were derived using both drawdown and recovery data (drawdown / recovery). Based on its derivation, hydraulic conductivity by the Turcan (specific capacity) method is more reliable than transmissivity, which is an estimated value.

Based on its derivation, transmissivity by the Papadopulos-Cooper (log-log drawdown) method is more reliable than hydraulic conductivity, which is an estimated value.

ARCADIS

Appendix A

Certification of Well Completion for Injection Well IW1 and Deep Monitor Well MW1

ARCADIS REESE MACON & ASSOCIATES

Infrastructure, buildings, environment, communications

Joseph R. May, P.G.
Program Manager – UIC Section
Florida Department of Environmental Protection
400 N. Congress Ave., Suite 200
West Palm Beach, FL 33401

Reese, Macon and Associates, Inc. 6415 Lake Worth Road Suite 307 Lake Worth Florida 33463-2907 Tel 561 433 3226 Fax 561 433 8011 www.arcadis-us.com

Subject

Class I, Westport Injection Well System City of Port St. Lucie Permit No. 189145-001-UC

Dear Mr. May:

This is to certify that the construction of the Westport injection well, IW-1 and deep monitor wells, DMW-1 have been completed in accordance with the plans and specifications submitted and approved by the Florida Department of Environmental Protection and in accordance with Chapter 62-528 FAC. Record drawings are enclosed.

Should you have any questions or wish to discuss further, please call.

Sincerely,

Reese, Macon and Associates, Inc.

James T. Macon, P.E. Reg. No. 34308

August 27, 2003

James T. Macon, P.E.

Phone: (561) 433-3226

Email: jmacon@arcadis-us.com

Our ref: RF001121.0001



Florida Department of Environmental Protection

Twin Towers Office Bldg., 2600 Blair Stone Road, Tallahassee, Florida 32399-2400 DEP Form No: Form Title: 62-528.900(10) Certification of Monitor Well Completion

Effective Date: DEP Application No.:

(Filled in by DEP)

CERTIFICATION OF MONITOR WELL COMPLETION

Facility Name: WESTPORT Wastewater Treatment Plant
Owners Name: City of Port St. Lucie
Address: 900 S.E. Ogden Lane
City: Port St. Lucie State: Florida Zip: 34983
Well Contractor's Name: Youngquist Brothers, Inc.
Title: Tim Youngquist State License No.: 2172
Address: 15465 Pine Ridge Road
City: Fort Myers State: FL Zip: 33908
Well Location: 851 SW Darwin Blvd, Port St. Lucie, FL
UIC Construction Permit Number: 189145-001-UC Date Issued: 12/11/02
Monitor Well Purpose: (fill in all that are applicable)
1 On-site monitor well associated with Injection Well No(s). 1
Single Zone 2 Multizone
Regional monitor well
Other monitor well (specify)
Monitor Well Location:
Latitude/Longitude:
Location Relative to Injection Well(s):
Please indicate distance (in feet) and direction from each injection well for which the monitor well is associated. For regional monitor wells please indicate approximate distance and direction from a specified point at the injection facility and the address where the well is located.
27 14' 07"N / 80 21' 11" W
Monitor Well is located 50 feet south of injection well.
Actual Dimensions:
Diameter5.43 inches Monitoring Interval(s)1730'-1755';1920'-1970'
Well Depth 1970' feet Casing depth 1920' feet

DEP Form No: 62-528.900(10)
Form Title: Certification of Monitor

Effective Date:
DEP Application No.: (Filled in by DEP)

Deviations	from	the	appli	cation	and	plans	approved	by the	e Department	:	
								-	•		
				••							
											
· · · · · · · · · · · · · · · · · · ·									·	-	

Certification by Professional Engineer

I certify that the monitor well has been completed substantially in accordance with the approved plans and specifications, or that deviations will not prevent the monitor well from functioning in compliance with the requirements of Chapter 62-528, F.A.C., when properly operated and maintained. These determinations have been based upon on-site observation of well construction, scheduled or conducted by me or by a project representative under my direct supervision, for the purpose of determining if work proceeded in compliance with plans and specifications and application materials.

James T. Macon, RE. Florida Reg. No. 34308

(Affix Seal)

James T. Macon, P.E.
Name (please type)

34308

Florida Registration Number

ARCADIS Reese, Macon and Associates, Inc.

Company Name

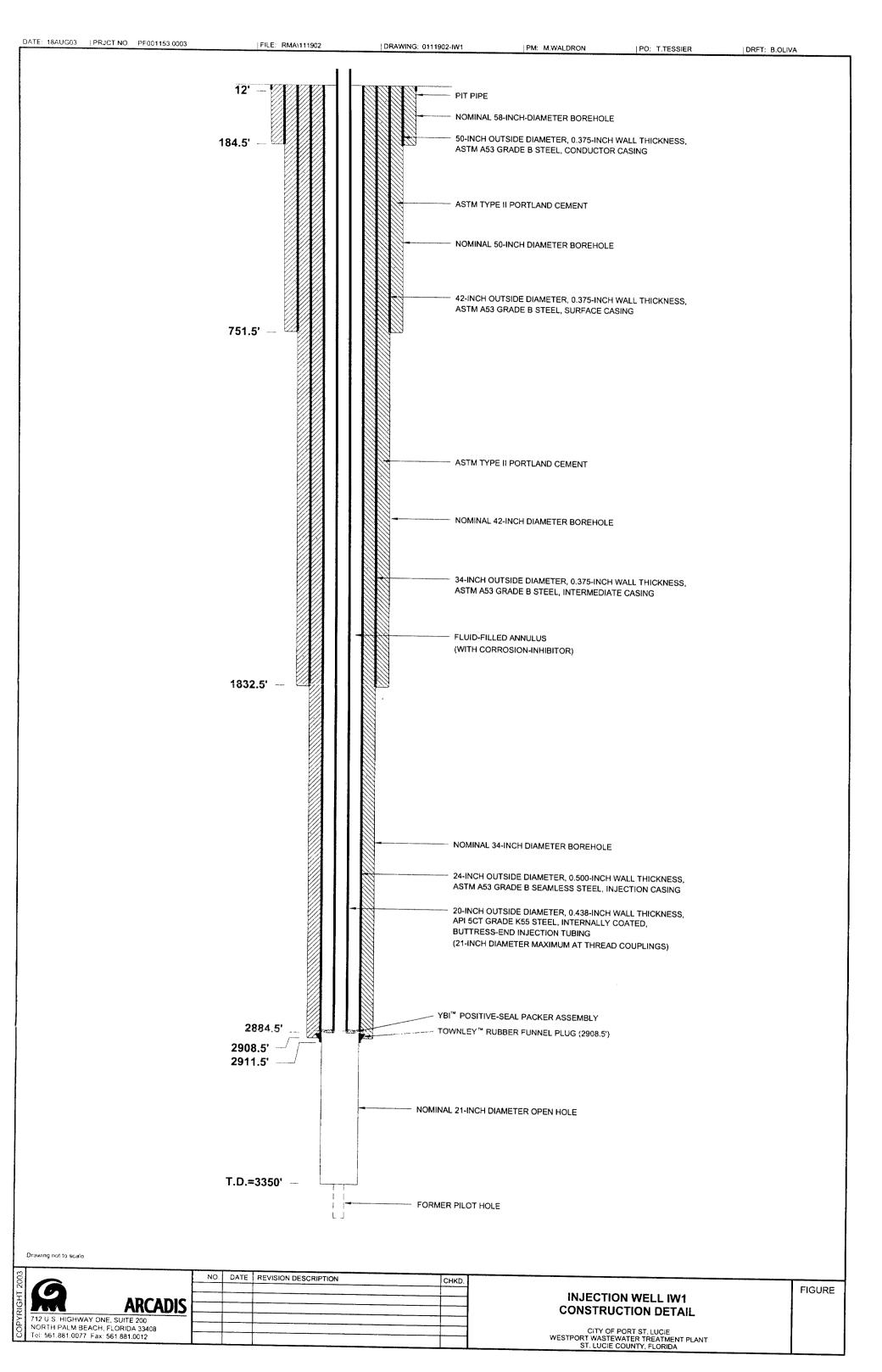
6415 Lake Worth Road, Suite 307

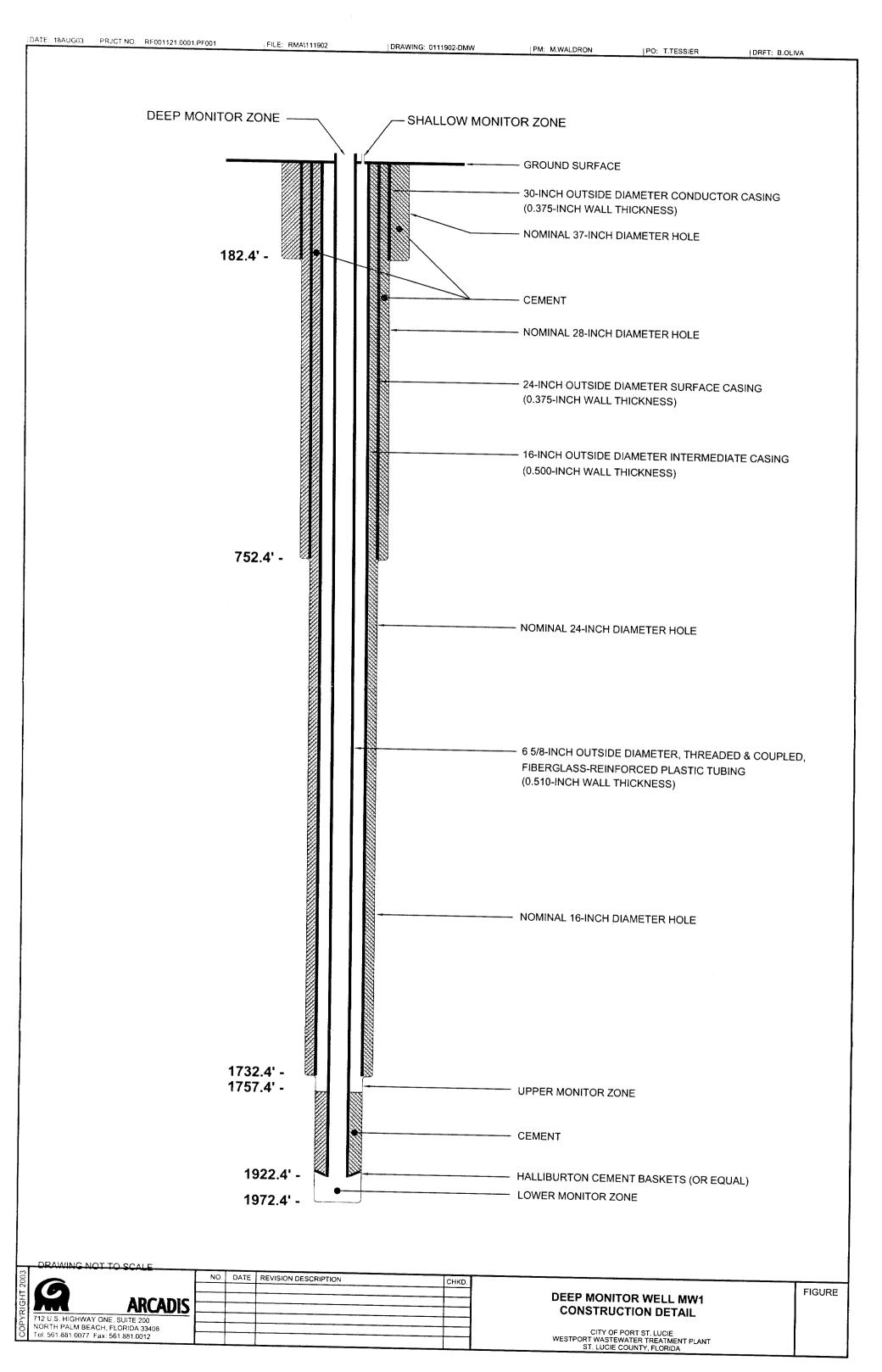
Company Address

Lake Worth
City

FL 33463-State Zip

Telephone No. (561) 433-3226





APPENDIX A: REPORT DISTRIBUTION CORE LABORATORIES LP FILE NO. HOU-030446

Youngquist Brothers, Inc.
Project No. PF001153.0003/Westport IW-1
Port St. Lucie, Florida
FINAL REPORT

3 Copies to:

Arcadis 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 Attn: Mr. Mike Waldron

ARCADIS

Appendix B

Permox Coating Data

IW1 Mill Certificates

MW1 Mill Certificates and FRP Product Cut Sheets



• O. F. M. SYSTEMS

• SPECIALTY FINISHES

♦ MAINTENANCE COATINGS

♦ HIGH PERFORMANCE COATINGS

YOUNGOUIST BROTHERS, INC. Has Reviewed this Shop Drawing/SubmittaPERMOX PIPE GLAZE YBI/Section No. # LTC -1/3/22 - FPCS-9043 TYPE II ASS FLAKE EPOXY Transmittal No. # 142 Dates C

Signature PIPE COATING

DESCRIPTION:

PCS-9043 TYPE II PIPE COATING is a high-build glass-flake epoxy coating specifically designed for use on concrete, ductile iron, steel pipe and related equipment. It is self priming and epoxy modified to produce thick films up to 60 mils dry film thickness in a single coat, where required. In field work, this product may be applied over damp surfaces and concrete with a moisture content of up to 26% at temperatures as low as 35°F, with unaffected chemical resistance and durability upon reaching full cure. When used in shop application, PCS-9043 TYPE II PIPE COATING provides easy application, outstanding adhesion, and recoat times of 2 hours minimum to 6 months maximum.

USE:

PCS-9043 TYPE II PIPE COATING is designed for Interior and exterior applications to pipe and related equipment. The high performance polyamine epoxy resin and laminar glass flake combine to produce a very tight, compact film with excellent abrasion and chemical resistance. The plate-like formation of glass flake produces a paint film of 0.0 perms when tested for six (6) weeks per ASTM 96-66 procedure A. The plate-like structure of glass flake in the cured Illm also provides superior coverage of irregular surface profile thus producing a holiday-free coating at lower film build when compared to coal-tar epoxies.

PCS-9043 TYPE II PIPE COATING can be used as an Interior and exterior coating for pipe in Industries such as chemical processing, pulp and paper, marine, water and sewage, offshore drilling, nuclear energy, textile, petroleum, and others.

PCS-9043 TYPE II PIPE COATING meets or exceeds all the requirements of the Corps of Engineers Specification C200; Steel Structures Painting Council Paint Specification SSPC-PT-16: AWWA C-210-84 liquid epoxy system for interior and exterior of steel water pipes; and DOD-P-23236(SH) Type I, Class I, Type III, Class I.

PRODUCT DATA:

V.O.C.

Color:

Gloss:

Suggested Film Thickness:

No. coats to achieve required Illim thickness: One to three coats

Volume Solids:

Theoretical Coverage:

.8 lbs per gallon

White, Black, & Standard Colors

80+ (60° Gloss Meter)

12 to 60 mils DFT depending on service

92% +/- 2%

1475 sq. ft. per gallon

No. of Components:

Bond Strength:

40100321003

Sandblasted Steel:

Concrete:

Mixing Ratio:

pH Tolerance: Pot Lile:

Application Temperature:

Dry Time:

To Touch:

To Recoat:

Full Cure:

For immersion:

Service Temperature:

Reducer & Clean-Up:

Packaging:

Shell Lile:

Two

2000 psi (Elcometer test)

Stronger than concrete 4 to 1 by volume

2 to 13

3 hrs at 77°F when reduced to spray, 1 hr

when not reduced. (Shorter at higher

temperatures)

20-140°F dry: 35-120°F wet

2 hrs @ 77°F

2 hrs minimum - 6 months maximum

7 days @ 77°F

5 days @ 77°F

300°F dry; 208°F submerged

(see "Chemical Resistance" chart for elevated

temperature immersion service.)

#76 Reducer

S-gallon kits

12 months in unopened containers. DO

NOT STORE ABOVE 90°F

SURFACE PREPARATION:

STEEL:

Non-Immersion: Solvent clean per SSPC-SP1 to remove all oil, grease, and loosely-adhering deposits.

Abrasive blast per SSPC-SP6 to remove all rust, mill scale, dust, and other surface

contaminants per SSPC-VIS 1-89.

Solvent clean per SSPC-SP1 to remove all oil, grease, and loosely-adhering deposits. Immersion:

Abrasive blast per SSPC-SP10 near-white conditions per SSPC-VIS 1-89.

None required. PCS-9043 TYPE II PIPE COATING has excellent adhesion to steel. Primer:

Brush blast to remove surface contaminants and roughen surface. Bug holes opened CONCRETE PIPE:

in the blasting process should be filled before coating.

None required. Primer:

Abrasive blast to remove all loosely-adherent oxides and loreign materials which **DUCTILE IRON:**

would adversely affect the coating adhesion. Since some oxides present after the manufacture of ductile iron pipe are so tightly adhered to the surface that they actually become an integral part of the pipe; the extent of abrasive blasting should be sufficient to remove the loosely-adherent oxides but not those that are tightly adhered. The

intent is to determine that the entire surface to be coated is struck by the blast media.

None required. Primer:

MIXING:

At temperatures higher than 80°F, refer to above paragraph on pot life to determine quantity to be mixed. DO NOT MIX MORE THAN CAN BE USED IN 3 HOURS FOR SPRAY APPLICATION, OR IN 1 HOUR FOR BRUSH APPLICATION.

Mix 4 gallons of BASE with 1 quart of REDUCER #76 until uniform with power mixer, then add in 1 gallon of HARDENER. Continue mixing for 3 minutes minimum, scraping sides of mixing container occasionally to ensure that all of the BASE component is thoroughly mixed in.

APPLICATION:

Brush, roller, spray. Do not use nylon or plastic equipment.

Spray Equipment:

Conventional Stray

Pump-Graco Bulldog (30:1) or equal Pump-Graco Mogul (8:1) or equal Line Pressure-70 to 90 psi Tip · 23 to 31 mil, reversible Tip filter - none Manifold filter - none or 30 mesh Hose-3/8" i.d., high pressure, for 50' or less length 1/2" i.d., high pressure, for over 50' with 3/8"H.P. whip end hose.

Airless Spray

Pressures-Material-30 to 55 psi Atomization - 50 to 90 psl Fluid Tip - 1/8" to 1/4" Atomizing tip - 3/16" (external wing) Hose - 1/2" i.d. to 50 ft. 3/4" i.d. for over 50 ft. Maximum working pressure 750 psi Minimum burst pressure 3000 psi

HOLIDAY DETECTION: Holiday detection is recommended. Use a wet sponge detector such as a Tinker and Rasor M-1 or AP/W .9 to 3.4 KV Dry Detector.

CATHODIC PROTECTION: PCS-9043 TYPE II PIPE COATING is compatible with conventional cathodic protection.

CHEMICAL

RESISTANCE:

PCS-9043 TYPE II PIPE COATING is hydrophobic and this accounts for the ability of the coating to displace moisture from the surface being coated. Most ambient temperature curing agents for epoxy coatings are either partially soluble in water or are easily emulsified so that effective cure in the presence of water is not possible. Except for a minor reduction in rate of cure, PCS-9043 TYPE II PIPE COATING is unaffected under the same circumstances.

The most common cause of coating failure is not lack of chemical resistance. Usually failures can be traced to inadequate surface preparation or to application under less than ideal conditions. PCS-9043 TYPE II PIPE COATING has been designed to minimize the Importance of surface preparation and ideal application conditions for all types of service, except immersion. The stresses of immersion service are so great that the best surface preparation possible must be specified; however, even with less than Ideal preparation, the excellent wetting properties and inertness to water of PCS-9043 TYPE II PIPE COATING will result in better performance than is possible with other coatings.

PCS-9043 TYPE II PIPE COATING is suitable for Immersion service at 77°F in the following:

Acetic Acid, 5%

Allphatic Hydrocarbons

Calcium Chloride

Citric Acid, 20%

Distilled Water

Gasoline

Hydrogen Peroxide, 5%

Phosphoric Acid, 10%

Potasslum Alum

Sodium Carbonate

Sour Crude Oil

Sulfuric Acid, 50%

Immersion service at elevated temperatures:

Black Liquor	160°F	Sea Water	180°F
Deionized Water	160°F	50% Sodium Hydroxide	120°F
Distilled Water	180°F	Tap Water	208°F
Green Liquor	160°F	White Liquor	160°F
Hydraulic Fluid	110°F		

Spillage conditions at room temperature:

room temperature.	
Ammonium Hydroxide, 20%	Hydrochloric Acid, 20%
Butyl Alcohol	Nitric Acid, 20%
Calcium Hypochlorite, 10%	Phosphoric Acid, 30%
Carbon Tetrachloride	Sodium Hypochlorite, 10%
Citric Acid, 25%	Sulfuric Acid, 85%
Ethyl Acetate	Toluene
Ethyl Alcohol	Xylene

WARRANTY:

Permite warrants that the BASE and HARDENER for PCS-9043 TYPE II PIPE COATING will be identical in chemical and physical properties from batch to batch within the specification limits of the raw materials used in their manufacture.

CAUTIONS:

PCS-9043 TYPE II PIPE COATING hardener is corrosive. Components of this product, when combined, may be skin irritants and/or skin sensitizers.

Rubber gloves should be worn to minimize skin contact. Practice caution and good personal cleanliness to avoid skin and eye contact. Avoid breathing vapors of heated material.

See material safety data sheet for full precautions prior to use.

If swallowed, do not induce vomiting. Call a physician immediately. For eye contact, flush with water. In case of skin contact, wash thoroughly with soap and water.

PCS-9043 TYPE II PIPE COATING is Intended for INDUSTRIAL USE ONLY.

PRODUCT PROFILE *

GENERIC DESCRIPTION

Modified Polyamidoamine Epoxy

COMMON USAGE

High-build, flexible coating for marginally prepared rusty steel and tightly adhering old coatings. Excellent abrasion-, chemical- and corrosion-resistance. Perfect foundation for

aliphatic-polyurethanes. NOT FOR IMMERSION SERVICE.

COLORS DC++ Off-White, 1243 Metallic Aluminum and more; refer to Tnemec Color Guide.

> Note: Epoxies chalk with extended exposure to sunlight. Lack of ventilation, incomplete mixing, miscatalyzation or the use of heaters that emit carbon dioxide and carbon monoxide

during application and initial stages of curing may cause vellowing to occur.

FINISH Semi-gloss

PERFORMANCE CRITERIA Extensive test data available. Contact your Tnemec representative for specific test results.

COATING SYSTEM

PRIMERS Steel: Self-priming

Galvanized Steel and Non-Ferrous Metal: Self-priming

TOPCOATS

Series 28, 29, 30, 66, N69, 73, 84, 104, 135, 161, 175, 1074, 1075. Note: When topcoating with Endura-Shield polyurethane finish, exterior exposed Series 135 has the following maximum time to recoat: Series 73, 175, 1074 or 1075, 60 days. If this time is exceeded, an epoxy intermediate coat or scarification is required before topcoating. Refer to appropriate topcoat data sheet for additional information.

SURFACE PREPARATION

STEEL Abrasive blast cleaning generally produces the best coating performance. If conditions won't

permit this. Series 135 may be applied to SSPC-SP2 or SP3 Hand or Power Tool Cleaned

surfaces.

GALVANIZED STEEL &

NON-FERROUS METAL PAINTED SURFACES Surface preparation recommendations will vary depending on substrate and exposure conditions. Contact your Themec representative or Themec Technical Services.

Test patch is recommended. Note: Contact Themec Technical Services if application is over

Series 4, 10 or chlorinated rubber coatings.

ALL SURFACES Must be clean, dry and free of oil, grease and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS.

84.0 ± 2.0% (mixed)

RECOMMENDED DFT

Conventional Build: 4.0 to 6.0 mils (100 to 150 microns) per coat.

Hi-Build: 7.0 to 9.0 mils (180 to 230 microns) per coat.

Note: Number of coats and thickness requirements will vary with substrate, application

method and exposure. Contact your Tnemec representative.

CURING TIME

Temperature	To Touch	To Handle	To Recoat
75°F (24°C)	6 hours at 5.0 mils DFT	18 hours	24 hours
	(125 microns)		

		1125 microns)	
	Curing time varies v	vith surface temperature, air movemer	t, humidity and film thickness.
VOLATILE ORGANIC	Unthinned	Thinned 15% (No. 19 Thinner)	Thinned 15% (No. 18 Thinner)
COMPOUNDS.	1.16 lbs-gallon	1.92 lbs/gallon	2.06 lbs: gallon

1.92 lbs/gallon (139 grams litre) (230) grams litre)

2.06 lbs/gallon (247 grams/litre)

THEORETICAL COVERAGE*

4.347 mil sq ft gal (33.1 m² L at 25 microns). See APPLICATION for coverage rates.

NUMBER OF COMPONENTS

Two: Part A and Part B

PACKAG:14G

Five-Gailon Kit: Consists of four gallons of Part A in a five-gallon pail and one gallon of Part

B in a one-gallon can. When mixed, yields five gallons (18.9L).

One-Gallon Kit: Consists of a partially filled one-gallon can of Part A and a partially filled

one-quart can of Part B. When mixed, yields one gallon (3.79L)

NET WEIGHT PER GALLON!

Series 135: 12.30 ± 0.25 lbs $(5.58 \pm .11 \text{ kg})$ (mixed)

135-1243: 11.52 ± 0.25 lbs $(5.23 \pm .11 \text{ kg})$ mixed $Minimum (2 - F) e^{-1} \epsilon.$

Maximum 12 difference

STORAGE TEMPERATURE TEMPERATURE RESISTANCE

*Dryn Centinucus 2562F+121FC+

Intermittent 275 F (135) C

SHELF LIFE

24 months at recommended storage temperature.



SERIES 135 Chembuild®

TECHNICAL DATA continued

FLASH POINT - SETA

Part A: 75°F (25°C)

Part B: 201°F (94°C)

HEALTH & SAFETY

Paint products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product. Keep out of the reach of children.

APPLICATION

COVERAGE RATES*

Conventional Build (Spray, Brush or Roller)

Hi-Build (Spray Only)

	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m²/Gal)	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m²/Gal)
Suggested	5.0 (125)	6.0 (150)	269 (25.0)	8.0 (205)	9.5 (240)	168 (15.6)
Minimum	4.0 (100)	5.0 (125)	337 (31.3)	7.0 (180)	8.5 (215)	192 (17.8)
Maximum	6.0 (150)	7.0 (180)	224 (20.8)	9.0 (230)	11.0 (280)	150 (13.9)

Note: Can be spray applied at 7.0 to 9.0 mils (180 to 230 microns) DFT per coat when extra protection or the elimination of a coat is desired. Can be sprayed at 4.0 to 6.0 mils (100 to 150 microns) DFT per coat for use in systems requiring a conventional build. Brush or roller will normally achieve the 4.0 mil (100 microns) minimum for conventional build application. However, under certain conditions some colors may require two coats to achieve suggested film thickness. Allow for overspray and surface irregularities. Film thickness is rounded to the nearest 0.5 mil or 5 microns. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance.

MIXING

Power mix contents of each container, making sure no pigment remains on the bottom. Add the contents of the can marked Part B to Part A while under agitation. Continue agitation until the two components are thoroughly mixed. Do not use mixed material beyond pot life limits. Note: Both components must be above 50°F (10°C) prior to mixing. For application to surfaces between 50°F to 60°F (10°C to 16°C), allow mixed material to stand thirty (30) minutes and restir before using. For optimum application properties, blended components should be above 60°F (16°C).

POT LIFE

8 hours at 50°F (10°C)

4 hours at 77°F (25°C)

2 hours at 100°F (38°C)

THINNING

For air or airless spray, thin 10% to 15% or 45 pint to 15 pints (380 to 570 mL) per gallon with No. 19 Thinner. For brush or roller, thin 10% to 15% or % pint to 15 pints (380 to 570 mL) per gallon with No. 18 Thinner.

SURFACE TEMPERATURE

Minimum 50°F (10°C)

Maximum 135°F (57°C)

The surface should be dry and at

least 5°F (3°C) above the dew point. **Note:** Amine blush may develop during cure if the surface temperature drops below the minimum, particularly under high humidity. Blush must be removed prior to topcoating; contact your Themee representative.

APPLICATION EQUIPMENT

Air Spray

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure	Pot Pressure	
DeVilbiss	Е	765 = e	5 16 or 3 8"	3 8" or 1 2"	70-90 psi	20~30 psi	
MBC or JGA		or 78	€7.9 or 9.5 mm ²	(9.5 or 12.7 mm)	(4.8-6-2 bar)	(1.4-2.	

Low temperatures or longer hoses require higher pot pressure.

Airless Spray

Tip Orifice	Atomizing Pressure	Mat'l Hose ID	Manifold Filter
0.015"-0.021"	2800-4200 psi	1 +" or 3/8"	60 mesh
(380-535 microns)	(193-290 bar)	(6.4 or 9.5 mm)	(250 microns)

Use appropriate tip atomizing pressure for equipment, applicator technique and weather conditions. Note: Series 135-1243 must be applied by brush or roller to achieve aluminum appearance. For spray application, contact your Themee representative.

Roller: Use 3.8" or 1.2" (9.5 mm or 12.7 mm) synthetic nap covers.

Brush: Use high quality natural or synthetic bristle brushes

CLEANUP

Flush and clean all equipment immediately after use with the recommended thinners or MEK. Values may vary with color.

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realistic existence in the relection of use at the coming FGA NGESTRAN AFFORM

PRODUCT PROFILE

GENERIC DESCRIPTION Polyamide Epoxy

COMMON USAGE Industry standard for epoxy coatings for over 30 years. Known for its forgiving application

characteristics in adverse and varied conditions, and for benchmark performance.

COLORS Refer to Tnemec Color Guide. Note: Epoxies chalk with extended exposure to sunlight and

may yellow on aging. Lack of ventilation, incomplete mixing, miscatalyzation or the use of heaters that emit carbon dioxide and carbon monoxide during application and initial stages

of curing may accelerate any potential yellowing.

FINISH Satin

SPECIAL QUALIFICATIONS Meets the performance requirements of AWWA C 210 (not for potable water contact).

Contact your Tnemec representative for system recommendations.

PERFORMANCE CRITERIA Extensive test data available. Contact your Tnemec representative for specific test results.

COATING SYSTEM

PRIMERS Steel: Self-priming or Series 20, 37H, N69, 90, 91-H₂0, 161, 530

Galvanized Steel and Non-Ferrous Metal: Self-priming

Concrete: Self-priming, 5-i-660, 201, 216, 218

CMU: 54-562, 54-660, 130, 216, 218

Drywall: 51-792 for dry interior environments

TOPCOATS 46H-413, 66, N69, 73, 84, 104, 113, 114, 161, 175, 262, 265, 291, 1074, 1075

Refer to COLORS on applicable topcoat data sheets for additional information.

SURFACE PREPARATION

STEEL Immersion Service: SSPC-SP10 Near-White Blast Cleaning

Non-Immersion Service: SSPC-SP6 Commercial Blast Cleaning

PRIMED STEEL Immersion Service: Scarify the Series 66 prime coat surface by abrasive-blasting with a fine

> abrasive before topcoating if: (a) the 66 prime coat has been in exterior exposure for 60 days or longer and 66, 46H-413, N69 or 161 is the specified topcoat; (b) the 66 prime coat has been in exterior exposure for 14 days or longer and Series 104 is the specified topcoat; (c) the 66 prime coat has been in exterior exposure for 7 days or longer and Series 262 or

265 is the specified topcoat.

GALVANIZED STEEL & Surface preparation recommendations will vary depending on substrate and exposure

NON-FERROUS METAL conditions. Contact your Themec representative or Themec Technical Services.

CAST/DUCTILE IRON Contact your Themec representative or Themec Technical Services

CONCRETE Allow new concrete to cure 28 days. Abrasive blast referencing SSPC-SP13/NACE 6 Surface

Preparation of Concrete and Tnemec's Surface Preparation and Application Guide.

Allow mortar to cure for 28 days. Level protrusions and mortar spatter.

CMU

PAINTED SURFACES Non-Immersion Service: Ask your Themec representative for specific recommendations.

ALL SURFACES Must be clean, dry and free of oil, grease and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS* 56.0 ± 2.0% (mixed)

RECOMMENDED DFT 2.0 to 6.0 mils (50 to 150 microns) per coat. Note: Number of coats and thickness

requirements will vary with substrate, application method and exposure. Contact

your Tnemec representative.

CURING TIME Temperature To Touch To Handle To Recoat Immersion

5°F (24°C) 2 hours 10 hours 12 hours days

Curing time varies with surface temperature, air movement, humidity and film thickness,

VOLATILE ORGANIC Unthinned Thinned 5% Thinned 10% COMPOUNDS: 3.04 lbs gallon 3.22 lbs gallon 3.39 lbs. gallon

(364 grams:litre) (406 grams litre) +385 grams litre) THEORETHIAL CONERAGE! 898 mil sq ft gal (220) mil Lat 25 micronish See APPLICATION for a worage rates

NUMBER OF COMPONENTS Two: Part A and Part B

> PACKAGING 5 gallon (18.9L) pails and 1 gallon (3.79L) cans — Order in multiples of 2

NET WEIGHT PER GALLONI $12.50 \pm 0.25 \text{ (bs.)} 5.07 \pm .11 \text{ kg.} \cdot \text{mixed}$

STORAGE TEMPERATURE Minimum 20°F (-"°C) Maximum Hoff (43°C)

> Politished technical foto and instructions are subject to change without value. The armine ortalog at www.themeo.com should be referenced for the most rte difeshiolof Mitolical instructions in volume, cost of volumenes representative for larged tool will his be only treat







SERIES 66 Hi-Build Epoxoline

TECHNICAL DATA continued

TEMPERATURE RESISTANCE (Dry) Continuous 250°F (121°C) Intermittent 275°F (135°C)

SHELF LIFE

Part A: 24 months; Part B: 12 months at recommended storage temperature.

FLASH POINT - SETA

Part A: 82°F (28°C)

Part B: 64°F (18°C)

HEALTH & SAFETY

Paint products contain chemical ingredients which are considered hazardous. Read container label warning and Material Safety Data Sheet for important health and safety information prior to the use of this product. Keep out of the reach of children.

APPLICATION

COVERAGE RATES*

	Dry Mils (Microns)	Wet Mils (Microns)	Sq Ft/Gal (m²/Gal)
Suggested	4.0 (100)	7.0 (180)	225 (20.9)
Minimum	2.0 (50)	3.5 (90)	450 (41.8)
Maximum	6.0 (150)	10.5 (265)	150 (13.9)

Note: The above reflects the total range to which Series 66 can be applied for specific applications. To insure the proper thickness and number of coats is specified for certain substrates and exposures, consult the Tnemec Guide Specifications and/or contact your Tnemec representative. Note: Roller or brush application may require two or more coats to obtain recommended film thickness. Allow for overspray and surface irregularities. Film thickness is rounded to the nearest 0.5 mil or 5 microns. Application of coating below minimum or above maximum recommended dry film thicknesses may adversely affect coating performance.

MIXING

Power mix contents of each container, making sure no pigment remains on the bottom. Pour a measured amount of Part B into a clean container large enough to hold both components. Add an equal volume of Part A to Part B while under agitation. Continue agitation until the two components are thoroughly mixed. Do not use mixed material beyond pot life limits. Note: Both components should be above 50°F (10°C) prior to mixing. For application to surfaces between 50°F to 60°F (10°C) to 16°C), allow mixed material to stand thirty (30) minutes and restir before using. For optimum application properties, blended components should be above 60°F (16°C). Mixing ratio is one to one by volume.

POT LIFE

20 hours at 50°F (10°C)

10 hours at *** (25°C)

4 hours at 100°F (38°C)

THINNING

Use No. 4 Thinner. For air spray, thin up to 10% or ¼ pint (380 mL) per gallon. For airless spray, roller or brush, thin up to 5% or ¼ pint (190 mL) per gallon.

SURFACE TEMPERATURE

Minimum 50°F (10°C)

The surface should be dry and at

Maximum 135°F (5°°C)

least 5°F (3°C) above the dew point. Coating won't cure below minimum surface temperature.

APPLICATION EQUIPMENT

Air Spray

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure	Pot Pressure	
DeVilbiss	Е	765	5 16" or 3-8"	3.8" or 1:2"	75-100 psi	10-20 psi	
MBC or JGA		or 78	(7.9 or 9.5 mm)	(9.5 or 12.7 mm)	(5.2-6.9 bar)	(0.7-1.4 bar)	

Low temperatures or longer hoses require higher pot pressure.

Airless Spray

Tip Orifice	Atomizing Pressure	Mat'l Hose ID	Manifold Filter
0.015"-0.019"	1800-3000 psi	L+" or 3/8"	60 mesh
(380-485 microns)	(124-207 bar)	(6.4 or 9.5 mm)	(250 microns)

Use appropriate tip-atomizing pressure for equipment, applicator technique and weather conditions. Note: Application over inorganic zinc-rich primers: Apply a wet mist coat and allow tiny bubbles to form. When bubbles disappear in 1 to 2 minutes, apply a full wet coat at specified mil thickness. Roller: Roller application optional when environmental restrictions do not allow spraying. Use 3.8° or 1.2° (9.5 mm or 12.7° mm) synthetic nap covers.

Brush: Recommended for small areas only. Use high quality natural or synthetic bristle brushes.

CLEANU?

Flush and clean all equipment immediately after use with the recommended thinner or MEK.

*Values may vary with color.

AMMAIN COMMISSIAM SEMBLICS (ABOLIC) Towards Company and Ammais and that it soutings represented between meet the formanism strangers in financial Control, but HE MATTAN FORSCHIERD IN THE 1880HE PARAGRAPH GHARL BE IN EIRE OF NAT GYMER MATTAN FOR PRESSER CHOWNERD. INCLUDING BUT NOT CHAPTE TO, AND WREED MATTAN FOR METCHANTERIEF OF PRINCESS FOR A PERTICULAR PORROSE THERE NO MARRANTES THAT ENTEND BETOND THE DESCRIPTION IN THE PACE HEREOF. The buser's core and exclusive remeds, opening there is undown in the description of the product should be bound to exist and the exclusive remeds should not have tabled its escential purpose as long as Themed is willing to provide companion replacement product to the buser. NO Office arrangement of the product should be bound to exist and the exclusive remeds should not be secondary and the product should be bound to exist and the product should be bound to exist and the product of the bound of the product should be bound to exist and the product of the bound of the product of the bound of the product of the bound of the product should be bounded in the product of the bound of the product 1888. Sink (1881 AUMINABEL 10 Titls Burk 11 Technical own representation where it is provided for the purpose of extra own in greated profile of the courting only proper courting controlled an incomplete extraording of several courting of the medical own of th should be exercised in the selection and use of the contraging FCP INDESTRIAL USE CASE

PRODUCT PROFILE

GENERIC DESCRIPTION

Aliphatic Acrylic Polyurethane

COMMON USAGE

A coating highly resistant to abrasion, wet conditions, corrosive fumes, chemical contact and exterior weathering. High build quality combines with project specific primers for two-coat,

labor saving systems. NOT FOR IMMERSION SERVICE.

COLORS

Refer to Tnemec Color Guide. Note: Certain colors may require multiple coats depending on method of application and finish coat color. When feasible, the preceding coat should be in the same color family (blue, gray, etc.), but noticeably different.

FINISH

Semi-gloss

SPECIAL QUALIFICATIONS

TNEMEC

Series 73 meets the requirements of SSPC-36 Paint Standard.

PERFORMANCE CRITERIA

Extensive test data available. Contact your Tnemec representative for specific test results. enurolnos vol vino al acidam à s

COATING SYSTEM

PRIMERS Steel: Series 20, 37H, 66, N69, 90-97, 91-H,0, 104, 135, N140, 161 Galvanized Steel and Non-Ferrous Metal: Series 66, N69

Goncrete: 54-660, 86, N69, 104

CMU: 54-660

*Note: Series 104 or 135 exterior exposed more than two months, or Series N69 or N140 rexterior exposed more than three months must first be scarified or reprimed with themselves. Brush blasting with fine abrasive is the preferred method of scarification.

Series 76, optional when extended weatherability is desired.

TOPCOAT

our mass exilet

SURFACE PREPARATION

ALL SURFACES

Must be clean; dry and free of oil, grease and other contaminants.

TECHNICAL DATA

VOLUME SOLIDS*

 $58.0 \pm 2.0\%$ (mixed)

RECOMMENDED DFT

2.0 to 5.0 mils (50 to 125 microns) per coat. Note: Number of coats and thickness requirements will vary with substrate, application method and exposure. Contact

your Tnemec representative.

CURING TIME

Temperature	To Touch	To Handle	To Recoat
75°F (24°C)	1 hour	5-8 hours	12 hours

Curing time varies with surface temperature, air movement, humidity and film thickness. Note: For faster curing and low-temperature applications, add No. 44-710 Urethane Accel-

erator; see separate product data sheet.

VOLATILE ORGANIC

COMPOUNDS*

Unthinned

Thinned 10% (No. 39 Thinner) Thinned 10%

3.16 lbs/gallon

3.44 lbs/gallon

(No. 42 Thinner) 3.48 lbs/gallon

(378 grams/litre)

(412 grams/litre)

(417 grams/litre)

THEORETICAL COVERAGE* NUMBER OF COMPONENTS 930 mil sq ft/gal (22.8 m²/L at 25 microns).

Two: Part A and Part B

PACKAGING

Five-Gallon Kit: Consists of four gallons of Part A in a five gallon pail and one gallon of Part

B in a separate container. When mixed, yields five gallons (18.9L).

One-Gallon Kit: Consists of a partially-filled one gallon can labeled Part A and a partially

filled quart can labeled Part B. When mixed, yields one gallon (3.79L).

NET WEIGHT PER GALLON*

 11.82 ± 0.25 lbs $(5.36 \pm .11 \text{ kg})$

Maximum 110°F (43°C)

STORAGE TEMPERATURE TEMPERATURE RESISTANCE Minimum 20°F (-7°C)

Intermittent 275°F (135°C)

SHELF LIFE

(Dry) Continuous 250°F (121°C) Part A: 24 months at recommended storage temperature.

Part B: 12 months at recommended storage temperature.

FLASH POINT - SETA

Part A: 55°F (13°C)

Part B: 104°F (40°C)

HEALTH & SAFETY

Paint products contain chemical ingredients which are considered hazardous. Read con-

tainer label warning and Material Safety Data Sheet for important health and safety informa-

tion prior to the use of this product. Keep out of the reach of children.



TUBULAR FIBERGLASS CORPORATION

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September 2002

RED BOX 2250

FIBERGLASS TUBING, CASING, AND LINERS AROMATIC AMINE CURED EPOXY RESIN

DIMENSIONAL SPECIFICATIONS

Nominal Size	Nominal I.D.	Minimum Drift Dia	Nominal O.D.	Nominal Wall	Pin Upset O.D.	Max Box OD(inches)	Max Box OD(inches)	Nomina	l Weight	Connection Type
(inches)	(inches)	(inches)	(inches)	(inches)	(inches)	IJ Conn.*	TC Conn.*	(lbs/ft)	(lbs/jt)	API 5B, Table 14*, 7**, 6*** Fourteenth Edition August 96
2-3/8	2.00	1.91	2.38	0.19	2.69	3.28	2.99	1.2	35	2-3/8" 8Rd EUE Long*IJ/TC
2-7/8	2.47	2.37	2.93	0.23	3.19	3.79	3.50	1.7	52	2-7/8" 8Rd EUE Long*IJ/TC
3-1/2	3.00	2.90	3.58	0.29	3.85	4.67	4.31	2.6	79	3-1/2" 8Rd EUE Long*IJ/TC
4-1/2	3.98	3.89	4.74	0.38	4.85	5.74	5.62	4.5	135	4-1/2" 8Rd EUE Long*IJ/TC
5-1/2	4.42	4.33	5.28	0.43	5.60	6.54	6.34	5.8	173	5-1/2" 8Rd Csg Long**IJ/TC
6-5/8	5.43	5.33	6.46	0.52	6.73	8.17	7.89	8.5	256	6-5/8" 8Rd Csg Long**IJ/TC
7-5/8	6.21	6.11	7.39	0.59	7.73	9.08	9.10	11.2	335	7-5/8" 8Rd Csg Long**IJ/TC
9-5/8	7.84	7.75	9.32	0.74	9.73	11.95	11.48	17.7	531	9-5/8" 8Rd Csg Short***IJ/TC
10-3/4	8.85	8.76	10.52	0.83	10.85		13.10	22.7	682	10-3/4" 8Rd Csg Short***TC
<u> </u>										

^{*}Depending on the application, smaller maximum box diameters are available.

30 ft Standard Joint Length

PERFORMANCE AND RATINGS (-60 deg F to +210 deg F)

Nominal Size	Internal Pressure Rating (psi)	Mill Test Pressure (psi)	Collapse Rating (psi)	Axial Tension Rating (lbs)	Stretch vs. Tension-Over-Pipe-Wi Stretch (ft) = Coeff. x P x L
2-3/8	2,250	2,600	2,600	18,500	0.255
2-7/8	2,250	2,600	2,600	25,500	0.170
3-1/2	2,250	2,600	2,700	34,500	0.110
4-1/2	2,250	2,600	2,600	50,000	0.064
5-1/2	2,250	2,600	2,700	55,000	0.050
6-5/8	2,250	2,600	2,600	75,000	0.034
7-5/8	2,250	2,600	2,600	92,500	0.026
9-5/8	2,250	2,600	2,600	130,000	0.017
10-3/4	2,250	2,600	2,600	160,000	0.013
				•	

Where:

P = Tensile Load (1,000 lbs)

L = String Length (1,000 ft)

MECHANICAL AND PHYSICAL PROPERTIES

TUBING/CASING BODY PROPERTIES	UNIT	VALUE	VALUE	TEST METHOD
		2-3/8 - 10-3/4	11-3/4 - 13-3/8	
Tensile Strength, Hoop	psi	31,300	31,300	ASTM D1599
Tensile Strength, Axial	psi	30,000	20,000	ASTM D2105
Modulus of Elasticity, Axial	10E+06 psi	3.0	2.0	ASTM D2105
Long Term Hydrostatic Strength at 20 Years	psi	16,875	19,109	ASTM D2992 (B)
Specific Gravity		1.9	1.9	ASTM D792
Density	lbs/in ³	0.07	0.07	ASTM D792
Thermal Conductivity	Btu/hr/ft²/in/degF	2.4	2.4	ASTM C177
Thermal Expansion Coefficient (Linear)	10E-05in/in/degF	1.1	1.2	ASTM D696
Flow Factor		150	150	Hazen Williams







TUBULAR FIBERGLASS CORPORATION

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USES AND APPLICATIONS

RED BOX fiberglass reinforced aromatic amine cured epoxy resin casing and tubing is designed for downhole services of medium to high pumping pressure at depths as great as 13,000 feet.

RED BOX is available in 1000, 1250, 1500, 1750, 2000, 2250, 2500, 2750, 3000 and 3250 psi operating pressure ratings.

RED BOX offers a high-strength, non-corroding casing and tubing system in 2-3/8 through 13-3/8 inch sizes that has a proven low installed cost and long lifespan.

RED BOX casing and tubing system is recommended for use in:

- production wells (oil, gas, thermal)
- disposal wells (salt water, chemical effluent, and waste)
- injection wells (salt water, CO2, polymer)
- liners for the repair of corroded steel casing
- municipal and commercial water wells.

COMPOSITION AND CLASSIFICATION

RED BOX casing and tubing is of a machine-made composite material, produced by the filament-winding method, combining high strength glass fiber filaments and corrosion resistant epoxy resin specially formulated to result in a structurally and chemically optimum product. The epoxy resin is an aromatic amine cured system that has the highest mechanical strength, thermal resistance and best corrosion resistance of all commercially available resin systems used in the fabrication of fiberglass tubulars.

RED BOX casing and tubing will be authorized to use the API monogram by conforming to API Specification 15TR (when issued). The Tubular Fiberglass Corporation Quality Management System is certified to be in compliance with ISO-9001 and ANSI-RAB.

RED BOX pipe conforms to ASTM Specification D2996 (Designation RTRP-11AT-1334) and ASTM Classification D2310 (Designation RTRP-11AT).

JOINING SYSTEM AND FITTINGS

RED BOX casing and tubing products are connected with the reliable, time proven integral joint API 8 round external upset end (EUE) long threaded connections, or casing long threaded connections. Pin ends are lathe cut while box ends are filament-wound as integral part of the tubing body.

RED BOX casing and tubing system is offered with a complete line of accessories including guide shoes, float collars, centralizers, polished bore receptacle stingers, and slotted screens.

The information published in our catalogue and on our web site is intended as a guide to our clients and customers. While Tubular Fiberglass Corporation makes a good faith effort to ensure the accuracy of such information and content, the reader should be aware that any information, graphics and content contained in our catalogue and on our web site does not constitute a warranty of any kind or sort. All rights and obligations relating to sales and purchases of our products and services are governed by the terms and conditions of the written documents evidencing each such sale or purchase.





SHIPPING PROCEDURES

PIPE, TUBING, AND CASING UP TO 6 INCH SIZE IN PIPE, (6-5/8 INCH IN CASING), IS PACKAGED IN OPEN-SIDE STEEL BAND REINFORCED WOODEN CRATE FRAMES PER THE DIAGRAM BELOW. DEPENDENT ON THE WALL THICKNESS OF THE PIPE SHIPPED, INDIVIDUAL CRATES WEIGH FROM 3,500 TO 5,000 LBS. THE CRATE OUTSIDE DIMENSIONS ARE 48 INCHES WIDE BY 21 INCHES TALL BY APPROXIMATELY 32 FEET LONG. TYPICALLY TEN CRATES CAN BE LOADED ON A STANDARD FLATBED TRAILER. THE CRATES CAN BE EASILY HANDLED WITH EITHER A CRANE OR A FORKLIFT.

ALWAYS USE NYLON STRAPS ON CRANE LIFTS AND SOME FORM OF PADDING ON FORKLIFT FORKS

TRUCK AND CONTAINER LOAD QUANTITIES ARE DETAILED ON THE FOLLOWING PAGES



DETAILS.

FOR LONG-TERM STORAGE. A TARP OR PLASTIC SHEETING WILL PROVIDE SUITABLE PROTECTION. SEE THE INSTALLATION INSTRUCTIONS FOR MORE

CRATE FRAME QUANTITIES

SIZE	JTS/CRATE	FEET/CRATE
2" / 2-3/8"	110	3,300
2-1/2" / 2-7/8"	83	2,490
3" / 3-1/2"	54	1,620
4" / 4-1/2"	34	1,020
5" / 5-1/2"	23	690
6" / 6-5/8"	17	510

PARTIAL HEIGHT CRATES ARE AVAILABLE FOR SPECIFIC LOAD QUANTITIES. AN OPEN TOP CONTAINER WILL HOLD 7-1/2 CRATES.

TUBULAR FIBERGLASS CORPORATION HOUSTON, TEXAS (281) 847-2987

CRATE FRAME

CATALOGUE INSERT

12580 8/15/01 NONE "CRATING"

TRUCKLOAD AND CONTAINER LOAD QUANTITIES RED BOX FIBERGLASS DOWNHOLE TUBING AND CASING

Joints/Feet per Truckload

PIPE				SURE F	RATING .	RED BO	OX TUBI	NG & C/	SING		
SIZE	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500
2-3/8"	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,046	941	866	787
	33,000	33,000	33,000	33,000	33,000	33,000	33,000	31,366	28,216	25,976	23,624
2-7/8"	830	830	830	830	830	830	769.44		632.16	575.13	476.37
	24,900	24,900	24,900	24,900	24,900	24,900	23,083	21,012	18,965	17,254	14,291
3-1/2"	540	540	540	540	540	540	518.53		422.53	386.4	
	16,200	16,200	16,200	16,200	16,200	16,200	15,556	14,030	12,676	11,592	
4-1/2"	340	340	340	340	340	334.31	299.94		228.75		
	10,200	10,200	10,200	10,200	10,200	10,029	8,998	7,502	6,863		
5-1/2"	230	230	230	230	230	230	230	211.58	191.12		
	6,900	6,900	6,900	6,900	6,900	6,900	6,900	6,347	5,734		
6-5/8"	170	170	170	170	170	170	156.05	140.73			
	5,100	5,100	5,100	5,100	5,100	5,100	4,681	4,222			
*7"	125	125	125	125							
	3,750	3,750	3,750	3,750							
*7-5/8"	100	100	100	100	100	100	100	100			
	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000			
*9-5/8"	64	64	64	64	64	64	64	64			
	1,920	1,920	1,920	1,920	1,920	1,920	1,920	1,920			
*10-3/4"	56	56	56	56	56	56	56				
	1,680	1,680	1,680	1,680	1,680	1,680	1,680				
*11-3/4"	49	49	49	49	49						
	1,470	1,470	1,470	1,470	1,470						
*13-3/8"	36	36	36								
	1,080	1,080	1,080						i		

Joints/Feet per Container

PIPE		825 24,750 23,520 21,150 19,470 17,7 623 623 623 623 623 623 577 525 474 431 35 18,690 18,690 18,690 18,690 17,310 15,750 14,220 12,930 10,7 405 405 405 405 405 389 351 317 290 12,150 12,150 12,150 12,150 12,150 11,670 10,530 9,510 8,700 255 255 255 255 251 225 188 172 7,650 7,650 7,650 7,650 7,530 6,750 5,640 5,160													
SIZE	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500				
2-3/8"	825	825	825	825							591				
	24,750	24,750	24,750	24,750	24,750	24,750	24,750				17,730				
2-7/8"	623										357				
	18,690	18,690	18,690			A Sec. of the base agencies of					10,710				
3-1/2"	405	405	405												
	12,150	12,150	12,150	12,150						8,700					
4-1/2"	255		255												
	7,650	7,650	7,650	7,650.	7,650	7,530	6,750								
5-1/2"	173	173	173	173	173	173	173	159							
	5,190	5,190	5,190	5,190	5,190	5,190	5,190	4,770	4,290						
6-5/8"	128	128	128	128	128	128	117	106							
	3,840	3,840	3,840	3,840	3,840	3,840	3,510	3,180							
*7"	107	107	107	107											
	3,210	3,210	3,210	3,210											
*7-5/8"	89	89	89	89	89	89	89								
	2,670	2,670	2,670	2,670	2,670	2,670	2,670								
*9-5/8"	56	56	56	56	56	56	56								
	1,680	1,680	1,680	1,680	1,680	1,680	1,680								
*10-3/4"	42	42	42	42	42	42									
	1,260	1,260	1,260	1,260	1,260	1,260									
*11-3/4"	41	41	41	41	41						i				
	1,230	1,230	1,230	1,230	1,230										
*13-3/8"	30	30	30						I	l	ł				
	900	900	900							l	<u> </u>				

[•] THESE LARGER SIZES ARE UNSUITABLE FOR CRATE FRAMES AND ARE LOADED IN ROWS AND COLUMNS ON FLATBED TRAILERS WITH WOOD DUNNAGE BETWEEN ROWS AND SIDE FRAMES AT EACH DUNNAGE CROSS SLAT.



City of Port St. Lucie Westport Injection Well System

Port St. Lucie, Florida

CASING TALLY FORM Date: 07/18/03

Injection Well IW1 24-inch Outside Diameter, 0.500-inch Wall Thickness Steel Injection Casing

Section	Casing	Cumulative	Heat		Section	Casing	Cumulative	Heat
No.	Length (feet)		Number		No.	Length (feet)	Length (feet)	Number
Reducer.+ plug	8.88	8.88			37	41.17	1521.22	A46076
1	35.70	44.58	B45662		38	40.65	1561.87	A46076
2	42.79	87.37	A46076		39	39.54	1601.41	A45276
3	42.03	129.40	A46076		40	39.86	1641.27	A45276
4	42.16	171.56	A46076		41	38.33	1679.60	B45661
5	42.00	213.56	A46076		42	41.52	1721.12	A45276
6	42.00	255.56	A46076		43	40.35	1761.47	A46076
7	36.94	292.50	A46076		44	42.00	1803.47	A46076
8	41.16	333.66	A46076		45	41.60	1845.07	A46076
9	40,90	374.56	A43196		46	41.27	1886.34	A46076
10	42.51	417.07	A43195		47	41.94	1928.28	A46076
11	43.13	460.20	B45662		48	40.46	1968.74	A46076
12	39.13	499.33	A43196		49	41.55	2010.29	A46076
13	41.53	540.86	B45662		50	43.30	2053.59	A46076
14	41.10	581.96	A43196		51	42.61	2096.20	A46076
15	42.15	624.11	A43195	 3	52	43.10	2139.30	A46076
16	40.26	664.37	A43196		53	40.98	2180.28	A46076
17	43.10	707.47	A43196		54	42.22	2222.50	A46076
18	40.32	747.79	A43196		55	42.30	2264.80	A46076
19	43.32	791.11	A43196		56	42.14	2306.94	A46076
20	39.68	830.79	B45660		57	42.22	2349.16	A46076
21	42.60	873.39	B45660		58	41.55	2390.71	A41440
22	36.72	910.11	B45660		59	37.00	2427.71	A42358
23	41.46	951.57	B45660		60	41.58	2469.29	A46076
24	41.05	992.62	A43198		61	42.35	2511.64	A46076
25	40.94	1033.56	A43195		62	41.40	2553.04	A24375
26	39.43	1072.99	A43195		63	35.02	2588.06	A43198
27	41.79	1114.78	A43195		64	42.60	2630.66	A46076
28	41.52	1156.30	A43195		65	37.55	2668.21	NA
29	42.95	1199.25	A43195		66	41.30	2709.51	A46076
30	38.43	1237.68	A43195		67	42.95	2752.46	A43196
31	37.85	1275.53	B45662		68	41.44	2793.90	A43196
32	39.27	1314.80	A46076		69	42.90	2836.80	A43196
33	38.56	1353.36	A43196		70	41.73	2878.53	A43195
34	42.41	1395.77	A46076		71	41.82	2920.35	A43195
35	41.82	1437.59	A46076			11.00	2909.35	-11.00' stickup
36	42.46	1480.05	A46076					

Sets of steel centralizers (4 centralizers per set) were welded onto casing at intervals specified in the Technical Specifications at: 20, 38, 80, 123, 322, 570, 779, 980, 1187, 1383, 1389, 1791, 1998, 2210, 2415, 2618, and 2825 feet above the bottom of the casing.

Casing installation was completed on 6/08/2003. (11.07 feet of stickup were left above grade)
Total casing below grade is 2908.3 feet to base of plug extension. Plug seated near 2,906 feet bpl.

Funnel Plug assembly is 7.8 feet long, mandrel in Section #1 is 1.08 feet long. Lengths have been added together to get 8.88 feet.

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 11/25/02 TIME: 09:02:47

CTYPE R . M. ACCORDENCE WITH ISO HEATA / FINIDEDA / INNEDOS N

		on the same and desired the same said.	A1	
WILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE LD	
DI05807 01				
SOLD TO	DADDRESS	MAIL TO	DOFESS	VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055
		60500000000000000000000000000000000000	An-1-1	

PIPE CARBON SMLS STD PIPE API 5L-×42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-×99B ASTM A106-X99 GRADE B QUAD STENCIL ASME SA53-X2001 EDITION ASME SA106-X2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 ×2000

PRODU	UCT	TENSI		TEST	GAUGE		VÆLD	PSI	,		TEMSE PS		٧,	ΛT	ELO	NG %		RDNESS E: HRB	MIN HYDR PSI	O	WELL (SEC)
DENTIFIC	MOM	DEST TYPE	IŎN	TEST COND.	GAUGE WIDTH I N	MIN: MAX:		2000 5000		MIN: MAX:		0000	M/	AX:	N	3D.	MIN: E MAX:	99.0		80	
45661 2	213050	STRIP/T	78	AR ××	1.50 END		4	5800 THIS	. 5			5500	Ø	. 60		41.		B 6 2.	7 15	ВØ	
LEGEND: PRODI	U - UPS	TYPE	N ·	TRANSVEF NORMALIZ C MI	ED			NCHED & ESS REUE		EO CR	МО	AR · AS R	DUED	v	В	B - (500)Y	C8	8	M - METD	_1 F	GE.
-	2L 3 050 2L 3 050	HEAT PROD PROD	2	9 12	0 008	009 011 012 0F	22	9) 91 91 17:15	.204 .204 .204 .504	97 97 97 ET: *	102 102	238 236 239	} '	1001 2001 2001	1		2001 2001 2001				.4

TUBULAR PRODUCTS CERTIFIED TEST REPORT [TYPE B - 0N ACCORDANCE WITH IBD 10474/EN18204/DIN50848]

DATE: 11/25/02 TIME: 09:02:47

MILL OPDER/ITEM NO. DI05807 01		SHIPPE	RS NO.		P	O. NUMBE	R											
MATERIAL AS ROLLED						OD.:	24.0007	609.6	881	·	(mm) W	WLL (500	()2	700	1 \		in (epan)
	1	T		T		<u> </u>		003.0		CHARPY V-N	OTEN NO			(12	. 700	,,		
PRODUCT IDENTIFICATION			GRAIN	1.	AND.		TECT		1		UICH IK		-UBS				HEAR	
IDENTIFICATION	FLAT	BEND	GVZE	တပ်	AIN Lapbe	DIF	TEST LOC.	TEMP	SIZE	TEST COND.	1	2 1	3 T	AVG	1	2 1	3 1	AMG
	<u> </u>			}				DEG F										
845661 2L3050	DK		×× i	END OF	DATA	T THI	B SHEET	+ 32	FULL	AR	87	91	89	89	40	60	60	53
LEGEND: L-LONGITU	D MAI																	
E-CONSITO	Difference.		1 - 110	WSVERGE		B - BQ			M - METD			HAZ - H	EAT AFFE	CTED 20	ME			
VI at an				T		SING /	NSPECTION II	HEOMILATIO	N .									
FULL LENGTH VISUAL	SPECTION			YES						RESULTS /	COMME	NTS						
FULL LENGTH EMI				X	. E													
FULL LENGTH MPI				 ^	<u> </u>	OU	X	OD/ID		<u>L_X_</u>		L/T_		עם. פ	NO	ICH		
FULL LENGTH UT				 				On 46		,								
END AREA INSPECTION (P	AIN END			 		OD MPI		OD/ID		<u> </u>		L/T_				_:		
SPECIAL END AREA (SEA)	INSP			 	 	MPI		<u>nr</u>										····
FULL LENGTH DRIFT				 	┽		T MANDRE											
					+	OTAL	I WINDAUNE	L SIZE.	·								<u> </u>	
				 -														
						ADDITION	VAL NOTES/C	OMMENTS										
MELTED AND MANUF COMPOUNDS ARE AD OF CONTAINMENT, PIPE ALSO MEET T	DED TO	THE S	STEEL	AND A	LL ME	RS B	Y WELD: BEARI	ING. N NG EQU	JI PME N	T IS P	ROTE	RCUR CTED	BY	A DOL	JBLE.	BOU	NDAR	Y

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREN WAS MANUFACTURED, SAMPLED. TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND PULLILLS THE REQUIREMENTS IN SUCH RESPECTS

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 11/25/02

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 11/21/02 TIME: 13:11:21

(TYPE B - IN ACCOMPANCE WITH ISO 10474/EN W284/DINSO049)

MLL ORDERVITEMNO.	SIMPPERS NO.	P.O. NUMBER	ABAIC/E ft/	
DI05807 01 SOLD TO	ADDRESS	MAR. YO AJ	COMESS	VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055
		SPECIFICATION AND	GRADE	

PIPE CARBON SMLS STD PIPE API 5L-X42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM AS3-X99B ASTM A106-X99 GRADE B QUAD STENCIL ASME SA53-X2001 EDITION ASME SA106-X2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 X2000

MIERIAL AS ROLLE	D					1		^{O.D.} 24	.000	(609	.600	1)		in	(man) //	м. 0.	500	(12.7	(00)		ju (mi
	TENS		1	T		<u> </u>	MELD	PSI	EXT'S	T	TENSU PS		Υ/	1	ELON	IG %		RONESS E: HRB	MINH		CANESTICAE
PRIODUCT IDENTIFICATION	TEST T ORIENT	ATRON	CON	r 6	MOTH	MIN	4:	2000		MN:	76	9000	MA		N	N;	MIN:			580	
						MAX:		5000		NUX:		0000	- 0			30.0		99.8 3.18 B		580	
15660 2L3049	STRIP	T/B	AR	×× E	.508			4700 THIS				5500	υ.	58		46.6	1 '	000.	'	300	
			Ì		ND C	Ţ "	****			1				ļ					1) ·
						1		,											· (}
				1					! !					1			1				
LEGEND L - LON	CITIEN A		T - YRAN	CALINE		ــــــــــــــــــــــــــــــــــــــ	m. O.E.	HICHED A	I L TEMPERI	<u> </u>		R - AS RX	U FO			- BOOY	ــــــــــــــــــــــــــــــــــــــ		W · WEI	<u> </u>	<u> </u>
U - UPS	IGITUDI\AL ET		N - NORD		,,,,,		R - STRE	SS RELIE	VED							,		CO			C
BDON ICT			C	MN	Р	3	81	αυ	N	CP.	MO	<u> </u>	<u> </u>	<u>v</u>	В	וו	CB	W			- N
			1 I		ł	ļ .	İ	, ,	I			}	- 1		i			1 1		1	1.
PRODUCT DENTIFICATION	TYPE		1 1		1	1		7				1 1				1 1					
·			:19	1:25	007	005	24	10t	202	26	Øì	1930		1001		1:	2001				
4 5660	HEAT PROD		:19	1Ø5 1Ø9	906	008	22	19 2	Ø2 202	Ø 6	Ì۵۱	1930		1001			2001				:
0ENTIFICATION 45660 45660 2L3048 45660 2L3048	HEAT			1.09	006 006	008	22	1 9 2 1 9 1	9 2	Ø6 Ø6	101 101										—
45660 45660 2L3048	HEAT PROD		20	1.09	006 006	008	22	19 2	9 2	Ø6 Ø6	101 201	1930		1001			2001				
45660 45660 2L3048	HEAT PROD	٨	20	1.09	006 006	008	22	1 9 2 1 9 1	9 2	Ø6 Ø6	101 201	1930		1001			2001				
45660 45660 2L3048	HEAT PROD	\	20	1.09	006 006	008	22	1 9 2 1 9 1	9 2	Ø6 Ø6	101 201	1930		1001			2001				

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 11/21/02 TIME: 13:11:21

[TYPE 8 - IN ACCORDANCE WITH 129 19474/EN1R204/DIRESE441]

				ILE D - IN WY	HILDURUS W	110 100 1001	4/ CHIEDO	t/ Michael	-								
MILL ORDERVITEM NO.		SHIPPE	AS NO.		P.O. NUMBE	A											
DI05807 01	1			l			l										
MATERIAL AS ROLLED					OD:	24.000	(609.6	00)	ķ	(явя) У	MTF. 6	.500	3 (12	.700)		In (mm)
***************************************				1					CHARPY V-H	OTCH IM	ACT TE	STING					
PRODUCT			GRAIN	MH	DIR	TEST LOC.	TEMP	SIZE	TEST		FI	LBS				HEAR	
PRODUCT IDENTIFICATION	FLAT	BEND	SIZE	COLLAPSE	1,000	roc	I E OIL	346	OOND.	1	2	3	A/G		2	3	AVG
]			DEG E			;				,i			
B45660 2L304B	ОК		×× E	ND OF DA	T TA THI	B S SHEE	+ 32 **	FULL	AR	94	97	92	94	50	50	50	50
LEGEND: L-LONGITU	DINAL		T - TRA	NSVERIGE.	8-B	ODY		W - WELL)		HAZ - H	EAT AFF	ECTED A	SNE			
					TESTING /	INSPECTION	INFORMATI	DM.									
VEST / N	SPECTION			YES					RESULTS A	CONNE	ents						
FULL LENGTH VISUAL				X													
FULL LENGTH EMI				X	OD	X	OD/ID		L_X_		L/T_		10.0	Z NO	TCH		
FULL LENGTH MPI																	
FULL LENGTH UT					00		OD/ID		τ		L/T_						
END AREA INSPECTION (P	LAIN END	· · · · · · · · · · · · · · · · · · ·			MP	1	UT										
SPECIAL END AREA (SEA)	INSP.				MP	1	<u> Մ</u>										
FULL LENGTH DRIFT				1	DIR	FT MANDE	IEL SIZE										
				1													
				1													
					MOOR	ONAL HOTES	COMMENTS	3									

MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.

PIPE ALSO MEET THE REQUIREMENTS OF ASTM ALBO GRADE C & ASME SALOS GRADE C

THIS IS TO CEPTIFY THAT THE PRODUCT DESCRIBED HEREN WAS MANUFACTURED. SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 11/21/02

OI

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 07/25/02 TIME: 11:00:03

(TYPE 8 - IN ACCORDANCE WITH ISO 18474/EN10284/DIN50049)

				· · · · · ·			-	111 140 1			, muson	73)								
MILL ORDER/ITEM NO. DI 05781 01		SH	PPERS NO.			P.Q.	NUMBER			,	ÆHICLE I.	D.							···········	
	SOLD TO ADDE	RESS						MAIL	TO ADDF	RESS				2	199	EAST		RODUC H ST.		
							SPECIFI	CATION A	NO GRA	DE.										
PIPE CARBON SMI ASTM A106-×99 (MILL COAT PE BI	GRADE B	QUAD	STENCI	L ASN	1E S	A53-	N DA ×200	TED 1 ED	1/00 ITIC	PSL N AS	ME S	A106	-×28	100	EDTT	TON	GRAD	FRF	IK RE	3
MATERIAL AS ROLLI	E D					······································	O.D.: 2	4.00	0(60	9.60	0)		in	(mm) \	MIL: 0	.500	(12	.700)		in (mm)
PRODUCT IDENTIFICATION	TENS TEST TO ORIENTA		TEST COND.	GAUGE WIDTH T N	MIN: MAX:			5 EXT 9	·	TENSI PS	E	T/Y		ELOI (IN 2	NG % '') IN:	SCA MIN:	ARONESS LE: HR	В	NHYDRO PSI 1580	DWELL (SEC)
A43198 2G3Ø68	STRIP/	T/B	1 1	1.500 END (3	5	1000	.5	0		6000	Ø.	67	·	40.		B 83		1580	5
LEGEND: L - LON U - UPS	GITUDINAL. ET	T N	- TRANSVERSI - NORMALIZED				NCHED &		ED		AR - AS FK	DLED		В	- BODY	_i		W - 1	WELD	1
PRODUCT IDENTIFICATION	TYPE		C MN	Р	S	SI	cu	NI.	CR	мо	AL	И	V	В	π	СВ	co			CE.*
A43198 A43198 2G3068 A43198 2G3068	HEAT PROD PROD	:	18 125 18 126	008 006 007 END (008 010	23 23	191 ТН IS	.23 23 24 24 24 24 24 24 24 24 24 24 24 24 24	Ø6	Ø2 Ø2 Ø2	Ø34 Ø32 Ø31		001 001 001			201 201 201				.43 .38 .38
*C.E. IS BASED ON THE	FOLLOWING	EQUATION	N(S): CE=C	 +(MN/	 /6)+	CR+	MO+V	 	(NI	+CU)	/15		I		Li	:			<u> </u>	

....

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE:	07/25/02
TIME:	11:00:03

MILL ORDER/ITEM NO.		SHIPPE				O. NUMBE	11 13U 1U4	7/ CR.1020	T/ DIMBOU-	10)								
DI05781 01				.	•	O. NOMBE	.n											1
MATERIAL						IOD:		<u></u>										
COND: AS ROLLED		,	<u> </u>		· · · · · · · · · · · · · · · · · · ·	OD:	24.000	(609.6	00)		(mm) V	MLL: E	.500	(12	.700))		ln (mm)
BBON KT		l					·			CHARPY V-N	OTCH IM	ACT TES	TING					
PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	COL	MIN LAPSE	DIR	TEST LOC.	TEMP	SIZE	TEST COND.			LBS			% 5	HEAR	
	1	1					1	L	l	COND.	1-1-	2	_3	AVG	1	2	3	AVG
A43198 2G3068	014			+		 		-DEG_E		T			;					
143130 203000	OK			.l		T	В	+ 32	FULL	AR	82	89	88	86	50	50	50	50
		i	×× E	ס מאַ	F DATA	THI:	SHEE.	××]			Ţ		!	i 1	ŀ	- 1	
	1	i		1								İ	i			l	- 1	
1	1			1								i I				ł	- 1	
										1						1		
LEGEND; L-LONGITU	<u> </u>	L		<u> </u>		<u> </u>	<u> </u>										1	
LEGEND: L - LONGITU	DINAL		T - TRA	NSVERSE	·	B - BO			W - WELD			HAZ - HE	AT AFFE	CTED ZO	NE			
					TE	STING / N	VSPECTION II	VFORMATIO	N									
	SPECTION			YES	1					RESULTS /	COMMEN	us					·	
FULL LENGTH VISUAL				X														
FULL LENGTH EMI			·	X		OD	X	OD/ID		L X		L/T		0.0%	NOT	—U—		
FULL LENGTH MPI												<u></u>		0.0%	1101	Cn		
FULL LENGTH UT	···········					OD		OD/ID				L/T						
END AREA INSPECTION (PL	AIN END)					MPI		<u>UT</u>		<u> </u>								
SPECIAL END AREA (SEA)	INSP.				 	MPI		ut ut										
FULL LENGTH DRIFT		-			 		T MANDRE	<u> </u>										
							INVOIDE	L SILL.										
																		
						ADDOTION	44 NOTTO (0)											
MELTED AND MANUE	ACTURE	TNT	HE ISA	NO	DEDAT	ADDITION	AL NOTES/CO	MMENTS	A CHAR									
COMPOUNDS ARE AD	DED TO	THE C	TEEL A	NO AL	KELVI	KO D	MELUI	NG. N	U MERL	UKY OR	MER	CURY	,					
COMPOUNDS ARE ADD OF CONTAINMENT.	565 10	, , , , ,	HEEL A	מט אנ	- L LIEK	CORT	BEWKIN	IG EQU	THWENI	IS PR	OTEC	TED	BY A	V DOU	BLE	BOU	NDARY	(
PIPE ALSO MEET T	חב אבענ	TKEME	NIS OF	V211	1 416	6 GRA	ADE C 8	ASME	SA106	GRADE	С							j
																		}

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 07/25/02

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 07/24/02 TIME: 12:19:44

(TYPE E - IN A	ACCURDANCE	O21 HTIW	19474/ENID	204/DIN60049)

MILL ORDERVITEM NO. SHIPPERS NO P.O. NUMBER VEHICLE I.D. DI05781 01 SOLD TO ADDRESS MAIL TO ADDRESS VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055

SPECFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-×42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-×99B ASTM A106-X99 GRADE B QUAD STENCIL ASME 5A53-X2001 EDITION ASME SA106-X2001 EDITION GRADE B BLK REG MILL COAT PE BEY 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 ×2000

COND: AS ROL								ΩD.: 2	4.00	0(60	9.60	10)			id (man)	WALE: E	0.500	(12.	700)		in (and
PRODUCT TEST TYPE IDENTIFICATION ORIENTATION			TEST COND.		SAUGE WIDTH		YIELD	PSI			TENSI PS	SI		′/T		NG %	H	undness Le: HRB	MIN	HYDRO SI	OVÆLL (SEC
IDENTIFICATION					IN	MIN: MAX:		2000 5000	:	MAX		0000 0000	MAX;		MINA GE		MIN: 6 MAX: 100.1			1580	
43196 2G3066	STRIP/T	78	AR	×× E	. 500 ND (14700 THIS				6000	Ø	.59		43		B 83.		1580	
	ONGITUDINAL PSET TYPE	N	- TRANS - NORM		P			NCHED & SS RELI		ED CA	МО	AR - AS RO	OLLED N	v	В	3 - BODY	CB	co	W · WE	ELD .	CE.
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TUBULAR PRODUCTS CERTIFIED TEST REPORT

(TYPE 8 - IN ACCORDANCE WITH ISO 10474/EN18204/DIRSEB49)

DAIE	:	О	7/	Z	9/	02	
TIME	:	1	2:	1	9:	44	

MILL ORDER/ITEM NO.	1	SHAPPE	.OM 2F	P.0	D. NUMBE	R											
0105781 01																	
MATERIAL AS ROLLED					O.D:	24.000	(609.6	00)	in	(man) W	ALL: 6	3.500	1 (12	.700)		in (mm)
									CHARPY V-N	OTCH:M	ACT TE	STING					
PRODUCT IDENTIFICATION	FLAT	BENO	GRAIN	COLLAPSE	DIR	TEST LOC.	TEMP	SIZE	TEST	1	FT	-LBS			ع چ	HEAR	
IDEN IPICATION			3125	COLLAPSE		LOC.	L		LUND		2	_3	AVG	1	S	3	A/G
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				THE	STWG / I	NSPECTION I	NFORMATIO	W									
TEST / INS	РЕСТЮН			YES					RESULTS /	COMPE	VTS		-				
FULL LENGTH VISUAL				X													
FILL LENGTH EM					00	X	OD/ID		, X		T/T		TA DE		70		

FULL LENGTH MPI FULL LENGTH UT Ø 00/ID END AREA INSPECTION (PLAIN END) MPI ŨŤ SPECIAL END AREA (SEA) INSP. MPI UŤ FULL LENGTH DRIFT DRIFT MANDREL SIZE:

ADDITIONAL NOTES/COMMENTS

MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.

PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 07/24/02

TUBULAR PRODUCTS CERTIFIED TEST REPORT

			İLAI	PE 8 -	TH ACCO	DANCE WI	TH ISO 10	474/EI	110284	/DB(5864	(5)				-			
MALL ORDER/ITEM NO.		SHAPPERS NO		T		P.O. NUMBER		T		EHICLE (D		1		······				· —
0105807 01																		
	SOLD TO ADDRESS			k			MAIL T	O ADDR	ESS						VENDO AR PR 28TH	ODUCT	S	
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						PECF	CATIONA	ND ORM	TE .			<u> </u>						
PIPE CARBON SM	LS STD PIP	E API 5	L-×42	ZND	ÉDIT	ION DA	TED !	/00	PSL	-2 GR	ADF B	AND	GRAD	F X4	2 AS1	M A5	1-×99F	·
USIM VIOD-WAR	PRYDE B ON	AU STEN	CIL /	NSME	: SA5	3-×200	1 ED	CTIO	N AS	ME SA	\106-x	2001	FDTT	TON	GRADE	R RI	K RFG	;
MILL COAT PE B	EV 30 DEG	MEETING	ALL	THE	APP	LICABL	E REC	JUIR	EMEN	TS OF	NACE	STA	IDARD	MR-	Ø1-75	5 ×20	96	
COND: AS ROLL	Fn ·			<u> </u>		an: 2	4.00	2/60	0 67	(7)		in (man)	WALL .	- FD2		700		in (ma
COL. HOLL	TENSILE				- ·	EID	EXT		TENS!		Y/T		SMG X		ARDHESS	. 700)	IHYDRO	DWELL (SEC
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IDENTIFICATION	OPPENDENCE	COND.	1	[MIN:	42000	•	WN.	-	0000	MAX:		VIN:	. MIN:			1580	
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UNITED STATES STEEL

TUBULA CERTIFIE

	DATE	11/21/02
AR PRODUCTS		
ED TEST REPORT	I TWE :	13:11:34
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MILL ORDER/ITEM NO.		SHPPE	FIS NO.			Q HANGE	TO	19/ CB 19/2	M/ CHANGE	48)								
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PRODUCT IDENTIFICATION	FLAT	6640	GRAIN	1	MIN		TEST	T	T	TEST	OIGH M							
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OL CONTYTHMENT.								Lqu		1 13 FR	OIEC	IEU	BT /	י שטנ	HLF	ROO	NDAR	Y
PIPE ALSO MEET	THE REQ	UIREME	NTS OF	ASTN	1 416	36 GR	ADÉ C	C ACME	CALDO									
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THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREN WAS MANUFACTURED, SAMPLED, TESTED AND/OR NEPECTED IN ACCORDANCE WITH THE SPECIFICATION AND PULLFILLS THE REQUIREMENTS IN BUCH RESPECTS.

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 11/21/02

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 07/27/02 TIME: 07:06:08

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

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MILL ORDER/ITEM NO.		SHIPPER	RS NO.		l	P.O. N	WMBER.		-	٧	EHICLE II	D.	1							Ì
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MILL COAT PE B	E A 30 DE	O MEEL.	באט ר	יבנ ור	1E /	PPLIC	YARL	ב אבנ	MIK	EMEN	15 0	F N	ALE :	SIAN	DVKD	MK-	01-7	5 ×21	ยยย	
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PRODUCT IDENTIFICATION	TEST TY	πδίν α	TEST COND.	GAUGE WIDTH	MIN:	42	2000	 -	MIN:	7	0000	 	AX:		IN:	MIN:			1580	
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*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 07/27/02 TIME: 07:06:08

(TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN58048)

MILL ORDER/ITEM NO.	1	SHIPPER	RS NO.		P	O. NUMBE	₹											
DI05781 01				1														
MATERIAL AS ROLLED						OD:	24.000	(609.6	00)	in	(uuu) N	WLL:	.500	(12	.700)		in (mm)
										CHARPY V-NO	TCH IM	PACT TE	STING					
PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	-0.1	VIN LAPSE	DIR	TEST LOC.	ТЕМР	SIZE	TEST COND.			-LBS				HEAR	
IDENTIFICATION			SIZE	COL	TWASE		LOC.	L	L	COND.	 ' -	2	_3_	AVG	1	2	3	AVG
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TEST / INSPECTION YES RESULTS / COMMENTS																		
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FULL LENGTH MPI																		
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SPECIAL END AREA (SEA)	NSP.					MPI.		UT										
FULL LENGTH DRIFT						DRIF	T MANDRE	L SIZE:										
			·				IAL NOTES/C											
MELTED AND MANUF	CTURE	INI	THE USA	. NO	REPA:	IRS B	Y WELD	ING. N	O MERO	CURY OR	ME	CUR	Y					
COMPOUNDS ARE ADI	DED TO	THE S	STEEL A	ND A	LL MEF	RCURY	BEARI	NG EQL	JIPMEN.	T IS PR	OTE	CTED	BY .	A DOL	BLE	BOU	NDAR	Y
OF CONTAINMENT.																•		
PIPE ALSO MEET TO	HE REOL	JIREME	ENTS OF	AST	M Ale	26 GR	ADE C	& ASME	SA10	5 GRADE	C							
	•																	

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 07/27/02

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 07/24/02 TIME: 12:19:54

(TYPE B - IN ACCORDANCE WITH ISO 18474/EN10284/DIN50049) MILL ORDER/ITEM NO. SHIPPERS NO. P.O. NUMBER DI05781 01 SOLD TO ADDRESS MAIL TO ADDRESS VENDOR USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055 SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-×42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-×99B ASTM A106-x99 GRADE B QUAD STENCIL ASME SA53-x2001 EDITION ASME SA106-x2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 ×2000

MATERIAL AS	S ROLLE								OD: 2	4.00	0(60	9.60	10)			n (mm) 1	WALT: 0	.500	(12	700)		io (m
PRODU	ICT		TYPE/	TF.	ST ST	GALIGE		ΥŒLL	PSI	EXT 9		TENS PS		Y	7T	ELO (IN 2	NG %		RDNESS LE: HRI		NHYDRO PSI	DWELL (SE
IDENTIFICA	ATION	TEST T ORIENT	TATION	CO	ŇĎ.	GAUGE WIDTH IN	MIN: MAX:		2000 5000		MIN:		0000	•	AX:		IN	MIN: E MAX:	100		1580	
\42 3 58 20	G3067	STRIP/	/T/B	AR	×× [1.500 END (15400 THIS				2500	Ø	.63		44.		8 85		1580	
LEGENO:	L - LON U - UPS	GITUDINAL ET		T - TRAN N - NORM				IT - QUE	NCHED &	TEMPER EVED	ED		AR - AS R	OLLED	L		- BODY			W -	WELD	<u>ــــــــــــــــــــــــــــــــــــ</u>
PRODU IDENTIFICA	ICT IATION	TYPE		С	MN	P	S	SI	В	N	CR	МО	AL	И	V	В	n	CB	co			CE M/
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UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

DATE: 07/24/02 TIME: 12:19:54

ITYPE R . IN ACCORDANCE WITH ISO 10474/EN10204/DIN58048)

<u> </u>			(1	ITE B - M	I ALLUMI	WHILE MI	IN 13U Y04	4 / EMIATO	4/ DIN 9844	HB)		_						
MILL ORDER/ITEM NO.		SHIPPE	RS NO.		Ρ.(D. NUMBE	3											
DI05781 01 MATERIAL AS ROLLED						O.D.:	24.000	609.6	00 \	i	(mm) V	MLL:	a. 500	3 (12	. 700			in (mm
COND. THE MODIFIED		<u> </u>	I	7	··-					CHARPY V-N	OTCH IM				.,,	_		
PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	COLL	N	DIR	TEST LOC.	TEMP	SIZE	TEST COND.	1		-LBS		$\overline{}$	% S	HEAR	
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ADDITIONAL NOTES/COMMENTS MELTED AND MANUFACTURED IN THE USA. NO REPAIRS BY WELDING. NO MERCURY OR MERCURY COMPOUNDS ARE ADDED TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.

PIPE ALSO MEET THE REQUIREMENTS OF ASTM A106 GRADE C & ASME SA106 GRADE C

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS

PREPARED BY THE OFFICE OF: S. ANADELL - MANAGER, Q.A.

DATE 07/24/02

PAGE 2 OF

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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DECORAL POSITIONS FOR ELEMENTS ARE INDICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

TUBULAR PRODUCTS BERTIFIED TEST REPORT

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PIPE ALSO MEET THE REQUIREMENTS OF ASTM ALOG GRADE C & ASME SALOG GRADE C

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS IMPLIFACTURED. SAUPLED, TIESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND PULLFULS THE REGULFREMENTS IN SUCH BESPECTS

PREPARED BY THE OFFICE OF S. ANADELL - MANAGER, Q.A.

NV. 0100 F.

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TUBULAR PRODUCTS CERTIFIED TEST REPORT

TIME: (4:10:59

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TUBULAR PRODUCTS CERTIFIED TEST REPORT

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THIS IS TO CERTIFY THAT THE PRODUCT BESCRIED HEPEM WAS MANUFACTURED, SAMPLED. TESTED AND ON UNSPECTED IN ACCORDANCE WITH THE SPECYHLARON AND PULTULS THE RECUREMENTS IN SUICH RESPECTS

PREPARED BY THE OFFICE OF S. ANADELL - MANAGER, Q.A.

DATE 11/22/02	

TUBULAR PRODUCTS CERTIFIED TEST REPORT

TIME: 09:02:42

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DECIMAL POSITIONS FOR ELEMENTS ARE INCICATED BY THE LEFT MARGIN, VERTICAL DOTTED LINE OR DECIMAL POINT.

TUBULAR PRODUCTS CERTIFIED TEST REPORT

TIME: 09:02:42

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PIPE ALSO MEET THE REQUIREMENTS OF ASTM AND GRADE C & ASME SAND GRADE C

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ND FL	I.FIL	LS DER	EQUIPE	OUE METHOM	RESPECTS	

PREPARED BY THE OFFICE OF S. ANADELL - MANAGER, D.A.

DATE	11.725/07	
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TUBULAR PRODUCTS CERTIFIED TEST REPORT

TIME: 08:19:19

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			SPECIFICATION AND	O GRAVE	
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K COAT PE BEV	S STO PIPE FADE 8 QUAO ' 30 DEG ME	API 5L-×42NI STENCIL ASA ETING ALL TH	EDITION DATED 1.	/00 PSL-2 GRADE	8 AND GRADE X12 ASTM AS3-X998
M AING-X99 GF L COAT PE BEV	S STO PIPE FADE 8 QUAO 7 38 DEG ME	API SL-X42NI STEHCIL ASA ETING ALL TH	EDITION DATED 1.	/00 PSL-2 GRADE	B AND GRADE X12 ASTM A53-X99B
F COAT PE BEV	S STO PIPE RADE 8 QUAO 7 30 DEG ME	API SL-X12NI STENCIL ASA ETING ALL TA	EDITION DATED 1.	/00 PSL-2 GRADE	B AND GRADE X12 ASTM A53-X99B -X2001 EDITION GRADE B BLK REG CE STANDARO MR-01-75 X2002
E CARBON SMLS M A105-X99 GR L COAT PE BEV	S STO PIPE ADE 8 QUAO ' 30 DEG ME	API SL-*12NI) STENCIL ASA ETING ALL TH	EDITION DATED 1.	/00 PSL-2 GRADE	E 8 AND GRADE X12 ASTM A53-X998
E CARBON SMLS M A105-X99 GR L COAT PE BEV	S STO PIPE ADE 8 QUAO ' 3 8 DEG ME	API SL-*12NI) STENCIL ASA ETING ALL TH	EDITION DATED 1.	/00 PSL-2 GRADE	E 8 AND GRADE X12 ASTM A53-X998 -X2001 EDITION GRADE 8 BLK REG ACE STANDARD MR-01-75 X2002
E CARBON SMLS M A105-X99 GR L COAT PE BEV	S STO PIPE ADE 8 QUAO '30 DEG ME	API SL-*12NI) STENCIL ASA ETING ALL TH	EDITION DATED 1.	/00 PSL-2 GRADE	E 8 AND GRADE X12 ASTM A53-X998 -X2001 EDITION GRADE 8 BLK REG ACE STANDARD MR-01-75 X2002
F COAT PE BEV	S STO PIPE FADE B QUAO 7 3 8 DEG ME	API SL-*42NI STENCIL ASA ETING ALL TA	EDITION DATED 1.	/00 PSL-2 GRADE	E 8 AND GRADE X12 ASTM A53-X998 G-X2001 EDITION GRADE 8 BLK REG ACE STANDARO MR-01-75 X2002
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ERIAL ACCUSATION	JO DEG ME	API SL-*42NI STENCIL ASA ETING ALL TA	D EDITION DATED IA ME SAS3-X2001 EDI HE APPLICABLE REQU	/00 PSL-2 GRADE TION ASME SA106 JIREMENTS OF NA	CE STANDARO MR-01-75 *2002
S SOM YE BEY	JO DEG ME	API SL-*42NI) STENCIL ASA ETING ALL TA	EDITION DATED 1.	/00 PSL-2 GRADE TION ASME SA106 JIREMENTS OF NA	B AND GRADE X12 ASTM AS3-X99B i-X2001 EDITION GRADE B BLK REG ACE STANDARO MR-01-75 X2002

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CUBULAR PRODUCTS CERTIFIED TEST REPORT

TIME: 08:19:19

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TO THE STEEL AND ALL MERCURY BEARING EQUIPMENT IS PROTECTED BY A DOUBLE BOUNDARY OF CONTAINMENT.

PIPE ALSO MEET THE REQUIREMENTS OF ASTM ALOG GRADE C & ASME SAIDG GRADE C

THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HERE! WAS IMMURACTURED, SAMPLED, TESTED, AND/OF INSPECTED IN ACCORDANCE YATH THE SPECIFICATION AND FULFILLS THE RECUIREMENTS IN SUCH DESPECTS.

PREPARED BY THE OFFICE OF S. ANAUELL - MANAGER. Q.A.

CO-03/20-03



City of Port St. Lucie Westport Injection Well System

Port St. Lucie, Florida

TUBING TALLY FORM

Date: 07/07/03

Injection Well No. 1 20-inch Outside Diameter, 0.438-inch Wall Thickness, Steel Injection Tubing

Section	Tag	Section Length	Cumulative	Heat Number
No.	No.	(ft)	Length (ft)	
stainless shoe		1.69	1.69	YBI Mandrel
1	2A	36.92	38.61	A 41974
2	1E	35.61	74.22	A41977
3	6B	40.62	114.84	A41977
4	1D	39.75	154.59	A41977
5	4B	40.35	194.94	A 41974
6	4C	37.41	232.35	A 41974
7	3C	40.06	272.41	A 41974
8	5B	36.17	308.58	A41977
9	12A	35.98	344.56	A41974
10	13A	39.50	384.06	A41974
11	7B	39.57	423.63	A41974
12	8B	35.12	458.75	A41977
13	15	42.45	501.20	A41975
14	28	40.65	541.85	A41975
15	21	41.78	583.63	A41975
16	27	38.89	622.52	A41975
17	16	36.58	659.10	A41975
18	9	40.88	699.98	A41975
19	22	40.17	740.15	A41975
20	20	43.08	783.23	A41975
21	10	42.19	825.42	A41975
22	33	40.98	866.40	A41975
23	25	41.06	907.46	A41975
24	13	39.63	947.09	A41975
25	11	39.18	986.27	A41975
26	26	41.71	1027.98	A41975
27	32	40.85	1068.83	A41975
28	19	42.68	1111.51	A41975
29	6	42.10	1153.61	A41975
30	17	39.29	1192.90	A41975
31	5	41.70	1234.60	A41975
32	31	43.50	1278.10	A41975
33	18	40.40	1318.50	A41975
34	1	42.73	1361.23	A41975
35	29	42.23	1403.46	A41975
36	30	38.25	1441.71	A41975
37	15A	41.29	1483.00	A41975
38	1B	41.10	1524.10	A41975
39	11	36.83	1560.93	A 41974
40	23A	35.14	1596.07	A41975
41	1A	39.98	1636.05	A21637
42	31A	40.60	1676.65	A21637



City of Port St. Lucie Westport Injection Well System

Port St. Lucie, Florida

TUBING TALLY FORM

Date: 07/07/03

Injection Well No. 1 20-inch Outside Diameter, 0.438-inch Wall Thickness, Steel Injection Tubing

43	3	42.45	1719.10	A41975
44	23	42.10	1761.20	A41975
45	8	42.20	1803.40	A41975
46	7	39.14	1842.54	A41975
47	4	35.08	1877.62	A41975
48	24	39.96	1917.58	A41975
49	17	41.79	1959.37	A41975
50	5A	40.08	1999.45	A41975
51	3B	40.08	2039.53	A41975
52	4	36.03	2075.56	A 41974
53	21A	36.57	2112.13	A41977
54	14	41.66	2153.79	A41975
55	28	39.55	2193.34	A 41974
56	6	40.81	2234.15	A 41974
57	26	38.86	2273.01	A 41974
58	32	36.49	2309.50	A 41974
59	29	38.34	2347.84	A 41974
60	20	37.15	2384.99	A 41974
61	11	40.78	2425.77	A 41974
62	22A	39.66	2465.43	A 41974
63	16A	42.60	2508.03	A41975
64	12	38.29	2546.32	A 41974
65	8	42.42	2588.74	A 41974
66	13	39.56	2628.30	A 41974
67	24A	40.11	2668.41	A 41974
68	18A	42.41	2710.82	A41975
69	19	38.23	2749.05	A 41974
70	2	39.37	2788.42	A 41974
71	9A	40.52	2828.94	A 41974
72	7A	37.41	2866.35	A 41974
73	9B	19.26	2885.61	A 41974
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The bottom of 20-inch O. D. tubing was set at 2,881 ft bpl (with 5.75 feet of tubing stickup above pad level). Two-foot long section of PVC were used as centralizers (SDR-35, 20.78-inch inside diameter) and were attached to the tubing across each coupling.

Tubing installation was completed on July 8, 2003.

ไม่ซบะฝห หาบบบับเจ CERTIFIED TEST REPORT

11NE: 05:56:46

\smile	(TYPE I	3 - IN ACCORDANCE WITH ISO 1	D474 / EN10204 / DIN5004	9)
MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.O.	
DR14736 01	R47458		LT8234	
SOLD TO	ADDRESS	MAIL TO	DDRESS	VENDOR USS TUBULAR FRODUCTS 2199 EAST 28TH ST. LORAIN. OH 44055
		SPECIFICATION AND	GRADE	A CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CANADA CAN
PIPE CARBON SMLS C	ASING API 5CT-*6TH	EDITION DATED OCTO	9ER 1998 GRADE	K-SS EXCEPT END FINISH UF FE SC

COND: AS FOLI							OD;	0.000	(50	9.00	0)			in (mm)	WALL	.430	(11	.125	•	in (mı
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Ŭ - Ūr	TYPE	N · NOF	MALIZED	· 	S	R · STR	ESS RELI	EVED	· -	<u> </u>	O · AS OL	JENCHE		,		СВ	со	w.v	WELD	C.E.
PRODUCT IDENTIFICATION	TYPE	N · NOF	MALIZED	Р	S S	R - STAI	CU CU	EVED NI	CR	MO	AL AS OL	JENCHE		,		CB	со	w.v	WELD	C.E.
PRODUCT IDENTIFICATION	TYPE	N · NOF	MALIZED NM EC3	P 0 1 0	\$ \$ 010	SI SI	CU CU	NI 05	CR : 0.7	ом МО	AL 027	JENCHE		,		СВ	со	w.v	WELD	C.E.
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PRODUCT IDENTIFICATION 121636 121636 121636	TYPE HEAT PROD FROD	N · NOF C 35 32 33	MALIZED MN Ç33 Ç33	010 009 009	010 011 012	8 - STRI SI 2 4 2 2 2 3	03 :03 :03	0.5 0.5 0.5	CR 07 08 08	08 08	027 029 020	JENCHE		,		СВ	со	W - 1	WELD	C.E.
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PRODUCT IDENTIFICATION 121636 121636 121636 121637	TYPE HEAT PROD FROD HEAT FROD	N - NOF C 35 32 33 34 35	######################################	010 000 000 001 010	010 011 012 007 010	8-STRI SI 24 22 23 23	03 03 03 04	05 05 05 05 04	07 08 08 09	. A MO	027 027 029 028 028	JENCHE		,				W.V	WELD	C.E.
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V - UF	TYPE HEAT PROD FROD HEAT FROD	N - NOF C 35 32 33 34 35	######################################	010 009 009 011 010 010	010 011 012 007 010 009	8-STRI SI 24 22 23 23 22	03 03 03 04	05 05 05 05 04	07 08 08 09 10	. A MO 08 08 09 09 08	027 027 029 028 028	JENCHE		,				w.v	WELD	C.E.



TUBULAR PRODUCTS CERTIFIED TEST REPORT

TEME: 05:56:46

(TYPE 8 - IN ACCORDANCE WITH ISO 10474 / EN10204 / DIN50049)

MILL ORDER/ITEM NO.	1	SHIPPER	S NO.	- 1	P:O	NUMBER	1											
DR14736 01		R47458	3	i								002	1175					
MATERIAL OS FOLLED						QD: 2	0.000	(508.0	00)		p) (ww)	WALL:		B (1)	.125	5)		in (mm)
										CHARPY V-	нотсн	IMPACT T	ESTING					
PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	COLLA	N PSE	DIR	TEST LOC.	TEMP	SIZE	TEST			LBŞ			% :	HEAR	
IDENTIFICATION		1	UILL	1			LOC.	DEG	1	COND	1	3	3_	AVG	1	2	3	AVG
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FULL LENGTH MPI								ַ טווטט.		<u> </u>				0.0%	ROI	CH		
FULL LENGTH UT						00_	· //	OD/ID				1.00						
END AREA INSPECTION (PL	AIN END)					MPI		UT		<u> </u>	-	1/1_						
SPECIAL END AREA (SEA) II						MPI		UT_										
FULL LENGTH DRIFT				X			T MANDE	EL SIZE:	LENGT	11. 17		IAMEI		10 0	245			
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						ADDITION	AL NOTES/C	OMMENTS										
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THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED. SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF: J. MASSIMINO NGP. MCT. & U.S. TUDULAR PRODUCTS

DATE 08/28/01

TUBULAR PRODUCTS CERTIFIED TEST REPORT

11ME: 05:06:05

				(TYPE	B - IN /	ACCOR	DANCE	WITH IS	0 104	74 / EN	110204 /	DIN50	00491					. ~			
MILL ORDER/ITEM NO		SH	PPERS NO.				O NUMBI				VEHICLE						······································		·		
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PIPE CARBON SM	LS CASI	NG AP	I SCT-	*6TH	EDIT						998 G(3 A D E	 E K				D FI	итѕн	IJF	PE	aŭ
MATERIAL COND: AS FOLL	ED		·			V	00	20.00	0 (50	8.09	001	·		In (mm)	WALL:	420	(1.1		·····		in (mm)
	TENS	T L C				YIEL	D	EXT		TENS		Y	π	ELON			IARDNES			IYDRO	DWELL (SEC)
PRODUCT IDENTIFICATION	TEST T	YPE /	TEST	GAUGE			FS	I¦ .5	0	P 9	3 I			(IN 2"	, ,	1			FS		DIVECT (320)
IDENTIFICATION	ORIENT	AIKN	COND.	WOTH	MIN:		56000	0	MIN	: 9	5000	M	AX:	MI	N:	MIN:				900	5
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A 4 1 9 7 4 A 4 1 9 7 5	STRIP/		AR AR **	1.50 1.50 END	0	(67500 63500 THI		0	1 (06000 04000	4	61		31.				-	200 200	5 5
LEGEND L - LOH U - UP:	NGITUDIN AL	Ť	· TRANSVEI	RSE ED	C	OT - QUE	ENCHED RESS REI	& TEMPER	RED		AR - AS PC	DLLED	lED	В	· BODY				·WÉL	Ď	
PRODUCT			C MI	I P	s	SI	cu	NI	CR	МО	AL	N	V	В	TI	СВ	СО		Т		C.E.
PRODUCT IDENTIFICATION	TYPE																1	1			
A41974 V	115/1		 	4 000	1	 	 	 													-
R41974	HEAT PROD		35 13 33 13			1 -	0.2	0.2		10	027										
A41974	FROD	1 .		1		1:	02	02		10	024			ĺ						1	
A41975	HEAT		34 14 34 13				02	0.2	•	10	023	ļ									
A41975	PPOD		31 13	-	009		04	0.3	•	09	025	ļ		1]			1
A41975	PROD	[]	32 13		1	1.	04	03	•	08	022	ļ					1				
	"""	[16.4) F [:			03 SHE		08	022	- 1]				1	- [j
		1:		1	[: "	1:""	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	- <u>'</u>]										
C.E. IS BASED ON THE	FOLLOWING	EQUATIO	N(S):		<u> </u>	4	<u> </u>	اـــنـــا	<u>:</u>	<u> </u>	<u> </u>	1		L	<u></u> l	L	L	L		L_	

TUBULAR PRODUCTS CERTIFIED TEST REPORT (TYPE R - IN ACCORDANCE WITH ISO 10474 / EN10204 / DIN50049)

TIME: 05:06:05

MILL ORDER/ITEM NO	<u> </u>	SHIPPER				NUMBER		1		Jinauu49)						<u> </u>		_
DR17374 01		R5137	5					1				ΔΔ1.	4856			1		1
MATERIAL AS FOLLED				·	1/	0.0: 2	0.000	(508.0	00)		in (mm)			9 (11	.125	7		in (mm)
		T		T		 				CHARPY V-	NOTCH II	IDACT T	ESTING					
PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN	COLL	N	210	TEST			TEST	I		LBS			4/ 9	HEAR	
IDENTIFICATION	FLAI	BEND	ŞIZE	COLL	APSE	DIR	TEST LOC.	TEMP	SIZE	COND	1	2	3	AVG	1	2	3	ĀVĢ
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								<u> </u>	 		1		ļ]
LEGEND: L - LONGITUDII	NAL		T - TRAI	NSVERSE		8 · BO	DY	·	W-WELD	·	1	HAZ - F	IEAT AFF	ECTED Z	ONE			
					TE	STING / IN	SPECTION	NFORMATIC	N	······								
TEST / INSE	PECTION			YES						RESULTS	COMME	NTS			·			
FULL LENGTH VISUAL				X						***************************************	······································							
FULL LENGTH EMI				Χ		OD_	_X	OD/ID		L X.		L/T_		0.0%	TON	CH		
FULL LENGTH MPI												:=			-1.01	<u> </u>		
FULL LENGTH UT						OD_		OD/ID		Ĭ		L/T_						
END AREA INSPECTION (PL						MPI_		UT				<u> </u>						
SPECIAL END AREA (SEA) IN	ISP.					MPI_		UT		· · · · · · · · · · · · · · · · · · ·								
FULL LENGTH DRIFT				X		DRIF	T MANDR		LENGT	H: 12	n r	OME	F .	18.9	265			
										****		MITC I	L. N	10.7	363			
																		
						ADDITION.	AL NOTES/C	OMMENTS										
MANUFACTURED IN TH	E USA	. ио г	EPAIRS	BYK	ELGI	NG. N	O MERI	O VAII	8 MERC	URV			 -					
COMPOUNDS ARE ADDE	D TO	THE ST	EEL AN	O ALL	MERC	CURY	BEARIA	ia Fau	R HERE IPMENT	TS PE	OTEC	TEN	nv /		מופ	одии	n a a u	
OF CONTAINMENT.								. 3 3	. , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			1 L U	011	1 171313	ם נ. ב.	ti trilik	UHKY	
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THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF:S. ANADELL - MANAGER, Q.A.

DATE	0E/	28/	0.2	

TUBULAR PRODUCTS CERTIFIED TEST REPORT

TIME: 05:05:08

MILL ORDERVITEM NO	<u> </u>	SHIPPE			1		NUMBE		104		10284 / I		1048)	 							
DR17374 01	<u>_</u>	R5118	l						1		LTB3	_									
	SOLO TO ADDRES							•	DOA OT	•				2199 LDR	9 EAS Alh,	8T 2 OH	VENC PROD 8 TH S 4 4 0 5 5	UCTS T.			
A STATE OF THE PROPERTY OF THE	and the second	Holling Co.	問題	U.S.	VIE TY	CID S	SPECIF	CATION	ND DR	ADE 311	2.607	Kini		1000 St.				2. 137 (15	1		22.12.
TPE CARBON SM	Ca CHain	J HPL S	10 I - * t	5 1 11 1	.011	rnú	DATE	o uc	1086	.R 19	198 GR	ADE	: K~	55 E)	CEPT	EH	D FIN	ISH	UF P	E 9(C
MATERIAL OND: AS ROLL	E ()		_			V	/ 002	0.00	0(50	8.00	0)			in (mm)	WALL	438	(11.	1251			in (mm)
PRODUCT IDENTIFICATION	TENSII TEST TYPI ORIENTATK		EST OND	GAUGE . WIDTH	MIN:	YIEL	PSI	.5	^	PS	·CE	Y.		ELON (IN 2"	')	H SCAL MIN:	VUUNE 22	Į M	NHYDR PSI 190		'ELL (SEC)
(AIA)				HI	MAX		0000		III.	•				****	19.0				130	١	5
041975	STRIPTE	B		1.500 END (33500 THIS			10	4000	0.	E1	•	30.0				130	σ	5
LEGEND: L - LOI U - UP:	NGITUDINAL SET	T - TR/ N - NO	NSVERSE RMALIZED		0	T · QUE	NCHED E	TEMPER	REO		AR - AS RO	LLED		8	- BODY	<u> </u>		W-V	VELD		
DDON 107		С	MN	Р	s	SI	CU	NI	CR	MO	AQ - AS QL	N	V	В	πΙ	CB	co		1	· · · · · · · · · · · · · · · · · · ·	1054
PRODUCT IDENTIFICATION	TYPE													_ <u>=</u> _			- W			-	C.E.*
041975 041975 041975	PROD	34 31 32	1:34 1:34 1:34	008 800 800	009 009	21 21	04 04 04 THIS	03 03 9HE	9 O E	09 08 08	025 022 022					-	·				
*C.E. IS BASED ON THE	FOLLOWING E	QUATION(S)		4l.		4	<u> </u>	h	i	Li					L	1					

IUBULAH PHUUUCIS CERTIFIED TEST REPOR

TIME: 05:05:08

CERTIFIED TEST REPORT
(TYPE B - IN ACCORDANCE WITH ISO 10474 / EN10204 / DIN50049)

MILL ORDERVITEM NO.		SHIPPE	NO.	112) NUMBE		1041472	110204 / [D11430043)			· · · · · · · · · · · · · · · · · · ·			<u> </u>		
DR17374 01		R5118	1	1								001	4421			1		
MATERIAL AS ROLLED COND:			•			QD: 2	0.000	(508.0	00)	· · · · ·	in (mm)			8 (1)	.12	5)		In (mm
							· ···········	······································		CHARPY V	NOTCHI	MPACT T	ESTINO				<u>.</u>	
PRODUCT IDENTIFICATION	FLAT	BENO	GRAIN SIZE	COLLA	N LDGE	DIR	TEST LOC.	TEMP	SIZE		10.0		LBS		T	- 5	HEAR	
IDENTIFICATION	ł		3125	COLD	A-2E		LOC.	1	DIZE	CONO	I	2	3	AVQ	1	2	3 1	AVQ
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	1			Ì		1						Ì	1	1			ł	
LEGEND: L - LONGITU	DINAL	.l	T. TRAI	NSVERSE		B - BO		L		<u> </u>	L	<u> </u>	<u> </u>	<u> </u>				
			1 - 1104	TOTETIME	76			NFORMATIO	W - WELD			HAZ-F	EAT AFF	ECTED 2	ONE			
TEST/IN	SPECTION			YES	15	a i ind / in	SPECION	MPOHMATIO	N .									
FULL LENGTH VISUAL		***		× ×						RESULTS	COMM	ENTS						
FULL LENGTH EMI	·			$\frac{\hat{x}}{x}$		OD_												
FULL LENGTH MPI		· ·				<u> </u>		OD/ID_		<u>LX_</u>		L/T_		10.0%	HOT	CII		
FULL LENGTH UT						OD		0040		····					• .			
END AREA INSPECTION (P	LAIN ENDI					MPI_		OD/ID_	, 	<u>L</u>		L/T_						
SPECIAL END AREA (SEA)	NSP.	······································				MPI_		<u> </u>										
FULL LENGTH DRIFT				×			TAMANOO	UT							_			
				^-		DNIF	MANUH	EL SIZE;	LENGT	H: 12	<u>D</u> :	LAMET	ER:	18.9	365			
																		
						ADDITION	AL MOTTO	01445150			<u> </u>							
INNUFACTURED IN T	HE USA	. NO R	EPAIRS	BY WE	INT	J (2) 1	O MEDI	OMMENTS	MEDO	1160								
OMPOUNDS ARE ADD	ED TO	THE ST	EEL AN	D ALL	MEDI	יט פווי טפווי	0 11ERU 0 20 11	.URT U!	THE KU	UKY								
F CONTAINMENT.	•			» ner	HERE	JUKI	DEHKII	IN CAN	PHENI	18 68	UIE	TED	BYA	oou i	BLE	BOUN	DARY	. \$
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PREPARED BY THE OFFICE OFS. ANADELL - MANAGER, Q.A.

DATE 06/14/02

CERTIFIED TEST REPORT

144 . 00000	(ITE	5 - IN ACCUMUANCE WITH ISO 1	0474 / EN10204 / DIN5004	19 }
MILL ORDERVITEM NO.	SHIPPERS NO.	PO NUMBER	VEHICLE I.D.	
DR17374 01	R51375	1		
SOLD TO	ADDRESS	·	DEOBIL	
		MAIL TO A	DDRESS	VENDOR
		Į.		USS TUBULAR PRODUCTS
		:		2199 ERST 28TH ST.
	***			LORAIN, OH 44055
		•		2011/1/4 011 44000
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等的各种的 类型的		SPECIFICATION AND	GRADE lead to the second	MANAGERA MARKATAN AND AND AND AND AND AND AND AND AND A
			Taraba and the same of the sam	<u>我们们的,然后,那</u> 是是这种的最级是最级的。但是这种,这个人的,

PIPE CARBON SMLS CASING API 5CT-*6TH EDITION DATED OCTOBER 1998 GRADE K-55 EXCEPT END FINISH UF PE SC

COND: AS ROL	TENSILI	- 1	- [l vi	OD 2	0.000(,) WALL:	130	(11.	125)	in (mm
PRODUCT	TEST TYPE	TEST	GAUGE	ļ.	PSI	! "	TEN:		Ý/τ	1	ONG %		IARDNESS	OROYH NIM	DWELL ISE
IDENTIFICATION	ORIENTATION	COND		MIN:	56000			SI 95000	MAX:	(11)	? '' MIN:) SCA		129	
14675	<u> </u>		1 14	MAX	80000	: 1	AAX	33000	, maa.			MIN:		1900	!
941977	STRÍP/L/I	B AR *	1.500 * END 0		68500 THIS		**	07000	0.64		31.	0 MAX	·	1900	
PRODUCT	DNGITUDINAL PSET	T - TRANSVI N - NORMAL C N	ERSE IZED	OT OI SR - SI	JENCHED & RESS RELIE	TEMPERED VED NI CF	· · ·	AR - AS RO AQ - AS QL AL	DLLED JENCHED N V	В	B · BODY	СВ	со	W - WELD	C.E.
IDENTIFICATION															-
41977 41977 41977	HEAT PROD PROD	33. 1	37 009 35 009	006 25 008 23 009 22 F D TA	01	0.1	06 09 07 09 08 09	028 024 022							-

TUBULAR PHODUCTS CERTIFIED TEST REPOR

TIME: 05:06:05

CERTIFIED TEST REPORT
(TYPE B - IN ACCORDANCE WITH ISO 10474 / EN10204 / DIN50049)

MILL ORDER/ITEM NO.		SHIPPER	AS NO.		P.O	O NUMBER	1	10414/1	1102047	D11100043)	<u> </u>			-	•		
DR17374 01		R5137	5	- 1								221125			•		
MATERIAL AS ROLLED			*		./	O.D.: 2	0.000	(508.0	00)	· · · · · · · · · · · · · · · · · · ·	in (mm)	001485		7 7 7 7	<u></u>		
	T	7									** (17811)	WALL: 0 . 1	अस <u>।</u>	1.12	51		in (mm)
PRODUCT IDENTIFICATION	`a:		GRAIN		MN		· · ·	·	· · · · · · · · · · · · · · · · · · ·		NOTCH II	MPACT TESTIN	G	*****			
IDENTIFICATION	FLAT	BEND	SIZE	COLL	(IN LAPSE	DIR	TEST LOC.	TEMP	SIZE	COND		FT-LBS			*	SHEAR	
		<u> </u>						DEG		1 00/10	 	2 3	AVG		4 :3 +	3:	AVG
								1	T	T	 	 	- 11 (2)	1	3 4 1	i 	
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LEGENO: L - LONGITHO	<u> </u>							ļ						T : : :	1 1		
LEGENO: L - LONGITUD	INAL		T - TRA	NSVERSE		B · BO			W - WELD			HAZ-HEAT A	FFECTED	ZONE	4	1 ;	L
TEST / INS	PECTION				TE	STING / IN	SPECTION	NFORMATIO	N		1,						
FULL LENGTH VISUAL	PECTION			YES	 					RESULTS	COMME	NTS	•		****		
FULL LENGTH EMI				X								1.7.5		40 400 0		1	
FULL LENGTH MPI				X	 -	OD_	_X	OD/ID_		L_X		IJT	10.0	Z: NC			
FULL LENGTH UT					ļ							(GT 4) :				7. 1	
END AREA INSPECTION (PL	AIN END				 	OD_		OD/ID_		L		L/T				-	
SPECIAL END AREA (SEA) II	VSP.				 	MPI_		UT					·		7.5		
FULL LENGTH DRIFT				Y	 	MPI_	F 1 4 1 1 1 2 2	_ ரா							. 3		
					 	UHIF	MANDR	EL SIZE:	LENGT	H: 12	ÐI	AMETER:	18.	365			
					 								5		2	- 1	
					<u> </u>	ADDITION	AL NOTES O				<u>, , , , , , , , , , , , , , , , , , , </u>					. 1. 18	
KANUFACTURED IN TH	E USA	. NO E	EPAIRS	BY W	FI BY	1 5 11	AL NOTES/C		MERC	D.D.U.						-	
COMPOUNDS ARE ADDE OF CONTAINMENT.	OT 0	THE ST	EEL AN	ID ALL	MERC	CURY	RFARIN	16 FOUT	T PHENT	UKY TC nn	0756					.**	
DF CONTAINMENT.			*				2		1 1 14 12 14 1	15 1.4	UIEL	TED BAR	ומפ ח	19 F.E.	0.001	(BUB)	'
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THIS IS TO CERTIFY THAT THE PRODUCT DESCRIBED HEREIN WAS MANUFACTURED, SAMPLED, TESTED AND/OR INSPECTED IN ACCORDANCE WITH THE SPECIFICATION AND FULFILLS THE REQUIREMENTS IN SUCH RESPECTS.

PREPARED BY THE OFFICE OF S. ANADELL - MANAGER, O.A.

DATE 06/28/02

PAGE A OF

J. - F 1 V



CASING TALLY FORM

Date: 01/31/03

Monitor Well No.1 16-inch outside diameter, 0.500 inch wall thickness, steel Intermediate Casing

Section	Casing	Cumulative	Heat
No.	Length (feet)	Length (feet)	Number
1	48.69	48.69	33422
2	43.10	91.79	19047
3	42.11	133.90	F112986
4	42.14	176.04	K105617
5	42.13	218.17	K105647
6	42.12	260.29	Y105648
7	42.11	302.40	F112986
8	42.11	344.51	K105649
9	42.10	386.61	Y105648
10	42.13	428.74	K105647
11	42.14	470.88	K105649
12	42.15	513.03	K105649
13	42.16	555.19	K105647
14	42.12	597.31	K105647
15	42.08	639.39	Y105648
16	42.15	681.54	F112519
17	42.11	723.65	K105649
18	42.12	765.77	K105647
19	42.10	807.87	F112957
20	42.14	850.01	K105647
21	42.11	892.12	F112957
22	42.13	934.25	K105647
23	42.14	976.39	K105647
24	42.09	1018.48	F112519
25	42.14	1060.62	K105647
26	42.14	1102.76	F112519
27	42.11	1144.87	Y105648
28	42.13	1187.00	F112957
29	42.05	1229.05	K105649
30	42.16	1271.21	K105647
31	42.16	1313.37	F112986
32	42.15	1355.52	K105647
33	42.18	1397.70	F112197
34	42.18	1439.88	F112986
35	42.16	1482.04	F112517
36	42.14	1524.18	F112517
37	42.08	1566.26	F112517
38	42.10	1608.36	F112986
39	42.16	1650.52	K105647
40	42.15	1692.67	Y105648
41	42.13	1734.80	K105647

The bottom of Intermediate 16-inch O. D. casing was set at 1730 ft bpl (4.8 feet stick- up above pad level).

Sets of steel centralizers (4 centralizers per set) were welded onto casing at intervals specified in the Technical Specifications:

 $20,\,48,\,90,\,133,\,344,\,544,\,765,\,975,\,1186,\,\text{and}\,\,1608\,\,\text{feet above bottom}\,\,\text{of the casing}..$

Casing installation was completed on 01/31/03

Section No. 1 consists of two (37.69 ft and 11.00 ft long) sections welded prior to casing setting.

Commudity . ERW PIPE MANUFACTURED IN ACCORDANCE WITH

Purchaser :

Certificato No

Purchase Order No

: HL MPC1 12742

. 03/02/30

. PP-18139

: EN10704

HALL LONGMORE

a division of DMH Piping Systems (Pty) Limited

Co Reg No 01/0794207

PO Box XXX4 WADEVILLE 1427

HALL

3 1B

TEL (011) 124-1946

LONGMORE

										Qu	entity			Vasyal	Hart	ro Tagi	g.]	90	Doctify	Band Tabl
				Dimensio	ans a				Number of pieces	1	Luxigth ext		196 Om	Dimension	-	1	Fise Test	Park Test		я Уприда
	/ 15	inch 0 /	Or 63	nch.W	e) x 42	Fel	n Long		76	319	2.000	115	0.024	MCMT.	AC	CITT.	ACCENT	ACCEPT.	9/3/30	
Heat	No			· · · · · · · · · · · · · · · · · · ·		Che	emical Ar	alysis		_				N.D	E	3644	Tuchs		HADNEST	
& Coil	ſ	C X100	5i X105	Mn . X100	р Х1000	\$ X1000	Eu)(1000	NC X1000	Cz 3x10650	X9000	X KOZKI	IA CBOFK	N	υr		VS PERM	UTS PSIM	Biong'n OL 2 hob	HB	Remut
	Min													NOOSF	£.	42	€3	27		
pec	May	218		130	30	30	*													PILIST HO
K105	647	16.2	23.4	107.7	16	7	}					44		н	TW		79.75			1
4503	GA	15	1)	108	12	ł	20	10	50	0	0	37.1		P	TS	43.355	71.90	37.4]
F112	517	15.0	21 4	113.5	14	10						43		Н	IW		72.935			
4230	XQK	13	21	106	6	4	10	10	30	0	0	36.0		P	7S	43.79	M.92	39.3		
F112	917	16.5	19.4	102.1	17	•						44		Н	TVY		74965] '.
4202	Q.K	14	20	.96	5	2	10	10	70	Δ.	Q	474		P	19	45.135	61,515	35,4]
F112	986	16.1	20.5	110.1	10	. 6	10	10	37	7	6	36		н	TW		70.01	<u> </u>	1	
6100	2PF	14	20	134	12	3	10	10	30	0	4	34.1		Ρ	15	45.24	99,165	26	<u></u>	. I N
F112	957	16.4	16.2	110	20	6				<u> </u>		39		н	TW	1	73.66]] [
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H. Heat Analysis P. Product Analysis. Ts. - Transverse Stock TW. - Transverse Weld We have by cartly that the material with its beautiful and sind of accordance with the elicure numeround. Specification and Purchase Childs.

MILL INSPECTION CERTIFICATE

Purchaser :

: HL MPC1 12743 23/02/30

: PP-10139

: EN:0304

HALL LONGMORE a division of DALH Piping Systems (Phy) Limited

Co Reg No ON/0794207

PO Box X024 WADEVILLE 1422

HALL LONGMORE

CONTROLLY : ERW PIPE MANUFACTURED IN ACCORDANCE WITH

Specification : API SL GRI BANGASTH ASSO, ASINE SASS

HL Job No : 305075 3em : 130

TEL (211) 424-1140 FAX (011) 224-2870

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H - Heat Analysis. P - Product Analysis. Ts - Transverse Stock. TW - Transverse Weld.

MILL INSPECTION CERTIFICATE

COMMISSELY: FRW PIPE MANUFACTURED IN ACCORDANCE WITH

Purchaser :

Certification

Purchase Order Ne

: HL MPCI.12438 : 01.00715

: EN10264

HALL LONGMORE

a division of O&H Ploing Systems (Pty) Limited

Co Reg No 01/07940207

PO Box XO24 WADEVILLE 1422

TEL TOTAL PAN-1840

HALL LONGMORE

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H - Heat Analysis. P - Product Analysis. To - Transverse Stock, TW - Transverse Weld.

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QUALITY MANAGER

Commodity: ERW PIPE MANUFACTURED IN ACCURDANCE WITH

Purchaser:

CH LINCAL No

Date

HL MPC1:12848

HALL LONGMORE a division of D&H Piping Systems (Ply) Limited

: 09/05/32

Co Reg No 01/0794207

Purchase Dider No

: PP-17936

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H - Heat Analysis, P - Product Analysis, Ts - Transverse Stock, TW - Transverse Weld, We have my statily that the maintail three in the secret must and tested in concrete for with the above minutes of the maintail three in the second manual formation of furnitude to Order.

Page

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LONE STAR STEEL COMPANY

ISO 9001 REGISTERED QUALITY SYSTEM Page 1 of 1

the requirements in such repects

Date: 05/04/2000

1000, HWY. 259 S. LONE STAR, TX 75668	MATERIAL TEST REPORT	• •	٠. ب	Print
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#: 200005122

LSO: 0109013 Product: 16" 82.77 XS6 TBR4831 Customer Order: Item: 2 .500° Wall Customer Resource: Hent: 33422 🗸 PE-BEV RG 3(35'-44' 9') BR Customer Specification: Lot: Specification: API 5L X56,X52,X46,X42,GR B.ASTM AS1-99 GR B & ASME \$A53 GR B. ERW. MANUFACTURED IN THE USA. Sold to manufacture Sup to MTR Copies Sold To: 1. Ship To: 0 CHEMICAL ANALYSIS. % C Mn P S Si Cu Ni Ct Mo Sn A Ĉ TI Ca N CHO ĎI PEM Hent . 17 1.14 .014 .003 . 24 10. .01 .012 .002 .001 .045 .070 .0000 .035 .004 .0021 .0048 Check .16 1.11 .010 .004 .22 .02 .01 .008 .004 .002 .037 .069 .0001 .032 .003 .0026 Check 1.40 .010 .004 .21 .02 10. .008 .004 .002 .037 .069 1000. .031 .003 .0029 Here waters and wood a second facility MECHANICAL PROPERTIES Dix Test LK Notch Yield Teasile Boog % Area Practure YIT Grain size RR-1 KSI KSI 42 Red Location Ratio Martenaire % N \$6.5 77.5 40.0 .729 Collapse, PSI RR-2 2 Т " W N .0 78.7 0. IW .000 Hydrotest, PSI 2980 3 Flattenion RR-3 4 Impact Tests Hardness Iص Dic Loc Size Temp K Shear Engrey Lal Ero Scale D.D. M.W. LD. Var Body Weld HAZ Surf 2 3 Remarks Inspections Performed Lests are performed in accordance with one or more VISUAL of the following tests methodic El. El. Els. Els. Ecs. Evi. ULTRASONIC WELDLINE E113, E144, E311, E184, E461, E461, E4613, E1671, A113, A170 From the Office of: a. 7. Homon, gr. Director of Ownlity This is to certify that the product described herein was mentioned, sumpled, based, and/or impacted in accordance with the specification/order, and fulfills

ARCADIS

Appendix C

Injection-Test Flowmeter and Transducer Calibration Sheets and Electronic Data

BUILT DY



METER TEST RECORD

841404

SERIAL NUMBER

6/3/03

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.SIZE	TYPE				EARINGS		

DATEBUILT _____

WATER SPECIALTIES

FLOW METER MANUFACTURING RECORD

SOLD TO			OTHERS, I	NC.	-		SERIAL NUMBER 6/3/03 DATE
SHIP TO	SAME				PREPA	RED B	
i				DATE BUILT INV. DATE			
		MF	TER ACCURAC	Y PERCENTAGE CH	ANGE		
TESTE	D ACÇURACY					ESTA	BLISHED INDEX
DESIRED	ACCURACY					NEW	ADJUSTED INDEX
		PIPE	DIFFERENTIAL	& CALIBRATION D	ATA	-	· · · · · · · · · · · · · · · · · · ·
CUSTOMER	PIPE SIZE			O.D.			I.D.
STANDARD PIF	PE I.D. 19.2	20 st	O I.O. AREA	290.133	2.1	400	STD. INDEX
SPECIAL PIPE	I.D.	SPI	ECIAL I.D. AREA		= 2.1	400	NEW INDEX
		FLOW M	ETER DETAIL			METE	ER CHANGE GEARS
METER SIZE	AND MODEL #	20" MO	DEL ML-04-	HV		NB	5 20 / 42
TOTALIZE	R PER COUNT	10000	GALLONS	المنابة المتعارضة والتناوية المساحدين والموروق والمتعرب والمراوات والمتعرب والمراوات		GE/	AR RATIO 4762
ROFI SCALE	/ TOT GEARS	10000	GPM	15+/45	F	ACTUAL	METER 2.1221
	V. YEAT THIS	4 4500	1000	col Harizai	,-, 11	,,,,,	00.0

CUSTOMER SPECIFICATIONS

MRP

ACCESSORIES

Transducer



Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003053005007305

Calibration Result:

PASSED

2003-05-30	
PXD-261	
1723.7 kPa (250 PSI) Gauge	
In-Situ	
7305	
	PXD-261 1723.7 kPa (250 PSI) Gauge In-Situ

Calibration Procedures and Equipment Used:

- 1. Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180695

Applied Pressure

5. Automated software calibration procedures used

Range of Applied Temperatures: 4.55 C to 30.08 C

Range of Applied Pressures:

0.0207 kPa (0.0030 PSI) to 1723.7099 kPa (250.0030 PSI)

Current mA

Calibration Coefficients:

Linearity	1.7999
Scale	245.5637
Offset	-0.2085

PASS/FAIL Criteria:

			1	
Zero Response	0.0207 kPa (0.0030 PSI) 4.014		4.014	PASSED
Full Scale Response	1723.7099 kPa (250.0030 PSI)		20.183	PASSED
	Minimum	Maximu	ım	7
Temperature Stability (%FS)	-0.050	0.125		PASSED
Repeatability at 15 C (%FS)	-0.008	0.004		PASSED
Hysteresis (%FS)	0.006			PASSED
Thermal Hysteresis (%FS)	0.016			PASSED

Test Performed By:	LEH	Test Verified By:				
--------------------	-----	-------------------	--	--	--	--

Transducer



Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003033106000295

Calibration Result:

PASSED

,	
Calibration Date:	2003-03-31
Model:	PXD-261
Full Scale Pressure Range:	137.9 kPa (20 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	295

Calibration Procedures and Equipment Used:

- 1. Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180324

Applied Pressure

5. Automated software calibration procedures used

Range of Applied Temperatures: 4.10 C to 29.66 C

Range of Applied Pressures:

0.0000 kPa (0.0000 PSI) to 137.8972 kPa (20.0003 PSI)

Current mA

Calibration Coefficients:

Linearity	0.1320	
Scale	19.8171	
Offset	-0.0651	

D_{Λ}	 <i>,</i>		7 " " 1	~P1~!
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Zero Response	0.0000 kPa (0.0000 PSI) 4.05		4.053	PASSED
Full Scale Response	137.8972 kPa (20.0003 PSI)		20.092	PASSED
	Minimum	Maxim	um	
Temperature Stability (%FS)	-0.162	0.024		PASSED
Repeatability at 15 C (%FS)	-0.007	0.004		PASSED
Hysteresis (%FS)	0.007			PASSED
Thermal Hysteresis (%FS)	0.011			PASSED

Test Performed By:	LEH	Test Verified By:	



Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003030303006957

Calibration Result:

PASSED

Calibration Date:	2003-03-03
Model:	PXD-261
Full Scale Pressure Range:	137.9 kPa (20 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	6957

Calibration Procedures and Equipment Used:

- Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180324
- 5. Automated software calibration procedures used

Range of Applied Temperatures: 4.00 C to 29.60 C

Range of Applied Pressures:

-0.0041 kPa (-0.0006 PSI) to 137.8958 kPa (20.0001 PSI)

Calibration Coefficients:

Linearity	0.1192
Scale	19.7272
Offset	0.0328

PASS/FAIL Criteria:

	Applied Pressure		Current mA		
Zero Response	-0.0041 kPa (-0.0	006 PSI)	3.974	PASSED	
Full Scale Response	137.8958 kPa (20.0001 PSI)		20.096	PASSED	
	Minimum	Maxim	um		
Temperature Stability (%FS)	-0.148	0.044		PASSED	
Repeatability at 15 C (%FS)	-0.008	0.003		PASSED	
Hysteresis (%FS)	0.005			PASSED	
Thermal Hysteresis (%FS)	0.019			PASSED	

Test Performed By:	LEH	Test Verified By:		_
			Lange	



Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003033106005610

Calibration Result:

PASSED

2003-03-31	
PXD-261	
137.9 kPa (20 PSI) Gauge	
In-Situ	
5610	
	PXD-261 137.9 kPa (20 PSI) Gauge In-Situ

Calibration Procedures and Equipment Used:

- 1. Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180324

Applied Pressure

5. Automated software calibration procedures used

Range of Applied Temperatures: 4.10 C to 29.66 C

Range of Applied Pressures:

-0.0007 kPa (-0.0001 PSI) to 137.8972 kPa (20.0003 PSI)

Current mA

Calibration Coefficients:

Linearity	0.1208
Scale	19.8017
Offset	-0.0096

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Zero Response	i -0.0007 kPa (-0.0001 PSi)		4.008	PASSED
Full Scale Response	137.8972 kPa (20	.0003 PSI)	20.069	PASSED
	Minimum	Maximu	m]
Temperature Stability (%FS)	-0.209	0.074		PASSED
Repeatability at 15 C (%FS)	-0.005 0.003			PASSED
Hysteresis (%FS)	0.004			PASSED
Thermal Hysteresis (%FS) 0.009				PASSED

Test Performed By:	LEH	Test Verified By:	
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Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003040905008072

Calibration Result:

PASSED

2003-04-09	
PXD-261	
1723.7 kPa (250 PSI) Gauge	
In-Situ	
8072	
	PXD-261 1723.7 kPa (250 PSI) Gauge In-Situ

Calibration Procedures and Equipment Used:

- 1. Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180695

Applied Pressure

5. Automated software calibration procedures used

Range of Applied Temperatures: 4.20 C to 29.73 C

Range of Applied Pressures:

0.1172 kPa (0.0170 PSI) to 1723.7030 kPa (250.0020 PSI)

Current mA

Calibration Coefficients:

Linearity	1.7250
Scale	247.5363
Offset	-0.1575

PASS/FAIL Criteria:

Zero Response	0.1172 kPa (0.0170 PSI) 4.011		PASSED	
Full Scale Response	1723.7030 kPa (250.0020 PSI)		20.057	PASSED
	Minimum	Maximu		
Temperature Stability (%FS)	-0.061	0.106		PASSED
Repeatability at 15 C (%FS)	-0.003	0.002		PASSED
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Hysteresis (%FS)	0.002			PASSED
Thermal Hysteresis (%FS)	0.006		PASSED	

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Test Performed By:	LEH	Test Verified By:			
		root vormod by:	L		



Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003022106007830

Calibration Result:

PASSED

Calibration Date:	2003-02-21	<u> </u>
Model:	PXD-261	
Full Scale Pressure Range:	689.5 kPa (100 PSI) Gauge	
Manufacturer:	In-Situ	
Serial Number:	7830	

Calibration Procedures and Equipment Used:

- Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180324
- 5. Automated software calibration procedures used

Range of Applied Temperatures: 4.08 C to 29.68 C

Range of Applied Pressures:

-0.1034 kPa (-0.0150 PSI) to 689.4757 kPa (100.0000 PSI)

Calibration Coefficients:

Linearity	0.3617
Scale	100.3603
Offset	0.1999

PASS/FAIL Criteria:

	Applied Pressure		Current mA	
Zero Response	-0.1034 kPa (-0.0	150 PSI)	3.967	PASSED
Full Scale Response	689.4757 kPa (100.0000 PSI)		19.854	PASSED
	Minimum	Maximu		7
Temperature Stability (%FS)	-0.014	0.009		PASSED
Repeatability at 15 C (%FS)	-0.004	0.005		PASSED
Hysteresis (%FS)	0.004			PASSED
Thermal Hysteresis (%FS)	0.026		PASSED	

Test Performed By:	LEH	Test Verified By:	
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Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003031803000460

Calibration Result:

PASSED

Calibration Date:	2003-03-18
Model:	PXD-261
Full Scale Pressure Range:	137.9 kPa (20 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	460
Serial Number:	

Calibration Procedures and Equipment Used:

- Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302.
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180324

Applied Pressure

5. Automated software calibration procedures used

Range of Applied Temperatures:

4.12 C to 29.76 C

Range of Applied Pressures:

-0.0041 kPa (-0.0006 PSI) to 137.8965 kPa (20.0002 PSI)

Current mA

Calibration Coefficients:

Linearity	0.1126
Scale	19.7741
Offset	-0.1684

$D\Delta$	22	/E	ΛI	1	Cr	iter	12.
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).0041 kPa (-0.00	106 DCI)	4.136	7 240055
	JUU F 31)	1 4.130	PASSED
137.8965 kPa (20.0002 PSI)		20.226	PASSED
inimum	Maximu		7
.087	-0.017		PASSED
.007	0.008		PASSED
008			
			PASSED PASSED
)	37.8965 kPa (20. inimum 0.087 0.007 008 002	inimum Maximu 0.087 -0.017 0.007 0.008	inimum Maximum 0.087 -0.017 0.007 0.008

Test	Per	forn	ned	By
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LEH

Test Verified By:



Calibration Report

210 S. Third Street, Laramie, Wyoming 82070 U.S.A. (TEL) 1-800-446-7488, 307-742-8213 (FAX) 307-721-7598

Visit us on the Internet at www.in-situ.com!

Report Number:

2003022106000306

Calibration Result:

PASSED

2003-02-21
PXD-261
589.5 kPa (100 PSI) Gauge
n-Situ
306

Calibration Procedures and Equipment Used:

- 1. Digital Multi-Meter (DMM), HP 3457A, s/n 3114A15302
- 2. Multi-Channel Thermometer, Instrulab 4312A-15, s/n 41039
- 3. Platinum RTD (RTD-10), Instrulab 832, s/n 805
- 4. Pressure Controller, Mensor PCS-400, s/n 180324

Applied Pressure

5. Automated software calibration procedures used

Range of Applied Temperatures: 4.08 C to 29.68 C

Range of Applied Pressures:

-0.1034 kPa (-0.0150 PSI) to 689.4826 kPa (100.0010 PSI)

Current mA

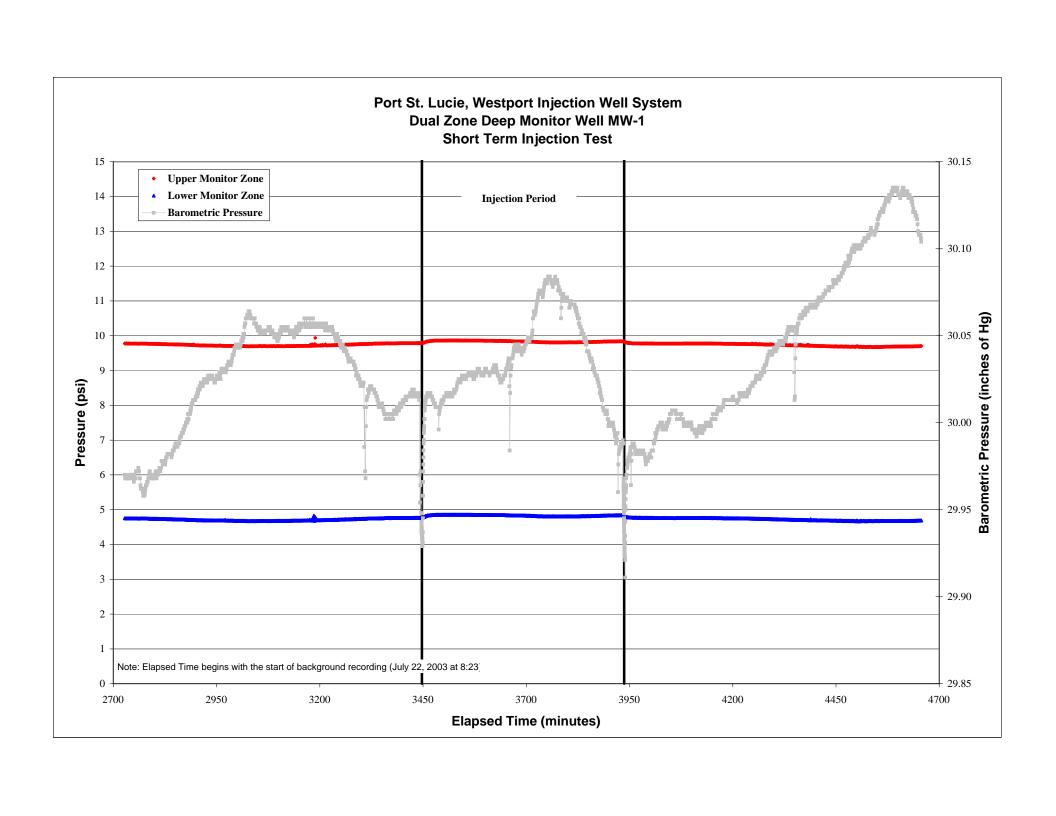
Calibration Coefficients:

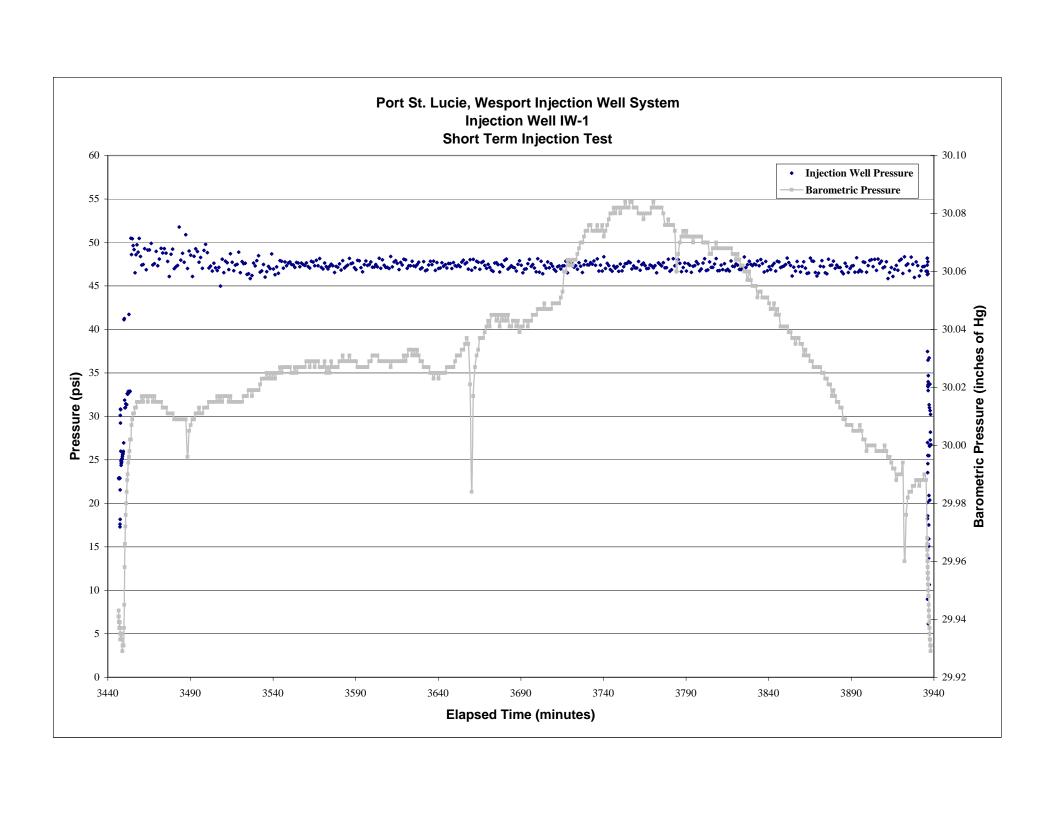
Linearity	0.1430
Scale	99.9804
Offset	-0.1895

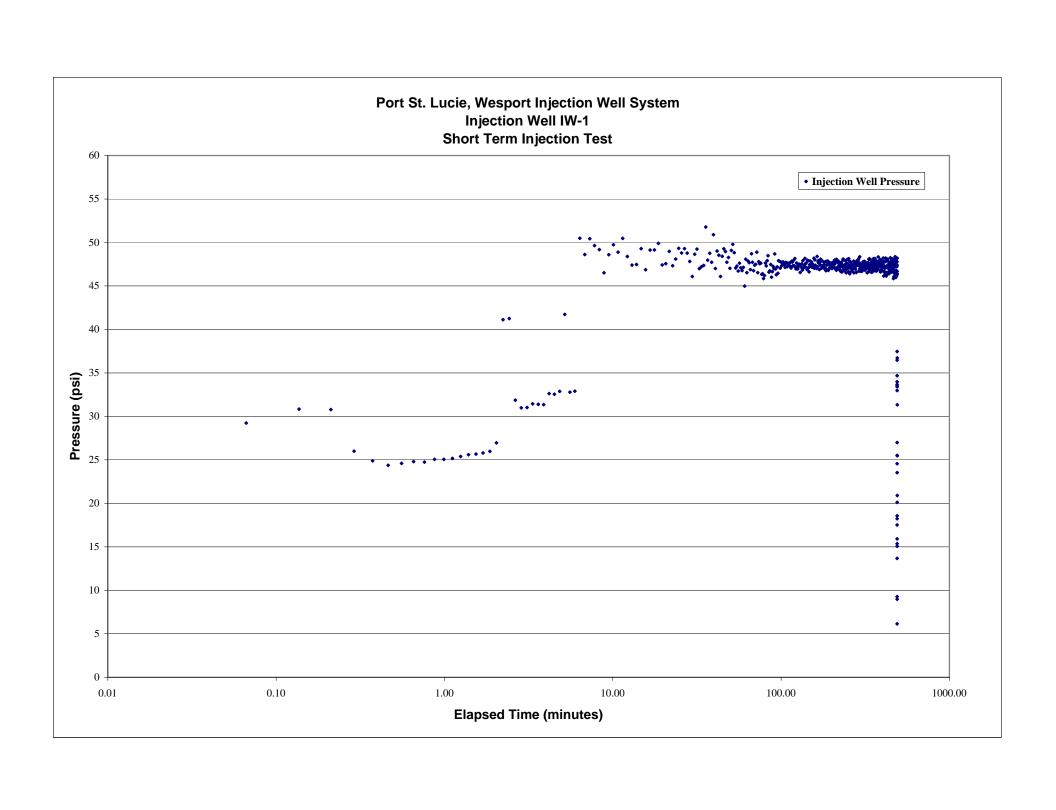
PASS/FAIL Criteria:

	111111111111		Contentiny	1
Zero Response	-0.1034 kPa (-0.0	150 PSI)	4.030	PASSED
Full Scale Response	689.4826 kPa (10		20.010	PASSED
	Minimum	Maximu	ım	
Temperature Stability (%FS)	-0.093	0.115		PASSED
Repeatability at 15 C (%FS)	-0.003	0.013		PASSED
11 -1 -1 (0/50)				
Hysteresis (%FS)	0.005			PASSED
Thermal Hysteresis (%FS)	0.011			PASSED

Test Performed By:	LEH	Test Verified By:	
		· .	







ARCADIS

Appendix D

Pilot-Hole Geologic and
Penetration-Rate Logs for Injection
Well IW1 and Deep Monitor Well
MW1

Core Analysis Reports

Electronic File of Core Sample Logs

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
FILL- Limerock, shell and sand compacted.	57-inch diameter reamer bit and stabilizer assembly. Mud-rotary method.	0 – 1.5	1.5
SAND – Sand, 100%, clear, quartz, fine to medium grained, well sorted, rounded to sub-rounded; Organic Matter, trace, black to dark brown, decomposed.	Revolutions per Minute (RPM): 3-5, Weight on Bit (WOB): 2-3K	1.5–2.0	0.5
SILTY SAND – Sand, 70%, clear to dusky brown (10YR 2/2), quartz, very- fine to fine grained, rounded to subrounded; Silt, 30%, dusky brown (10YR 2/2).	RPM: 3-5, WOB: 2-3K	2.0 – 5.0	3.0
HARD PAN – Sand, 70%, dusky brown (10YR 2/2) to black (N1), quartz, very- fine to fine grained, rounded to sub-rounded, moderately well cemented: Organic Matter, 30%, black (N10), silty, decomposed.	RPM: 3-5, WOB: 2-3K	5.0 – 6.0	1.0
SANDY CLAY- Clay, 70%, light olive gray (5Y 6/1), silty, very soft, low plasticity; Sand, 30%, clear, quartz, slightly silty, very- fine grained, sub-rounded; Organic Matter, trace, brown, poorly decomposed.	RPM: 3-5, WOB: 2-3K	6.0 – 10.0	4.0
SHELL WITH SOME SAND – Shell, 80%, very pale orange (10YR 8/2) to light brown (5YR 6/4) and medium gray (N5), "hash" of mostly shell fragments to 0.3- inch with some whole shells to 0.8- inch size; Sand, 20%, clear, quartz, fine grained, sub-rounded.	RPM: 16, WOB: 5-8K	10 – 50	40
SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4) and medium gray (N5), mostly shell fragments to 0.3- inch with some whole shells to 0.8-inch size; Sand, 30%, clear, quartz, fine grained, subrounded; Clay, 10%, medium gray (N5), very soft, medium plasticity, slightly phosphatic; Sandstone, 10%, light gray (N7), quartz, fine grained, soft, poorly cemented, numerous shell intraclasts.	RPM: 18, WOB: 8-10K	50-60	10
SANDSTONE WITH SAND AND SOME SHELL – Sandstone, 50%, medium gray (N5), quartz, some calcareous matrix, slightly phosphatic, fine to coarse grained, moderately- well cemented, numerous shell intraclasts; Sand, 30%, clear, quartz, fine to medium grained, subrounded; Shell, 20%, very pale orange (10YR 8/2) to light brown (5YR 6/4), fragments, some whole bivalves to 0.8 inch.	RPM: 20, WOB: 5-10K	60-70	10

SHELL WITH SOME SAND AND SANDSTONE— Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 25%, clear, quartz, fine grained, sub- rounded; Sandstone, 25%, medium light gray (N6), quartz with calcareous matrix, very fine to medium grained, moderately hard, moderately- well cemented, slightly phosphatic, numerous shell intraclasts; Clay, trace, medium light gray (N6), very soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND — Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine-to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND—Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND—Limestone Timestone, 50%, medium light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular.	GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 25%, clear, quartz, fine grained, sub- rounded; Sandstone, 25%, medium light gray (N6), quartz with calcareous matrix, very fine to medium grained, moderately hard, moderately- well cemented, slightly phosphatic, numerous shell intraclasts; Clay, trace, medium light gray (N6), very soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine-to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – RPM: 20-24, WOB: 6- 110-130 20 8K RPM: 20-24, WOB: 6- 110-130 20 8K RPM: 20-24, WOB: 6- 110-130 20 8K RPM: 20-24, WOB: 6- 110-130 20 8K RPM: 20-24, WOB: 6- 110-130 20 8K RPM: 20-24, WOB: 6- 110-130 20 8K	THE CALL OF CA	DDM 20 24 WOD 6V	70.00	20
(5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 25%, clear, quartz, fine grained, sub-rounded; Sandstone, 25%, medium light gray (N6), quartz with calcareous matrix, very fine to medium grained, moderately hard, moderately- well cemented, slightly phosphatic, numerous shell intraclasts; Clay, trace, medium light gray (N6), very soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine-to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to moderately hard, moderately well cemented, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 110-130 20 LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40		RPW: 20-24, WOB. 0K	70-90	20
25%, medium light gray (N6), quartz with calcareous matrix, very fine to medium grained, moderately hard, moderately-well cemented, slightly phosphatic, numerous shell intraclasts; Clay, trace, medium light gray (N6), very soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine-to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – RPM: 20-24, WOB: 6- 110-130 20 SK words and the sub-angular. Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	(5YR 6/4), mostly shell fragments to 0.4- inch; Sand,			
matrix, very fine to medium grained, moderately hard, moderately- well cemented, slightly phosphatic, numerous shell intraclasts; Clay, trace, medium light gray (N6), very soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine-to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	25%, clear, quartz, fine grained, sub-rounded; Sandstone,			
moderately- well cemented, slightly phosphatic, numerous shell intraclasts; Clay, trace, medium light gray (N6), very soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fineto fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND-RPM: 20-26, WOB: 6- 130-170 40	matrix, very fine to medium grained, moderately hard,			
soft, medium plasticity. SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine- to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub- rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 110-130 20 SK RPM: 20-24, WOB: 6- 8K APM: 20-24, WOB: 6- 110-130 20 APPM: 20-24, WOB: 6- 8K APPM: 20-24, W	moderately- well cemented, slightly phosphatic, numerous			
SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fine- to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub- rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-24, WOB: 6K 90-110 20 SRPM: 20-24, WOB: 6 8K 110-130 20 SRPM: 20-24, WOB: 6- 130-170 40				
SANDSTONE AND SAND – Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4– inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fineto fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 110-130 20 30 310-170 40		RPM: 20-24, WOB: 6K	90-110	20
fragments to 0.4- inch; Limestone, 20%, medium light gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fineto fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND — Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	SANDSTONE AND SAND – Shell, 50%, very pale			
gray (N6), intraclast (shells) grainstone, slightly phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fineto fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND — Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND— RPM: 20-26, WOB: 6- 130-170 40	orange (10YR 8/2) to light brown (5YR 6/4), mostly shell			
phosphatic, fine grained, moderately hard, moderately well cemented, slightly vuggy; Sandstone, 15%, medium dark gray (N4), quartz with calcareous matrix, very fineto fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40				
dark gray (N4), quartz with calcareous matrix, very fine- to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND — Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub- rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND— RPM: 20-26, WOB: 6- 110-130 20 RPM: 20-24, WOB: 6- 110-130 40	phosphatic, fine grained, moderately hard, moderately		j	
to fine grained, moderately hard, moderately well cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND — Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND— RPM: 20-26, WOB: 6- 110-130 20 8K	well cemented, slightly vuggy; Sandstone, 15%, medium			
cemented, few shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND — Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND— RPM: 20-24, WOB: 6- 8K RPM: 20-24, WOB: 6- 110-130 20 RPM: 20-24, WOB: 6- 110-130 40	to fine grained, moderately hard, moderately well			
medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND — RPM: 20-24, WOB: 6- SK Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub-rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	cemented, few shell intraclasts; Sand, 15%, clear to very			
LIMESTONE WITH SHELL AND LITTLE SAND – Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub- rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-24, WOB: 6- 8K 110-130 20 RPM: 20-24, WOB: 6- 130-170 40	light gray (N8), mostly quartz, some calcareous, fine to			
Limestone, 50%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, sub- rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40		RPM: 20-24, WOB: 6-	110-130	20
moderately hard, moderately well cemented, numerous shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	Limestone, 50%, medium light gray (N6), intramicrite	8K]	
shell intraclasts; Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	wackestone, slightly phosphatic, fine grained, soft to			
to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 10%, clear to very light gray (N8), mostly quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	shell intraclasts: Shell 40%, very pale orange (10YR 8/2)		į	
quartz, some calcareous, fine to medium grained, subrounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	to light brown (5YR 6/4), mostly shell fragments to 0.4-		1	ľ
rounded to sub-angular. LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40	inch; Sand, 10%, clear to very light gray (N8), mostly			
LIMESTONE WITH SHELL AND LITTLE SAND- RPM: 20-26, WOB: 6- 130-170 40				
Limostono 70% medium light gray (N6) intramicrite 8K		RPM: 20-26, WOB: 6-	130-170	40
Effications, 7070, medicini figure g. a.y (170), and	Limestone, 70%, medium light gray (N6), intramicrite	8K		
wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately- well cemented, numerous	wackestone, slightly phosphatic, fine grained, soft to			
shell intraclasts; Shell, 20%, very pale orange (10YR 8/2)	shell intraclasts; Shell, 20%, very pale orange (10YR 8/2)			
to light brown (5YR 6/4), mostly shell fragments to 0.4-	to light brown (5YR 6/4), mostly shell fragments to 0.4-		İ	
inch; Sand, 10%, clear to very light gray (N8), mostly	inch; Sand, 10%, clear to very light gray (N8), mostly			İ
quartz, some calcareous, fine to medium grained, sub- rounded to sub-angular.	•			

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE WITH SHELL AND SOME SAND – Limestone, 70%, greenish gray (5GY 6/1) and medium light gray (N6), grainstone, phosphatic, fine grained, moderately hard, moderately- well cemented; Shell, 15%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.2- inch; Sand, 15%, clear to very light gray (N8), mostly quartz, fine grained, subrounded to sub-angular; Clay, trace, very light gray (N8), calcareous, very soft, non- plastic.	RPM: 20, WOB: 7K	170-180	10
SANDY CLAY WITH SHELL AND LITTLE LIMESTONE– Clay, 50%, grayish olive (10Y 4/2) to dusky yellowish green (10GY 3/2), silty, slightly phosphatic, very soft to soft, cohesive, non-plastic; Shell, 25%, very pale orange (10YR 8/2) to light brown (5Y 6/4), bivalves, mostly tests to 0.3 inch; Sand, 15%, very light gray (N8), calcareous, detritic, some clear, quartz, very- fine to fine grained, sub-rounded to sub- angular; Limestone, 10%, yellowish gray (5Y 7/2), biosparitic, with shell intraclasts, slightly phosphatic, vuggy, moderately- well cemented.	RPM: 20, WOB: 5K TOP OF HAWTHORN	180 – 186	6
CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray (5G 4/1) with trace of pale olive (10Y 6/2), silty, very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine grained, sub-rounded; Shell, trace, very pale orange (10YR 8/2), isolated tests to 0.2 inch. Between 185 and 240 ft bpl large (more than 50%) amount of cement fragments in cuttings. Diminishing with depth and disappearing below 260 ft bpl.	RPM: 44, WOB: 4K	186 – 300	114
CLAY WITH VERY LITTLE SAND AND SHELL—Clay, 90%, dark greenish gray (5G 4/1), some grayish olive green (5GY 3/2), silty, soft to very soft, very cohesive, non-plastic; Sand, 5%, clear, quartz, fine grained, sub-rounded; Shell, 5%, very pale orange (10YR 8/2), small tests to 0.2-inch.	RPM: 30, WOB: 5K	300 310	10
CLAY – Clay, 100%, grayish olive (10Y 4/2) to dark greenish gray (5G 4/1), silty, slightly phosphatic to phosphatic, trace calcareous (limey), very cohesive, very soft to moderately hard, non-plastic; Sand, trace, clear, quartz, very- fine grained, sub-rounded; Shell, trace, white (N9) to very pale orange (10YR 8/2), tests up to 0.2 inch; Chert, trace, olive gray (5Y 4/1), micritic, very hard.	RPM: 30, WOB: 5K	310 – 470	160
CLAY WITH VERY LITTLE SAND – Clay, 95%, olive grav (5Y 4/1) to gravish vellow green (5GY 7.2), mostly	RPM: 30, WOB: 6K	470 - 510	40

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
silty, some calcareous, phosphatic, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz, very-fine grained, sub-rounded.			
CLAY WITH LITTLE LIMESTONE – Clay, 90%, 60% pale olive (10Y 6/2), calcareous (marl), 40% grayish olive (10Y 4/2), silty, very phosphatic, very soft to soft, highly cohesive, non- plastic; Limestone, 10%, grayish yellow green (5GY 7/2) to white (N9), arenaceous, slightly phosphatic, fine grained, poorly cemented, soft, microporous; Sand, trace, clear to light greenish gray (5GY 8/1), quartz and calcareous, very- fine to fine grained; Chert, trace, olive gray, (5Y 4/1), micritic, very hard.	RPM: 45-48, WOB: 3-4K	510 - 530	20
CLAY, SOME LIMESTONE AND VERY LITTLE SAND – Clay, 80%, pale greenish yellow (10Y 8/2) to yellowish gray (5Y 7/2), very soft to soft, calcareous, some silty, highly phosphatic, non-plastic, cohesive; Limestone, 15%, yellowish gray (5Y 7/2), arenaceous, phosphatic, fine grained, poorly cemented, soft, microporous; Sand, 5%, light gray (N7) to clear, mostly calcareous, detritic, some quartz, very- fine to fine	RPM: 45-46 WOB: 3-4K	530 - 560	30
grained, sub-rounded to angular. CLAY – Clay, 100%, pale olive (10Y 6/2), silty, very slightly calcareous, slightly phosphatic, very soft to soft, cohesive, non- plastic; Limestone, trace, grayish yellow green (5GY 7/2), arenaceous, slightly phosphatic, fine grained, poorly cemented, soft, microporous; Sand, trace, clear to light greenish gray (5GY 8/1), quartz and	RPM: 45-46 WOB: 3-4K	560 -570	10
calcareous, very fine to fine grained. CLAY WITH LITTLE LIMESTONE – Clay, 90%, mostly pale greenish yellow (10Y 8/2), calcareous (marl), some grayish olive green (5GY 3/2), silty, phosphatic, very soft to soft, highly cohesive, non- plastic to low plasticity; Limestone, 10%, grayish yellow green (5GY 7/2) to white (N9), arenaceous, slightly phosphatic, fine grained, poorly cemented, soft, microporous; Sand, trace, clear to light greenish gray (5GY 8/1), quartz and calcareous, very- fine to fine grained.	RPM: 45-46 WOB: 3-4K	570-580	10
CLAY – Clay, 100%, pale olive (10Y 6/2) to pale greenish yellow (10Y 8/2), slightly calcareous, silty, phosphatic, very soft to soft, cohesive, non-plastic; Limestone, trace, grayish yellow green (5GY 7/2), arenaceous, slightly phosphatic, fine grained, microporous, poorly cemented, soft; Sand, trace, clear to light greenish gray (5GY 8 1), quartz and calcareous.	RPM: 45-46 WOB: 3-4K	580-630	50

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
very- fine to fine grained.			
CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH LITTLE SAND – Clay, 70%, 90% yellowish gray (5Y 7/2), calcareous (marl), 10% grayish olive (10Y 4/2), silty, phosphatic, moderately soft to very soft, non-plastic, non-cohesive; Limestone, 20%, yellowish gray (5Y 7/2), oolitic grainstone, phosphatic, fine grained, poorly cemented, soft to moderately hard; Sand, 10%, clear to light gray, mostly calcareous, detritic, some quartz, very -fine to fine grained, sub-rounded to angular.	RPM: 45-46 WOB: 3-4K	630-640	10
CALCAREOUS CLAY (MARL) WITH VERY LITTLE LIMESTONE AND SHELL – Clay, 90%, 80% pale olive (10Y 6/2), calcareous (marl), 20% grayish olive green (5GY 3/2), silty, phosphatic, very soft to soft, non-plastic, cohesive; Limestone, 5%, very pale orange (10YR 8/2) to white (N9), arenaceous, some oolitic grainstone, phosphatic, fine grained, poorly cemented, very soft to soft; Shell, 5%, very pale orange (10Y 8/2) to white (N9), tests to 0.1-inch; Sand, trace, clear, quartz, very- fine to fine grained, sub-rounded.	RPM: 45-46 WOB: 3-4K	640-680	40
CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay, 70%, 90% yellowish gray (5Y 7/2), calcareous, trace white (N9), 10% grayish olive (10Y 4/2), silty, phosphatic, moderately soft to very soft, non-plastic, non- cohesive; Limestone, 25%, yellowish gray (5Y 7/2), oolitic grainstone, phosphatic, fine grained, poorly cemented, soft to moderately hard; Sand, 5%, clear to light gray, mostly calcareous, detritic, some quartz, very- fine to fine grained, sub-rounded to angular.	RPM: 45-46 WOB: 3-4K	680-690	10
CLAY WITH LITTLE LIMESTONE – Clay, 90%, mostly pale greenish yellow (10Y 8/2), calcareous (marl), some grayish olive green (5GY 3/2), silty, phosphatic, very soft to soft, highly cohesive, non- plastic to low plasticity; Limestone, 10%, grayish yellow green (5GY 7/2) to white (N9), arenaceous, slightly phosphatic, fine grained, poorly cemented, soft, microporous; Sand, trace, clear to light greenish gray (5GY 8/1), quartz and calcareous, very- fine to fine grained.	RPM: 44-46 WOB: 3-4K	690-730	40
CALCAREOUS CLAY (MARL) AND LIMESTONE WITH LITTLE SAND – Clay, 60%, 80% yellowish gray (5Y 7/2) to white (N9), calcareous, 20% grayish olive (10Y 4/2), silty, very phosphatic, moderately soft to very soft, non-plastic, poorly-cohesive; Limestone, 30%.	RPM: 44-46 WOB: 3-4K	730-740	10

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
	COMMENTS	INTERVAL	
yellowish gray (5Y 7/2), oolitic grainstone, phosphatic, fine grained, poorly cemented, soft to moderately hard; Sand, 10%, clear to light gray, mostly calcareous, detritic, some quartz, very -fine to fine grained, sub-rounded to angular.			
LIMESTONE WITH VERY LITTLE CLAY AND SHELL- Limestone, 90%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic grainstone, fossiliferous with forams and shell intraclasts, phosphatic, moderately- well cemented, moderately hard, vuggy, porous; Clay, 5% to trace at the bottom, yellowish gray (5Y 7/2), calcareous (marl), slightly phosphatic, very soft, non- plastic; Shell, 5%, very pale orange (10YR 8/2) to white (N9), tests to 0.3-inch.	Sample from 750-760 consisted of mostly cement. RPM: 44-46 WOB: 3-5K	740-770	30
LIMESTONE – Limestone, 100%, yellowish gray (5Y 8/1), sparry grainstone, fine to medium grained, subrounded, trace of fossils, slightly phosphatic, moderately-well cemented, soft, porous.	RPM: 46, WOB: 5-8K	770-840	70
LIMESTONE – Limestone, 100%; 85% yellowish gray (5Y 8/1), biosparitic, highly fossiliferous, with large amounts of foraminifera, crinoids and bivalves shell fragments, poorly cemented, very soft to soft, vuggy, porous; 15%, light gray (N7) to medium light gray (N6),	RPM: 40-46 WOB: 8-14K	840-910	70
micritic, moderately hard. LIMESTONE– Limestone, 100%; 95%, very pale orange (10YR 8/2) to yellowish gray (5Y 8/1), biosparitic grainstone, fossiliferous, fine grained, poorly cemented, very soft to soft; 5%, light gray (N7) to medium light gray (N6), micritic to fine crystalline, well cemented, hard.	RPM: 40-46 WOB: 10-13K	910-930	20
LIMESTONE AND LITTLE DOLOMITE – Limestone, 90%; 70% very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic grainstone, highly fossiliferous (forminifera, shell fragments), fine grained, poorly to moderately- well cemented, very soft to moderately hard; 30% yellowish gray (5Y 7/2), dolomitic, fine crystalline, slightly vuggy, moderately hard; Dolomite, 10%, very light gray (N8) to pale yellowish brown (10YR 6/2), micritic to fine crystalline, well cemented, hard.	RPM: 40, WOB: 10-13K	930-940	10
LIMESTONE – Limestone, 100%; 95% yellowish gray (5Y 7/2), grainstone, few fossils (foraminifera), poorly cemented, very soft, vuggy, porous; 5%, light gray (N7) to medium light gray (N6), micritic, moderately hard.	RPM: 36, WOB: 6-12K	940-960	20
LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; 90% yellowish gray (5Y 7.2), biosparitic, fossiliferous (foraminifera, crinoids), fine	RPM: 36, WOB: 10K	960-1050	90

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
GEOEGGE 200	COMMENTS	INTERVAL	
grained; 10% light gray (N7), fine crystalline, partly			
slightly dolomitic, poorly to moderately- well cemented, very soft to moderately hard, vuggy, microporous;	1		
Dolomite, 5%, grayish orange (10YR 7/4) to medium gray			
(N5), fine crystalline to micritic, moderately hard, slightly			
vuggy; Clay (marl), trace, yellowish gray (5Y 8/1), very			
soft, non plastic.			
LIMESTONE AND SOME DOLOMITE – Limestone,	RPM: 36, WOB: 10K	1050-1060	10
70%, very pale orange (10YR 8/2) to yellowish gray (5Y	<u>,</u>		
8/1), biosparitic, fossiliferous (foraminifera and crinoids,			
some bivalves shells), fine grained, very soft to soft,			
poorly cemented, vuggy, porous; Dolomite, 30%,			
moderate olive brown (5Y 4/4), olive gray (5Y 3/2) to			
medium gray (N5), very- fine crystalline to micritic, very-			
well cemented, hard, slightly vuggy.		10.60 10.50	10
LIMESTONE AND VERY LITTLE DOLOMITE-	RPM: 36, WOB: 10K	1060-1070	10
Limestone, 95%; 80% yellowish gray (5Y 7/2),			
biosparitic, fossiliferous (foraminifera, crinoids), fine			
grained, poorly cemented, very soft, vuggy; 20%, very			
pale orange (10YR 8/2) to light gray (N7), dolomitic,			
very- fine crystalline to micritic, well cemented,			
moderately hard; Dolomite, 5%, grayish orange (10YR			
7/4) to medium gray (N5), fine crystalline to micritic,			
moderately hard, slightly vuggy; Clay (marl), trace, yellowish gray (5Y 8/1), very soft, non plastic.			
LIMESTONE AND LITTLE DOLOMITE – Limestone,	RPM: 36, WOB: 10K	1070-1080	10
90%, very pale orange (10YR 8/2) to yellowish gray (5Y	14 1/11 5 5,		
8/1), biosparitic, fossiliferous (foraminifera, crinoids), fine			
grained, poorly cemented, very soft to soft, vuggy;		,	
Dolomite, 10%, dark gray (N3) to medium gray (N5) and			
grayish orange (10YR 7/4), very- fine crystalline, well			
cemented, hard, slightly vuggy.			
LIMESTONE AND SOME DOLOMITE – Limestone,	RPM: 36, WOB: 10K	1080-1100	20
75%, very pale orange (10YR 8/2) to yellowish gray (5Y			
8/1), biosparitic, fossiliferous (foraminifera and crinoids,			
some bivalves shells), partly dolomitic, fine grained,		•	
poorly cemented, very soft to soft, vuggy, porous;			
Dolomite, 25%, moderate olive brown (5Y 4/4), olive			
gray (5Y 3/2) to medium gray (N5), very fine crystalline			
to micritic, hard, well cemented, slightly vuggy.		1100 1110	
DOLOMITE AND LIMESTONE- Dolomite, 60%, dark	RPM: 36, WOB: 10K	1100-1110	10
gray (N3) to medium gray (N5) and grayish orange (10YR)			
7/4), very- fine crystalline to micritic, hard, slightly			
yuggy; Limestone, 40%, very pale orange (10YR 8/2) to			
vellowish gray (5Y 8/1), biosparitic, with some			

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
GEOLOGIC LOG	COMMENTS	INTERVAL	
foraminifera, partly dolomitic, fine grained, poorly			
cemented, very soft to soft, vuggy, porous. LIMESTONE AND VERY LITTLE DOLOMITE-	RPM: 36, WOB: 10K	1110-1140	30
Limestone, 95%; yellowish gray (5Y 7/2) to very pale			
orange (10YR 8/2), biosparitic, with some foraminifera,			
partly dolomitic, fine grained, poorly cemented, very soft			
to soft, yuggy, porous; Dolomite, 5%, grayish orange			·
(10VR 7/4) to medium gray (N5), very- fine crystalline to			
micritic, moderately- well cemented, moderately hard,			
slightly vuggy; Clay (marl), trace, yellowish gray (5Y			
8/1), very soft, non plastic.	RPM: 36-44,	1140-1150	10
LIMESTONE AND DOLOMITE – Limestone, 50%, very	WOB: 10K		
pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic, with some foraminifera, partly dolomitic, fine	11021 2022	ļ	
grained, poorly cemented, very soft to soft, vuggy, porous;			
Dolomite, 50%, moderate yellowish brown (10 Y K 5/4) to			
dark gray (N3), very- fine crystalline to micritic,			
moderately- well cemented, hard, slightly vuggy.		1170 1160	10
LIMESTONE AND SOME DOLOMITE - Limestone,	RPM: 36-44,	1150-1160	10
75%, very pale orange (10YR 8/2) to yellowish gray (5Y	WOB: 10K		
8/1), biosparitic, fossiliferous (foraminifera and crinoids),			
partly dolomitic, fine grained, poorly cemented, very soft			
to soft, vuggy, porous; Dolomite, 25%, very light gray (N8) to medium gray (N5), little grayish orange (10 YR			
8/2), very-fine crystalline to micritic, well cemented,			
moderately hard, slightly vuggy.			
LIMESTONE AND DOLOMITE – Limestone, 50%, very	RPM: 36-44,	1160-1170	10
pale orange (10YR 8/2) to yellowish gray (5Y 7/2),	WOB: 10-12K		
biosparitic, with some foraminifera, partly dolomitic, fine			
grained poorly cemented, very soft to soft, vuggy, porous;			
Dolomite, 50%, very light gray (N8) to medium dark gray			
(N4), little yellowish brown (10YR 5/4) very fine			
crystalline to micritic, moderately- well cemented, moderately hard, slightly vuggy.			
LIMESTONE AND SOME DOLOMITE – Limestone,	RPM: 36-44,	1170-1180	10
70%, very pale orange (10YR 8/2) to yellowish gray (5Y	WOB: 10-12K		
8/1) biosparitic, fossiliferous (foraminifera and crinoids),			
partly dolomitic, fine grained, poorly cemented, very soft			
to soft, yuggy, porous; Dolomite, 30%, very light gray			Ì
(N8) to medium gray (N5), little grayish orange (10 YR			1
8/2), very fine crystalline to micritic, well cemented,			1
moderately hard, slightly vuggy.			
TO COURT AND AUTOMALITTIC LIMITECTONIC	RPM: 36	1180-1190	10
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale vellowish brown (10YR 6/2), little	WOB: 12K		
Dolomite, 95%, pale vellowish blown (10 110 %2), little		<u></u>	

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
		<u> </u>	
dark yellowish brown (10YR 4/2) and medium light gray (N6), very-fine crystalline, slightly vuggy, well cemented, moderately hard to hard; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic with trace of forams, very- fine grained, poorly cemented, soft.			
DOLOMITE AND SOME LIMESTONE—Dolomite, 80%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4) and medium light gray (N6), very-fine crystalline, slightly calcareous, well cemented, moderately hard to hard, slightly vuggy; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic, very-fine grained, poorly to moderately-well cemented, soft, slightly vuggy.	RPM: 36-44 WOB: 10-15K	1190-1220	30
DOLOMITE- Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4) and dark gray (N3), very- fine crystalline, moderately-well to well cemented, hard, few vugs; Limestone, trace, very pale orange (10YR 8/2), biosparitic, very-fine grained, moderately- well cemented, soft, slightly vuggy.	RPM: 44 WOB: 10-15K	1220-1230	10
DOLOMITE AND LITTLE LIMESTONE – Dolomite, 90%, pale yellowish brown (10YR 6/2), moderate yellowish brown (10YR 5/4) and medium light gray (N6) to medium dark gray (N4), very- fine crystalline, slightly vuggy, well cemented, moderately hard to hard; Limestone, 10%, very pale orange (10YR 8/2), biosparitic, very- fine grained, slightly fossiliferous (fragments of shell and coral), poorly cemented, soft, slightly vuggy.	RPM: 44 WOB: 10-15K	1230-1240	10
LIMESTONE AND DOLOMITE- Limestone, 60%, very pale orange (10YR 8/2), slightly fossiliferous (fragments of shell and coral), very fine grained, poorly cemented, soft, slightly vuggy; Dolomite, 40%, pale yellowish brown (10YR 6/2), moderate yellowish brown (10YR 5/4) and medium light gray (N6) to medium dark gray (N4), sucrosic to very-fine crystalline, well cemented, moderately hard to hard, slightly vuggy, Clay, trace, medium dark gray (N4), moderately soft, non-plastic, cohesive.	RPM: 44 WOB: 10-15K	1240-1270	30
DOLOMITE AND VERY LITTLE LIMESTONE; Dolomite, 95%, from pale yellowish brown (10YR 6/2) to grayish olive green (5GY 3/2) and greenish black (5GY 2/1) with trace of medium light gray (N6) to medium gray (N5), sucrosic to micritic, moderately well- to well cemented, hard to very hard, few small yugs; Limestone.	RPM: 36-44 WOB: 10-15K	1270-1330	60

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
GEOLOGIC 200	COMMENTS	INTERVAL	
5%, very pale orange, (10YR 8/2), mostly dolomitic, micritic, some biosparitic, very- fine grained, slightly fossiliferous, poorly to moderately- well cemented, soft to			
moderately hard, slightly vuggy. DOLOMITE AND VERY LITTLE LIMESTONE — Dolomite, 95%, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4) and very little light gray (N5), sucrosic to micritic, brittle, well cemented, moderately hard to hard with micro vugs; Limestone, 5%, very pale orange (10YR 8/2), grainstone, moderately- well	RPM: 40-48 WOB: 15K	1330-1370	40
cemented., soft. DOLOMITE AND VERY LITTLE LIMESTONE; Dolomite, 95%, from pale yellowish brown (10YR 6/2) to grayish olive green (5GY 3/2) with some medium light gray (N6) to medium gray (N5), sucrosic to micritic, hard to very hard, moderately- well to well cemented, few small vugs; Limestone, 5%, very pale orange, (10YR 8/2), grainstone, moderately- well cemented, soft.	RPM: 36-48 WOB: 10-15K	1370-1410	40
LIMESTONE AND DOLOMITE—Limestone, 60%, 90% very light gray (N8), clayey limestone with other detritic impurities, very soft to soft, poorly cemented, vuggy; 10% yellowish gray (5Y 8/1), very calcareous, grainstone, moderately- well cemented, moderately hard, vuggy; Dolomite, 40%, from pale yellowish brown (10YR 6/2) to grayish olive green (5GY 3/2), fine crystalline, well cemented, hard, few small vugs; Clay, trace, greenish gray (5G 6/1) to medium gray (N5), slightly calcareous, soft to	RPM: 36 WOB: 10-18K	1410-1420	10
very soft, non- plastic. LIMESTONE AND SOME DOLOMITE- Limestone, 80%, very pale orange (10YR 8/2) to grayish orange (10Y 7/4), biospartic, fine grained, slightly fossiliferous, poorly cemented, moderately soft, vuggy, porous; Dolomite, 20%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), fine crystalline, vuggy, well cemented, hard; Clay, trace, greenish gray (5G 6/1) to medium gray (N5), slightly calcareous, soft.	RPM: 36 WOB: 10-20K	1420-1440	20
DOLOMITE AND VERY LITTLE LIMESTONE — Dolomite, 95%, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4) and very little light gray (N5), fine crystalline, with micro vugs, well cemented, hard; Limestone, 5%, very pale orange (10YR 8/2), grainstone, moderately- well cemented, soft.	RPM: 30 WOB: 20K	1440-1450	10
LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange (10YR 8 2) to very light gray (N8), oolitic grainstone, fine grained, poorly cemented, soft;	RPM: 30 WOB: 20K	1450-1460	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
Dolomite, 10%, pale yellowish brown (10YR 6/2) to medium dark gray (N4), fine crystalline to micritic, compact, well cemented, hard.			
DOLOMITE – Dolomite, 100%, light brown (5YR 6/4) to dark yellowish brown (10YR 4/2), fine crystalline, vuggy, moderately hard; little dark gray (N3), sucrosic to micritic, moderately- well cemented, moderately hard to hard, very slightly vuggy; Limestone, trace, very pale orange (10YR 8/2), oolitic grainstone, fine grained, poorly cemented, moderately hard	RPM: 30-36 WOB: 15-20K	1460-1510	50
LIMESTONE AND DOLOMITE – Limestone, 60%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), oolitic grainstone, very- fine grained, dolomitic, fossiliferous, poorly to moderately- well cemented, soft; Dolomite, 40%, moderate yellowish brown (10YR 5/4) and medium gray (N5), micritic to very-fine crystalline, poorly to moderately- well cemented, moderately hard to hard, slightly vuggy.	RPM: 32 WOB: 5K	1510-1530	20
LIMESTONE AND SOME DOLOMITE—Limestone, 80%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), oolitic grainstone, very-fine grained, fossiliferous, dolomitic, soft, poorly to moderately-well cemented, slightly vuggy; Dolomite, 20%, medium light gray (N6) to medium dark gray (N4), fine crystalline to micritic, multiple limestone inclusions and fossils, moderately-well cemented, moderately hard,	RPM: 28 WOB: 20-22K	1530-1550	20
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2), grayish orange (10YR 7/4), and medium light gray (N6) to medium dark gray (N4), sucrosic, some micritic to very-fine crystalline, slightly vuggy, well cemented, moderately hard; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), oolitic dolomitic grainstone, very fine grained, poorly cemented, soft.	RPM: 28-44 WOB: 15-22K	1550-1600	50
DOLOMITE– Dolomite, 100%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2), grayish orange (10YR 7/4) and medium light gray (N6) to medium dark gray (N4, micritic to very-fine crystalline, some sucrosic, slightly vuggy, moderately hard, well cemented; Limestone, trace, very pale orange (10YR 8/2), oolitic dolomitic grainstone, very- fine grained, poorly cemented, soft.	RPM: 40-48 WOB: 15K	1600-1620	20
DOLOMITE AND LITTLE LIMESTONE – Dolomite, 85%, pale vellowish brown (10YR 6/2), dark vellowish	RPM: 36-44 WOB: 15K	1620-1650	30

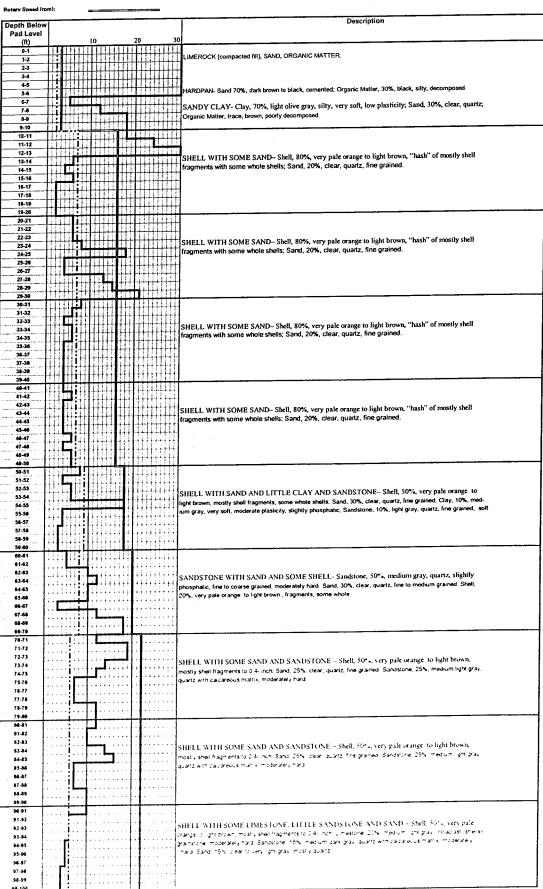
GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
	COMMENTS	HILEKIAD	
brown (10YR 4/2), grayish orange (10YR 7/4), and medium light gray (N6) to medium dark gray (N4), sucrosic, some micritic to very-fine crystalline, slightly vuggy, well cemented, moderately hard, Limestone, 15%, very pale orange (10YR 8/2), oolitic dolomitic grainstone, trace of forams, very- fine grained, poorly cemented, soft.			
LIMESTONE AND SOME DOLOMITE—Limestone, 70%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), oolitic grainstone with nodules, very- fine grained, slightly fossiliferous with forams, partly dolomitic, soft, poorly cemented, slightly vuggy; Dolomite, 30%, medium light gray (N6) to medium dark gray (N4), micritic, little pale yellowish, fine crystalline, moderately- well cemented, moderately hard.	RPM: 36-44 WOB: 15K	1650-1660	10
DOLOMITE AND SOME LIMESTONE – Dolomite, 75%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2) and grayish orange (10YR 7/4), sucrosic to fine crystalline, some medium light gray (N6) to medium dark gray (N4), micritic, moderately hard, moderately well cemented; Limestone, 25%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), oolitic grainstone with nodules, very fine grained, little micritic, slightly fossiliferous with forams, partly dolomitic, poorly	RPM: 36-44 WOB: 15K	1660-1670	10
cemented, soft, slightly vuggy. DOLOMITE AND VERY LITTLE LIMESTONE— Dolomite, 95%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2) and grayish orange (10YR 7/4), fine crystalline and sucrosic, some medium light gray (N6) to medium dark gray (N4), micritic, moderately- well cemented, moderately hard; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), grainstone, very- fine grained, little micritic, slightly fossiliferous, partly dolomitic, poorly cemented, soft, slightly vuggy.	RPM: 44 WOB: 15K	1670-1680	10
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2) and grayish orange (10YR 7/4), fine crystalline and sucrosic, some medium light gray (N6) to medium dark gray (N4), micritic, moderately- well cemented, moderately hard; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7 2), grainstone, very- fine grained, little micritic, slightly fossiliferous, partly dolomitic, poorly cemented, soft, slightly vuggy.	RPM: 30-44 WOB: 10-20K	1680-1720	40
DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, moderate vellowish brown (10YR 5/4) and some	RPM: 32-36 WOB: 15-20K	1720-1730	10

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
	COMMENTS	INTERVAL	
dark gray (N3), sucrosic to fine crystalline, vuggy to solid, moderately- well cemented, moderately hard,; Limestone, 10%, very pale orange (10YR 8/2) to grayish orange (10YR 7/4), dolomitic, micritic, some fine grained, slightly vuggy, moderately- well cemented, soft to moderately hard.			
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2) and grayish orange (10YR 7/4), fine crystalline and sucrosic, some medium light gray (N6) to medium dark gray (N4), micritic, moderately well cemented, moderately hard; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), grainstone, very- fine grained, little micritic, slightly fossiliferous, partly dolomitic, poorly cemented, soft, slightly vuggy.	RPM: 32-36 WOB: 15-20K	1730-1740	10
DOLOMITE- Dolomite, 100%, moderate yellowish brown (10YR 5/4) to yellowish gray (5Y 8/1), fine crystalline, vuggy to solid, hard to very hard, very- well cemented; Limestone, trace, very pale orange (10YR 8/2), dolomitic, micritic, moderately- well cemented, moderately hard, slightly vuggy.	RPM: 36 WOB: 15-20K	1740-1750	10
DOLOMITE AND SOME DOLOMITIC LIMESTONE—Dolomite, 75%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2) and grayish orange (10YR 7/4), some medium light gray (N6) to medium dark gray (N4), trace black (N1), fine- crystalline to micritic, well cemented, hard to very hard, vuggy; Limestone, 25%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), dolomitic, fine crystalline, little micritic, hard, well	RPM: 36 WOB: 15-20K	1750-1760	10
cemented, slightly vuggy. DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) dark yellowish brown (10YR 4/2), some dark gray (N3), fine- crystalline to micritic, trace sucrosic, hard to very hard, slightly vuggy; Limestone, trace, very pale orange (10YR 8/2), dolomitic, micritic, moderately hard.	RPM: 36, WOB: 20- 25K	1760-1780	20
DOLOMITE AND SOME DOLOMITIC LIMESTONE—Dolomite, 75%, pale yellowish brown (10YR 6/2 and grayish orange (10YR 7/4), little light gray (N7), fine crystalline to micritic, well cemented, hard to very hard, vuggy; Limestone, 25%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), dolomitic, fine crystalline, little micritic, well cemented, hard, slightly vuggy.	RPM: 36, WOB: 20- 25K	1780-1790	10
DOLOMITE- 100%, moderate yellowish brown (10YR 5.4) to grayish orange (10YR 7/4), little light gray (N7), fine crystalline to micritic, moderately hard.	RPM: 36, WOB: 20- 25K	1790-1800	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2), dark yellowish brown (10YR 4/2), some dark gray (N3), sucrosic to fine- crystalline, moderately well to poorly cemented, moderately hard, slightly vuggy; Limestone, trace, very pale orange (10YR 8/2), dolomitic, micritic, moderately hard.	RPM: 36, WOB: 20- 25K	1800-1820	20
DOLOMITE AND SOME DOLOMITIC LIMESTONE—Dolomite, 80%, pale yellowish brown (10YR 6/2 and grayish orange (10YR 7/4), little light gray (N7), fine-crystalline to micritic, well cemented, hard to very hard, vuggy; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), mostly dolomitic, some chalky, fine crystalline, little pellitic, poorly to moderately-well cemented, moderately hard to soft, slightly vuggy.	RPM: 36, WOB: 20-25K	1820-1840	20
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), sucrosic, moderately- well to poorly cemented, moderately hard to soft, slightly vuggy; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very- fine grained, poorly cemented, partially dolomitic, moderately hard.	RPM: 24, WOB: 5K	1840-1846	6
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), little medium light gray (N6), mostly fine- crystalline and sucrosic, some micritic, moderately- well to very- well cemented, moderately hard to very hard, vuggy; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), partially dolomitic, very- fine grained, poorly cemented, moderately hard.	RPM: 26-40, WOB: 10-20K Core #1 collected from interval 1846.5- 1860.0 ft bpl.	1846-1870	24
DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), sucrosic, some light gray (N7) to medium light gray (N6), very-fine crystalline, moderately well cemented, moderately hard to hard, vuggy; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), dolomitic, fine crystalline, poorly to moderately well cemented, soft.	RPM: 40-44, WOB: 15-18K	1870-1900	30
DOLOMITE AND LITTLE LIMESTONE – Dolomite, 90%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), little brownish gray (5YR 4/1), very-fine crystalline, moderately-well cemented, hard, vuggy, porous; Limestone, 10%, very pale orange (10 YR 8/2), very-fine grained, partially crystalline, poorly cemented, moderately hard.	RPM: 43 WOB: 15K	1900-1950	50
DOLOMITE AND VERY LITTLE LIMESTONE— Dolomite, 95%, 80% moderate vellowish brown (10YR	RPM: 43 WOB: 15K	1950-1960	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
	COMMENTS	HILLIAN	
5/4) to dark yellowish brown (10YR 4/2), very-fine crystalline, moderately-well cemented, vuggy, porous; 20% brownish black (5YR 2/1), very-fine crystalline, moderately-well cemented, hard, slightly vuggy; Limestone, 5%, very pale orange (10YR 8/2), very-fine grained, partially crystalline, moderately hard, poorly cemented.			
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), very-fine crystalline to fine crystalline, moderately-well cemented, hard, vuggy; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, partially crystalline, moderately hard, poorly cemented.	RPM: 32 WOB: 15K	1960-1970	10
DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, yellowish gray (5Y 7/2) to pale yellowish brown (10 YR 6/2), very-fine grained and very-fine crystalline, dolomitic, poorly to moderately- well cemented, hard, slightly fossiliferous; Dolomite, 20%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), very-fine crystalline, moderately well-cemented, moderately hard, vuggy; Lignite, trace, black, micritic.	RPM: 32 WOB: 15K	1970-1980	10
DOLOMITE AND LIMESTONE – Dolomite, 60%, moderate yellowish brown (10YR 5/4), very-fine crystalline, moderately-well cemented, hard, vuggy (with calcite partially filling vugs); Limestone, 40%, very pale orange (10YR 8/2), partially dolomitic, very-fine grained, moderately hard, moderately-well cemented, fossiliferous; Clay, trace, very pale orange (10YR 8/2), calcareous, soft,	RPM: 32 WOB: 15K	1980-1990	10
non-plastic; Lignite, trace, black (N2), micritic, soft. DOLOMITE AND LITTLE LIMESTONE— Dolomite, 90%, moderate yellowish brown (10YR 5/4) with little pale yellowish brown (10YR 6/2), very-fine to fine crystalline, well cemented, hard, partially vuggy; Limestone, 10%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), partially dolomitic, very-fine grained, moderately hard, moderately-well cemented; Clay, trace, very pale orange (10YR 8/2), calcareous, soft, non-plastic; Lignite, trace, black (N2), micritic, soft.	RPM: 32 WOB: 15K	1990-2000	10
DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, moderate yellowish brown (10YR 5/4) with little light gray (N7), very-fine to fine crystalline, hard, slightly vuggy; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/4), very-fine grained, partially dolomitic, moderately-well cemented, moderately hard.	RPM: 32 WOB: 15K	2000-2010	10

Penetration rate (min/ft):	
Weight On Bit (K lbs):	
Potent Speed (mm):	



Penetration rate (min/ft):	
Weight On Bit (K Ibs):	

Rotary Speed from	1: <u>-</u>			
Depth Below Pad Level (ft)	10)	20 30	Description
200-201				
201-202		 		
202-203	┠┼┼╬┼┼┼┼┼	 	<u> </u>	CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,
204-205				non-plastic, Sand, 5%, clear, quartz; Shell, trace, very pale orange. Between 185 and 240 ft bpl large ((more than 50%) amount of cement fragments in cultings.
205-206	 		.	(more than 50%) amount of certain regiments in comings.
206-207 207-208	[; 	 		
208-209				
209-210	 			
210-211 211-212				
212-213			IIII	CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,
213-214	 -	 	[non-plastic: Sand, 5%, clear, quartz: Shell, trace, very pale orange. Between 185 and 240 ft bpl large
214-215 215-216	H-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	 		(more than 50%) amount of cement fragments in cultings.
216-217		шш		
217-218		++++++	 	
218-219 219-220				
220-221		ШН	 	
221-222	┠┿┇┼┼┼┼┼	1 	╏╏╏	
223-224				CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,
224-225		144444	[non-plastic, Sand, 5%, clear, quartz, Shell, trace, very pale orange. Between 185 and 240 ft bpl large (more than 50%) amount of cement fragments in cultings.
225-226		++++++	 - -+++++	, , , , , , , , , , , , , , , , , , , ,
227-228				
228-229	14.	144144	╀┼┼┼┼┼	
229-230 230-231				
231-232			1444	
232-233		++++++++		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,
234-235			44 rpm +	non-plastic; Sand, 5%, clear, quartz; Shelt, trace, very pale orange. Between 185 and 240 ft opi large
235-236			1 1 - 1 - 1 - 1 - 1	(more than 50%) amount of cement fragments in cuttings.
236-237 237-238				
238-239				
239-248 240-241	-		 	
241-242				•
242-243	1.11.			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,
243-244				non-plastic; Sand, 5%, clear, quartz; Shelf, trace, very pale orange. Between 185 and 240 ft bpt large
245-246				(more than 50%) amount of cement fragments in cuttings.
246-247 247-248				
248-249				
249-250				
250-251 251-252		. , . ! ! ! ;		
252-253				CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,
253-254 254-255	i . ,			non-plastic; Sand, 5%, clear, quartz, Shell, trace, very pale orange Between 185 and 240 ft bpt large
255-256				(more than 50%) amount of cement fragments in cuttings
256-257				
257-258 258-259				
259-260				
260-261 261-262	, i j i		, . ,	
262-263				and the service of th
263-264		النبنين أبابا		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive, non-plastic: Sand, 5%, clear, quartz, Shell, trace, very pale orange. Between 185 and 240 ft bpl large.
264-265 265-266	1.4.1.4.	1111111		(more than 50%) amount of cement fragments in cuttings
266-267	i.i			
267-268 268-269	i . .		1	
268-270				
270-271				
211-272 272-273	· i · · · · · ·			and the contract of the contract of the contract of the contract of the contract of
273-274				CLAY WITH VERY LITTLE SAND Clay, 95°s, dark greenish gray, silty, very soft to soft, cohesive, non-plastic Sand, 5%, clear, quartz Sheil, trace, very pale orange. Between 185 and 240 ft bpl large.
274-275 275-276				(move than 50%) amount of cement fragments in cuttings
276-277	::: ! ::::: :		\$4 rpm 🍃	
271-278	i .			
278-279 279-280				
280-281				
281-282 252-283				
282-283	· · · · · · · · ·			CLAY WITH VERY LITTLE SAND Clay, 95° a, dark greenish gray, silty, very soft to soft, cobesive,
284-285				non-plastic Sand, 54, clear, quartz. Shell trace, key pale prange. Between 185 and 240 ft op large more than 50% amount of cement fragments in cuttings.
285-286 286-287				, v
287-298				
288-289				
285-290				
291-292				
292-293				CLAY WITH VERY LITTLE SAND - Clay, 95%, Lark greenish gray, 5thy, very 5oft to 8oft, cohesive,
293-294 294-295	. j			nomicrastic Sand, 55s, bear, quartz, Sheri trace, very pare zrange. Between 185 and 240 ft bb., arge.
295-296	7:			more than 50% is amount of comment fragments in cultings.
296-297				
297-298 298-299	1			
299-300	1: 1			

Penetration rate (min/ft):	
Weight On Bit (K lbs):	

Weight On Bit Rotary Speed		
Depth Belo	ow	Description
Pad Leve		
(ft) 400-401		
401-402		
402-403 403-404		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
404-405 405-406		hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange.
405-407		
407-408 408-409		
409-410		
410-411		
412-413		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
413-414 414-415		hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, while to very pale orange.
415-416		
416-417 417-418		
418-419 419-420		
420-421		
421-422 422-423		
423-424		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately hard, non-plastic: Sand, trace, clear, quartz, very fine grained: Shell, trace, while to very pale orange.
424-425 425-426	<u>╶┠┼╏┼┼┋┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼</u>	Hall, Hollingson, Sora, Hone, Andri, Andrie and House, and Honey House of Safe and Safe.
426-427		
427-428 428-429		İ
429-430 430-431		
431-432		
432-433 433-434	╌ ╏┊┋┊┋ ┼┋┼┼┋╀╏╁┼╂┟┼┼┼┼┼╏╂┼┼┼┼┼┼┼	CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
434-435		hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Sheff, trace, white to very pale orange.
435-436 436-437	30 rpm >	
437-438		
438-439 439-440		
440-441		
442-443		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
443-444 444-445		hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, while to very pale orange.
445-446 446-447		
447-448		
448-449 449-450	- - - - - - - - - - - - - -	
450-451		
451-452 452-453		or any or agent of the second of the second of the second of the moderately
453-454 454-455	┈╂╸┠┊┊╂┼┼┼┼╏┼┼┼╂┼┼╀╏┼┼┼ ┼	CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately hard, non-plastic, Sand, trace, clear, quartz, very fine grained. Shell, trace, while to very pale orange.
455-456		
456-457 457-458		
458-459 459-460		
460-461		
461-462 462-463		
463-464		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately lard, non-plastic. Sand, trace, clear, quartz, very line grained. Shell, trace, while to very pale orange
464-465 465-466	30 cpm →	and the second s
464-467		
467-468 468-469		
469-470 470-471	╂	
471-472		
472-473 473-474		LAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very
474-475 475-476		off, low plasticity to non-plastic; Sand, 5° «, clear, quartz.
476-477		
477-478 478-479		
479-480	11-1	
480-481 481-482	the interest to the	1
482-483		LAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very
493-494 484-495		off, low plasticity to non-plastic; Sand, 5°s, clear, quartz.
485-486 486-487		
456-487 487-458		
455-489 459-49 6		
490-491		
491-492 492-493		
493-494	la la la la la la la la la la la la la l	LAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to gray shiyellow green, cohesive, very
494-495 495-496		off, low plasticity to non-plastic; Sand, 5%, clear, quartz.
496-497	4!	
497-458 495-499		
499-500	<u> </u>	

Penetration rate (min/ft):	
Weight On Bit (K lbs):	

Rotary Speed (rom)	:		
Depth Below			Description
Pad Level	10	20 30	
(ft) 500-601	10		
601-602			
602-603 603-604			CLAY - Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft,
604-605		46 rpm 🗲	cohesive, non- plastic.
605-606			
607-608 608-609	I.		
608-609 609-610			
610-611 611-612	Hi llian (19		
612-613			CLAY - Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft,
613-614 614-615		 	cohesive, non- plastic.
615-616			
616-617 617-618			
618-619			
619-629 620-621			
621-622		 	
622-623 623-624			CLAY - Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft,
624-625		44 rpm 🏲	cohesive, non- plastic.
625-628 626-627			
627-628 628-629	┨ ┆┇┧┟┶┽╌┠┆ ┆ ┼╏┼┼┼┼	<u> </u>	
629-630		ЩЩЩ	
630-631 631-632			
632-633			CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH LITTLE SAND Clay, 70%,
633-634 634-635	╏╉┼┋╫┼┼╫┼╂┼┼┼┼		well-wish army calcargous filtle sity phosphalic moderately soft to very soft, non-plastic, non-consiste,
635-636		[[:::::::::::::::::::::::::::::::::::::	yellowish gray, calcae dous, miles strip, perspectively hard; Sand, 10%, clear to light gray, mostly detrilic.
536-637 637-638			
638-639 639-646	<u>₽</u>	1	
640-641			
641-642			Charles of the control of the contro
643-644			CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, mostly calcareous, very soft to soft, non-plastic, cohesive: Limestone, 5%, very pale orange to white, fine grained, very soft to soft.
644-645 643-646	\!		poorly cemented: Shell, 5%, very pale orange to white.
646-647 647-648			
648-649			
649-650 650-651	liilii liiliili		
651-652			
652-653 653-654		ilmulli	CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, mostly calcareous, very
654-655			soft to soft, non-plastic, cohesive, Limestone, 5%, very pale orange to white, fine grained, very soft to soft, poorly cemented. Shell, 5%, very pale orange to white
655-656 656-657			,
657-658 658-659		. []	
659-660	[1] [1] [1] [1] [1] [1] [1] [1] [1] [1]		
660-661 661-662		.	
662 663	111111111111111		CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, mostly calcareous, very
663-664 664-665	i oughtenism	44 rpm - ₱	soft to soft, non-plastic, cohesive, Limestone, 5%, very pale orange to white, line grained, very soft to soft,
665-666			poorly cemented; Shell, 5%, very pale orange to white
666-667 667-668	l:		
569-669 569-670	1.	.	
670-671	1!		
671-672 672-673	-j		The state of the program of the state of the
673-674	1::	.	CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90°s, pale office, mostly calcareous, very soft to soft, non-plastic, conesive. Limestone, 5%, very pale orange to white, fine grained, very soft to soft,
674-675 675-676			poorly cemented. Shell, 5%, very pale grange to white
676-677			
677-678 676-679			
679-689 550-681		+	
581-682			
682-683 683-684			CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND - Cby.
684-685			CALCHARDOC AND AND AND AND AND AND AND AND AND AND
685-686 686-687			ye swan gray son to noordawy that poor your order order or the enter to be a first
687-688			
688-689 689-698			
690-691			
691-692 692-693			and the second of the second o
693-694			CLAY WITH LITTLE LIMESTONE – Clay, Porth, meathy pale greenish yellow mostly calcuredus manners are set to soft to soft to got, conessee monoposition on passion, in mesone 10%, got, shi leading reen to
594-595 595-696			white soft poon, temented
696-697			
697-699 698-699			
599-700	10.10.00		

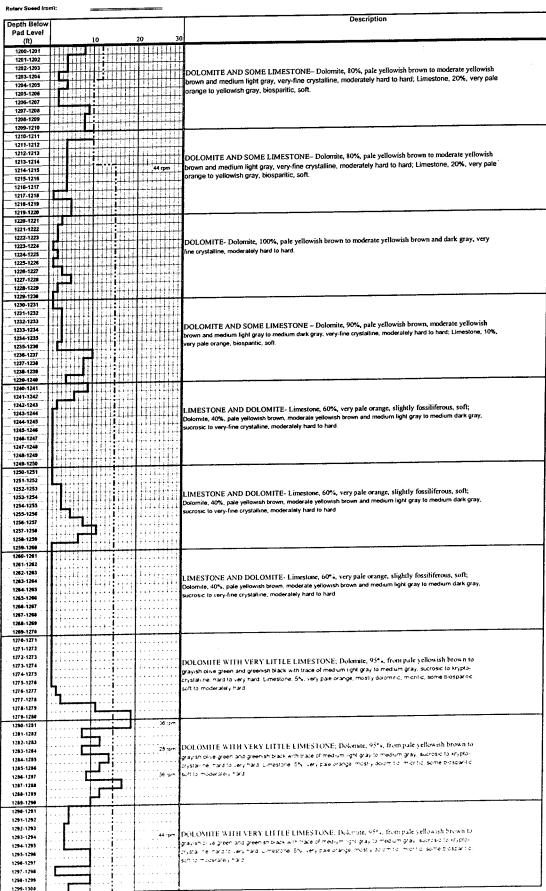
Penetration rate (min/ft):		_
Weight On Bit (K fbs):	·	
D		

Rotary Speed (m	om):		
Depth Below	10	20	Description 30
(ft) 800-801	han erraña u		
801-802 802-803			
803-804			LIMESTONE - Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft,
804-805	<u> </u>	-}}}}	moderately well cemented.
806-807			
807-808			
809-810			
810-811 811-812	 		
812-813			LIMESTONE – Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft,
813-814 814-815			moderalely well cemented.
815-816 816-817			
817-818			→
818-819 819-820	[]	+ + 	†
820-821			
821-822 822-823	 	 	
823-824			LIMESTONE – Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft, moderately well cemented.
824-825 825-826	 	<u> </u>	
826-827 827-828			
828-829			†
829-830 830-831			
831-832			
832-833 833-834		44 rpm	LIMESTONE - Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft,
834-835 835-836		44 rpm	moderately well cemented.
836-837			
837-838 838-839	 	+++++++++++	
839-846 840-841			
841-842			
842-843 843-844	! +++ ! ++++	+++++++++++	LIMESTONE Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented,
844-845			some light gray to medium light gray, microcrystalline, moderately hard.
845-846 846-847	!		
847-848 848-849			
849-850			
850-851 851-852	 		
852-853			LIMESTONE - Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented,
853-854 854-855			The same of the sa
855-856 856-857		4144	
857-858			
858-859 859-860	l tetimenta et		
860-861 861-862			
862-863		44	the property of the state of th
863-864 864-865	I : : : : : : : : : : : : : : : : : : :	4444144444	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard
865-866			
866-867 867-868			
868-869 869-878			
870-871			
871-872 872-873	l de la la la la la la la la la la la la la		
873-874			LIMESTONE - Limestone, 100*s; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystatine, moderately hard
874-875 875-876			
876-977 877-878			
878-879	,	,	
879-880	 -<u> -</u>-		
881-882			
842-843 843-884	- <u> -i</u>		LIMESTONE - Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented.
884-885 885-886	<mark> </mark>		someright gray to medium, grk gray, microcrystakine, moderately hard
886-887			
587-688 555-689			
849-890			
190-891 891-892			
897-893]		LIMESTONE - Limestone, 1007 st yellowish gray, biospantic, very soft to soft, poorly cemented.
893- 8 94 894-895			some igni gray to medium i gni gray, microarysta ine, moderstay nard
895-896 896-897			
897-898			
898-899 899-900			

Penetration rate (min/ft):	
Weight On Bit (K ibs):	
Potent Speed (rpm):	

Rotary Speed (rom	n):	·	·	
Depth Below				Description
Pad Level	10	. 2	ი 30	
(ft) 1000-1001				
1001-1002				
1002-1003 1003-1004			++++++++	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, f
1004-1005	<u> </u>			LIMES TONE AND VERY IE THE BOOM IN SIGNIFY SIGNIFY STATES TO MAKE THE PROPERTY SIGNIFY
1005-1006 1006-1007	┃ ┼┼┼┼┼┼╀	 	+++++++	grayion orange to model gray, may a year
1007-1008	<u> </u>			
1008-1009			 	
1009-1010				
1011-1012	4	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	+++++++	and the state of
1012-1013	 			LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, f ossiliferous, little light gray, fine crystalline, partly slightly dotomitic, very soft to moderately hard. Dotomite, 5%, ossiliferous, little light gray, fine crystalline, partly slightly document.
1014-1015				ossiliferous, little light gray, line crystalline, party signity documer, buy some state of the light gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1015-1016 1016-1017	+++++	\cdots		graphic graphi
1017-1018			77-44-44	
1018-1019	<u> </u>	++++++		
1020-1021			44444	
1021-1022	┼┲┿╃╌┼┼╬	++++++		DOLONGER DE DOS CARITES L'investore 05% vellougish gray biosparitic f
1023-1024				LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, f ossiiferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; Dolomite, 5%, ossiiferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; blood slightly approximately and soft partly and soft partly approximately approxim
1024-1025 1025-1026	· [++++++++++	╀┼┼┼┼		ossifierous, fittle light gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy. grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1026-1027				
1027-1028 1028-1029	 	+++++++	#######################################	
1029-1036			36 rpm 🕦	
1030-1031 1031-1032	•	 	36 rpm 🍑	
1032-1033			71447	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, f
1033-1034 1034-1035		!+!+!+ !		title light grow fine crystalline, nadly slightly dolomitic, very son to moderately hard, coloring, 5 %.
1035-1035		!!!!!!!!!		ossulerous, little light y ay, line by statistic, purply lightly microcrystalline, moderately hard, slightly vuggy. grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1036-1037 1037-1038	i	• • • • • • • • •	++++++	
1038-1039				
1039-1040 1040-1041			+++++	
1041-1042				
1042-1043 1043-1044	1.		44-4-4-4-4-4-4	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, f
1044-1045			$\Pi \Pi \Pi \Pi \Pi$	LIMES TONE AND VERY EMBODISHED DOCUMENT Slightly dolomitic, very soft to moderalely hard: Dotomite, 5%, graysh orange to medium gray, finely crystalline to microcrystalline, moderalely hard, slightly vuggy.
1045-1046 1046-1047	1		1.1411114	grayish transpertor medium grup, many september 1
1047-1048			1.11	
1048-1049 1049-1050				
1050-1051	H			
1051-1052	ii		44.4.4.4	t and the state of
1052-1053 1053-1054				LIMESTONE AND SOME DOLOMITE - Limestone, 70%, very pale orange to yellowish gray, biospanilic, very soft to soft. Dolomite, 30%, moderate dive brown, olive gray to medium gray, very fine to micro
1054-1055			4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	crystalline, hard, very well cemented
1055-1056 1056-1057				
1057-1058				
1058-1059 1059-1068			11111111	
1060-1061		السنسا	4.4.44	
1061-1062 1062-1063				LIMESTONE AND VERY LITTLE DOLOMITE: Limestone, 95%; yellowish gray, biosparitic, very
1063-1064				the contract agency male orange to light gray dolomitic, very line to microcrystamile, modernicy
1064-1065 1065-1066	11			son, poonly centering, swine vary pear or organization of the control of the cont
1066-1067	ii			
1067-1068 1068-1069	L			
1069-1976				
1078-1071	P			
1072-1073		,		LIMESTONE AND LITTLE DOLOMITE - Limestone, 90%, very pale orange to yellowish gray,
1073-1074 1074-1075				biosparitic, very soft to soft, Dolomite, 10%, dark gray to medium gray, and grayish brange, kelly life crystolics.
1075-1076				had, keli cemented
1075-1077				
1678-1079				
1079-1080	-			
1081-1082	!			
1082-1083	;			LIMESTONE AND SOME DOLOMITE - Limestone, 75° a, very pale orange to yellowish gray.
1084-1085				Environ CALL Action Section (ery soft to soft Doomstel 25%, moderate onle provin othergray, to medium gray, beginned to microstrystayine hard.
1055-1085				, · · · · · · · ·
1887-1058	[
1088-1089				
1089-1090	<u> </u>			
1091-1092				
1092-1093	-			LIMESTONE AND SOME DOLOMITE – Limestone, 15th, very pule orange to yellowish gray, operation party documents, lesy soft to soft. Docume, 25th, indicates one power to usely ay its medium gray,
1094-1095				prospersor party, absomitio, liery soft to soft indicating upon moderate or resolvent or they are in the control of the contro
1095-1096				
1897-1898				
1998-1899	 			

Penetration rate (minift):	
Weight On Bit (K lbs):	
Potent Speed (mm):	



Penetration rate (min/ft):	
Weight On Bit (K lbs):	

Description Descr	Weight On Bit (K		
Comparison of Comparison of			
(a) 10 20 20 20 20 20 20 20 20 20 20 20 20 20		1	Description
DOLOMITE AND VERY LITTLE LIMESTONE, Debraia, 99%, from pask yellowish brown to yellow and the property of the processor of	(ft)	10 20	
Company Comp			
State of the state	1402-1403		DOLOMITE AND VERY LITTLE LIMESTONE: Dolomite. 95% from pale vellowish brown to
December - St., vary pade starpy, grandown, sub.			grayish olive green with some medium light gray to medium gray, sucrosic to kryptocrystalline, hard to very hard,
Improve	1405-1406		Limestone, 5%, very pale orange, grainstone, soft.
Comment Comm			j
Interest	1408-1409		
HATESTONE AND DOLOMITE-Limestone, 60%, very light gray, very soft to self-with limit of provided by the control of the control			
LIMESTONE AND DOLLOWITE. Limestone, 80%, very pair energy to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage, because of the complete and an interest to gray the reage and very limit girl gray, finely cytatione, band, limited an interest to gray the reage, and very limit girl gray, finely cytatione, band, limited and gray, source of the money station, moderately had been a fairly gray, finely to more crystaline, moderately soft, say, into dark gray, source to money station, moderately had been an interest to gray the say, say, into dark gray, source to money station, moderately had to finely crystalline, moderately soft, say, say, into dark gray, source to money station, moderately had to finely crystalline, moderately soft, say, stationed and say, say, stationed and say, say, stationed an interest to gray the say, say, say, source to money station, moderately had to finely crystalline, moderately soft, say, say, say, say, source to money station, moderately had to finely crystalline, moderately soft, say, say, say, say, say, source to money station, moderately had to finely crystalline, moderately had, say, stationed and say, say, stationed and say, say, say, say, say, say, say, say,	1411-1412		
### STATE	1413-1414 .	<u> "1 </u>	LIMESTONE AND DOLOMITE—Limestone, 60%, very light gray, very soft to soft with little of
HINESTONE AND SOME DOLOMITE. Limestone, 80%, very pale orange to grayith erange, No- gradient of the state of		┨ ╌┋ ╌┼┼┼┼┼┼┼┼┼┼┼┼┋╌┼╏┼┼┼┼┼┼┼┼	grayish olive green, fine crystalline, hard.
LIMESTONE AND SOME DOLOMITE. Limestone, 80%, very pale canage to grayish draings, bio- particle, moderately soft, bedomin, 20%, moderate yeldowich brown to dark yeldowich brown, findy crystalline, moderately soft, bedomin, 20%, moderately soft, bedomin, 20%, moderately soft, bedomin, 20%, very pale canage to grayish draings, bio- particle, moderately soft, bedomin, 20%, moderately soft, between the beautiful property of the yellowich brown. Index crystalline, moderately soft, bedomin, 20%, moderately soft, between the beautiful property of the yellowich brown. Index crystalline, moderately soft, bedomin, 20%, moderately soft, very pale canage to grayish draings, bio- particle, moderately soft, bedomin, 20%, moderately pales strong to grayish draings, bio- species, moderately soft, bedomin, 20%, moderately pales strong to grayish draings, bio- particle, moderately soft, bedomin, 20%, moderately pales strong to grayish draings, bio- species, moderately soft, bedomin, 20%, moderately pales strong to grayish draings, bio- particle, moderately soft, begone to death yellowish brown, finely crystalline, moderately soft, moderately soft, service, soft, servy pale canage to very light gray, posts gravations, soft, Descript, 10%, pale yellowish brown to medium dark gray, finely to moter crystalline, moderately soft, moderately soft, moderately soft, moderately soft, servy pale canage to very light gray, posts gravations, soft, Descript, 10%, pale yellowish brown, finely crystalline, moderately soft, moderately soft, moderately soft, moderately soft, moderately soft, servy pale canage to very light gray, posts gravations, soft, Descript, 10%, pale yellowish brown, finely crystalline, moderately soft, moderately soft, moderately soft, soft soft soft soft soft soft soft soft	1416-1417		
SUBSTONE AND SOME DOLOMITE. Limestone, 80%, very pale orange to gray/sh rearge, bio- packing to the state of			
LIMESTONE AND SOME DOLOMITE. Limestone, 10%, very pale orange to grayfalt erange, biospecies, moderately soft, Dolomic, 29%, moderate yellowich brown to derk yellowich brown, finely crystalline, moderately soft, Dolomic, 29%, moderate yellowich brown to derk yellowich brown, finely crystalline, moderately soft, Dolomic, 29%, moderate yellowich brown to derk yellowich brown, finely crystalline, moderately soft, Dolomic, 29%, moderate yellowich brown to derk yellowich brown from yorgadine. LIMESTONE AND SOME DOLOMITE. Limestone, 50%, very pale orange to grayfah crange, biospecies, moderately soft, Dolomic, 29%, moderate yellowich brown to derk yellowich brown from yorgadine. LIMESTONE AND SOME DOLOMITE. Limestone, 50%, very pale orange to grayfah crange, biospecies, moderately soft, pale yellowich brown to derk yellowich brown to grayfah brown to grayfah brown to derk yellowich brown to grayfah brown to grayfah brown to derk yellowich brown, finely crystalline, moderately soft, see soft soft soft soft soft soft soft soft	1419-1420	<u> </u>	
Section 1997 Sectio	1421-1422		
Section 1997 Sectio		┠┦┋┊┊┊┊┊ ┼┼ ╏┊ ┼┼┼ ╏	LIMESTONE AND SOME DOLOMITE- Limestone, 80%, very pale orange to grayish orange, bio-
Committee Comm	1424-1425		sparific, moderately soft; Dolomite, 20%, moderate yellowish brown to dark yellowish brown, mady by yellowish
Compared Compared			y name us.
Committee Comm	1427-1428		
LIMESTONE AND LITTLE DOLOMITE - Limestone, 50%, very pale orange to grayith orange, bio- particular contents of the particular	1429-1430		
LIMESTONE AND SOME DOLOMITE. Limestone, 10%, very pale energe to grayith crange, No- position, moderately soft, Dotentia, 25%, moderate yellowish brown to dark yellowish brown, finely crystalline,		┊	
Section December	1432-1433	╽ ┆ ┋ ┾┼╃╃╃╃╃╃╃┪	I IMESTONE AND SOME DOLOMITE- Limestone, 80%, very pale orange to grayish orange, bio-
Institute			sparilic, moderately soft; Dolomite, 20%, moderate yellowish brown to dark yellowish brown, finely crystalline,
Section Sect	1435-1436		hard.
1981-199 198			
1961-196 1961-1961-		▎▍▍▍ ▗▗▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗	
DOLOMITE AND VERY LITTLE LIMESTONE — Dolomic, 95%, pals yellowish brown to grayish coarge, grantstone, both the light gray, finely crystalline, hard. Limestone, 5%, very pale orange, grantstone, both the limestone or service of the light gray, finely crystalline, hard. Limestone, 5%, very pale orange, grantstone, both the limestone or service or serv	1440-1441	 	
reservised before the control of the	1442-1443		DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite 95% nale vellowish brown to gravish
Section Sect		╏ ╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫	orange and very little light gray, finely crystalline, hard; Limestone, 5%, very pale orange, grainstone, soft.
Section Sect	1445-1446		
ILINESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 100-101			
LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 1053-1643 LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 1053-1645 LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 1053-1645 LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 1053-1645 LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 1053-1646 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, pale yellowish brown to medium dark gray, Innely- to micro-crystalline, moderately soft, 1053-1646 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1646 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1646 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1647 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, 1053-1649 LIMESTONE AND LITTLE DOLOMITE-Dolomite, 100%, light brown to dark yellowish brown, finely crystalline,	1448-1449		
LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, 1933-1943 1943-1943 1944-1944 1944-1944 1944-1944 1944-1944 1944-1944-	1450-1451		
LIMESTONE ADDITION LITTLE DOLONITE - Limestone, soft, overly place used or very place of very plac			
Name	1453-1454		LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, politic grainstone, soft: Dolomite, 10%, pale vellowish brown to medium dark gray, finely- to micro- crystalline,
193-1939 193-1949 193		┆╡╂┧╫┧╫┧╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫╫	
159-159 159-			
Secretarian Secretarian	1458-1459		
DOLOMITE - Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, very hille dark gray, sucrose to mercocrystaline, moderately hard to hard		30 rpm	
DOLOMITE Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, sery little dark gray, sucrose to merocrystalline, moderately hard to hard	1461-1462		
185-1646 166-1647 167-1648 168-1649			DOLOMITE - Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft,
168-168 169-169 169-	1464-1465 1465-1466	L	very nine uark gray, эосгоэс го инстостувания, посостоку пасты поло
165-1476 165-1471 167-1492	1464-1467		
S076-1471 1971-1472 1971			
### ### ##############################			
1973-1874 DOLOMITE - Dolomite, 100%, light brown to dark yellowish brown, tinely crystalline, moderately soft, 1973-1975 1973-1975	1471-1472		
107-1075 107-1076 107-1077 107-1078 107-1078 107-1078 107-1078 108-1080 108-1081 108			DOLOMITE - Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft,
107-1477 107-1478 107-1479 108-1481 108-1481 108-1481 108-1482 108-1483 108-1484 108-1484 108-1485 108-1486 108-1486 108-1486 108-1486 108-1486 108-1486 108-1487 108-1488 108-1488 108-1489	1474-1475		very little dark gray, sucrosic to microcrystatine, moderately hard to hard
107-1078 107-1079			
105-1486 Miss Mis	1477-1478		
143-1432 142-1433 143-1444 143-1444 143-1445 1445-1445 1445-1446 1446-1447 1446-1447 1446-1448 1446-1447 1446-1448 1446-1449 1	1479-1480		
102-1483 DOLOMITE Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, maximately soft, 103-1484 104-1485 104-1485 104-1486 104-1487 104-1486 104-1487 104-1489 104-148		36 rpm	
188-1885 188-1886 188-1887 188-1888 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1889 188-1888 188-1889	1482-1483		TWO CASTEE Podeovies 100%, light brown to dark vellowich brown, finely crystalline, moderately soft.
185-186 186-187 187-188 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189 185-189			equitte dark gray, sucrose to mereorystatine, moderately hard to hard
1487-1448	1485-1486		j
148-1496 169-1491 169-1492 169-1492 169-1493			İ
109-1491 109-1492 109-1493 109-1493 109-1493 109-1493 109-1493 109-1494 109-1493 109-1494 109-1493 109-1494 109-1493			
192-1493 DOLOMITE - Deletate. 160%, light brown to dark yellowish brown, finely crystalline, nuclerately soft. 163-1494			
DOLOMITE - Delerate, 160%, light brown to dark yellowish brown, their divisionine, incurrately sent. 185-1866 186-1807 1807-1808 1807-1808 1807-1809			
105-1456 1056-1437 1437-1438 1438-1499			DOLOMITE - Delonate, 1997s, light brown to dark yelly vish brown, finely crystalline, moderately soft.
1497-1497 1497-1438 1198-1499			wy lice days gray, succeso to microdrystals nei moderately hard to hard
193-1499	1496-1497		

Penetration rate (min/ft):	
Weight On Bit (K lbs):	
Potent Speed (rpm):	

Weight On Bit (i		
Rotary Speed (r		Description
Depth Belov Pad Level	· ·	Description
(ft)	10 20	30
1600-1601		
1601-1602 1602-1603	▐ ▗▐ ▕▕▕▕	
1603-1604		DOLOMITE - Dolomite, 100%, pale yellowish brown, dark yellowish brown, grayish orange and medium
1604-1605	<u> </u>	light gray to medium dark gray, microcrystalline to very-fine crystalline, some sucrosic, moderately hard;
1605-1606 1606-1607		
1607-1608		
1608-1609 1609-1610	▋ ┆ ╏┊╎┆╏┾╻╏╏╎┊┆ ┇┾┼╀╏┼╏┊╸┼┼	
1610-1611	36 rpr	
1611-1612		
1612-1613 1613-1614		The state of the s
1614-1615		DOLOMITE- Dolomite, 100%, pale yellowish brown, dark yellowish brown, grayish orange and medium light gray to medium dark gray, microcrystalline to very-fine crystalline, some sucrosic, moderately hard;
1615-1616 1616-1617		ingin gray to medicin dark gray, massa yasami to tary and a yasami to ta
1617-1618 *		• • • • • • • • • • • • • • • • • • •
1618-1619 1619-1620	▐▐▗ ▐▐▗ ▋	
1620-1621		
1621-1622		i
1522-1623 1623-1624	 	DOLOMITE AND LITTLE LIMESTONE - Dolomite, 85%, pale yellowish brown, dark yellowish
1624-1625		brown, grayish orange and medium light gray to medium dark gray, sucrosic, some microcrystalline to very-fine crystalline, moderately hard; Limestone, 15%, very pale orange, oolitic dolomitic grainstone, soft.
1625-1626 1526-1627	▋ ┼┇ ╒┩ ┼┼╀┼┧┦╄┼╄┋┼┼┼╂╟┼┼┼┼┼	
1527-1628		
1628-1629 1629-1630	┠┼╎┡╤╤┼╪╧ ┪┠╀ ╏╏┆ ╏┼╁┾┼┠┼┞┼┼┼┼┼	
1630-1631		
1631-1632 1632-1633	<u> </u>	
1633-1634		DOLOMITE AND LITTLE LIMESTONE - Dolomite, 85%, pale yellowish brown, dark yellowish
1634-1635 1635-1636	┃ <u>┃</u> ┃╏┼┼┼┡┼┦┞╎┇┤┞┼┠╇╀┞┼┼┼	brown, grayish orange and medium light gray to medium dark gray, sucrosic, some microcrystalline to very-fine crystalline, moderately hard, Limestone, 15%, very pale orange, oolitic dolomitic grainstone, soft.
1635-1637		
1637-1638	{ 	
1638-1539 1639-1640		
1640-1641		
1641-1642 1642-1643		The state of the s
1643-1644		DOLOMITE AND LITTLE LIMESTONE - Dolomite, 85%, pale yellowish brown, dark yellowish brown, grayish orange and medium light gray to medium dark gray, sucrosic, some microcrystalline to very-fine
1644-1645 1645-1646	▋▊▍▍▞▞▞░▐▗▘▞▐▗▘▞▞ ▘▍	crystalline, moderately hard, Limestone, 15%, very pale orange, colitic dolomitic grainstone, soft
1646-1647		
1647-1648 1648-1649	▎▊ ▎▗▐▗▗▞▗▘▍▘▍▘▍▘▍▗▘▗▗▗▗▗ ▗	
1649-1650		
1650-1651 1651-1652	30 rpm	
1652-1653		LIMESTONE AND SOME DOLOMITE- Limestone, 70%, very pale orange to yellowish gray, colitic
1653-1654 1654-1655	┨┇┧╻╏╒┇ ╻╌╏╩╧╧ ┋╏╏╏┼╏┞╏┆╍┼┼┼	grainstone with nodules, partly dolomitic, soft, Dolomite, 30%, medium light gray to medium dark gray.
1655-1656		microcrystalline, little pale yellowish, fine-crystalline, moderately hard
1656-1657 1657-1658	<u> </u>	
1658-1659		
1659-1660 1660-1661	 	
1661-1662		•
1652-1663	[, []	DOLOMITE AND SOME LIMESTONE Dolomite, 75%, pale yellowish brown, dark yellowish brown
1663-1564 1664-1665	44 spm	and grayish orange, sucrosic to fine crystalline, some medium light gray to medium dark gray, microcrystalline.
1665-1666 1666-1667		moderately hard. Limestone, 25%, very pale orange to yellowish gray, politic grainstone with nodules, partly dolomitic, soft
1666-1667 1667-1668		
1668-1669		
1659-1670		
1671-1672		
1672-1673 1673-1674		DOLOMHTE AND VERY LITTLE LIMESTONE- Dolomite, 95%, pale yellowish brown, dark
1674-1675		yellowish brown and grayish orange, sucrosic to fine crystalline, some medium light gray to medium dark gray, microcrystalline, moderately hard. Limestone, 5%, very pale orange to yellowish gray, grainstone,
1675-1676 1678-1677	 	gray, microcrystatine, moderately hard. Elimestone, 514, 169 pale or angle to you on the gray, it is a microcrystatine, moderately hard. Elimestone, 514, 169 pale or angle to you on the gray, and the parties of the gray of
1677-1678		
1678-1679 1679-1680	<u> </u>	
1680-1681		
1681-1682 1682-1683		
1683-1684		DOLOMITE - Dolomite, 100%, pale yellowish brown, dark yellowish brown and grayish orange.
1634-1685		sucrose to fine crustailine, some medium light gray to medium dark gray, microcrystailine, moderately hard
1685-1686 1686-1687		
1687-1688		
1688-1689	34.00	
1690-1691		
1691-1692	/	
1692-1693 1693-1694		DOLOMITE - Dolomate, 100%, pale yellowish brown, dark yellowish brown and grayish orange.
1694-1693	[sucrosicità fine pri starine, some medium, gnit gray to medium park gray, microcristarine, moderaler, haro
1695-1696		
1697-1698		
1698-1599		
1699-1700		

Penetration rate (min/ft):
Weight On Bit (K libs):

Rotary Speed (rom):	
Depth Belo		Description
Pad Level (ft)	10 2030	
1800-1801		
1801-1802 1802-1803		
1803-1804		DOLOMITE - Dolomite, 100%, pale yellowish brown, dark yellowish brown, some dark gray, sucrosic to fine-crystalline, moderately hard.
1804-1805 1805-1806	╶ ┦ ┢╪╃╃╃╃╃╃	TO TIME- CLYSTAMME, MIDDELATERY HAILS.
1806-1807		
1807-1808 1808-1809	-┃┤╎┤┊┊ ┃┼┃┼╏┼┼┼┼┼┼╏	
1809-1810		
1810-1811		
1812-1813		DOLOMITE - Dolomite, 100%, pale yellowish brown, dark yellowish brown, some dark gray, sucrosic
1813-1814 1814-1815		to fine- crystalline, moderately hard.
1815-1816		
1816-1817 1817-1818	38 rpm	
1818-1819		
1819-1820		
1821-1822		
1822-1823 1823-1824	- 	DOLOMITE AND SOME DOLOMITIC LIMESTONE- Dolomite, 80%, pale yellowish brown and
1824-1825		grayish orange, little tight gray, line- to micro-crystalline, hard to very hard; Limestone, 20%, very pale orange to yetlowish gray, mostly dotomitic, some chalky, fine crystalline, little pelitlic, moderately hard to soft.
1825-1826 1826-1827	- - - - - - - - - - - - - -	
1827-1828 1828-1829	- - - - - - - - - - - - - - - - - - -	
1829-1830	40 rpm	
1830-1831 1831-1832	┨╎┼ ╌┃ ╎╎┼ ┼┼┼╏	
1832-1833		DOLOMITE AND SOME DOLOMITIC LIMESTONE- Dolomite, 80%, pale yellowish brown and
1833-1834 1834-1835	▐▐▐▐▐	grayish orange, tiltle light gray, fine- to micro-crystalline, hard to very hard; Limestone, 20%, very pale orange to
1835-1836		yellowish gray, mostly dolomitic, some chalky, fine crystalline, little pellitic, moderately hard to soft.
1836-1837 1837-1838		
1838-1839 1839-1840		
1840-1841		DOLOMITE - Dolomite, 100%, pale yellowish brown to dark yellowish brown, sucrosic, moderately
1841-1842		hard to soft, moderately well to poorly cemented.
1843-1844		
1844-1845 1845-1846		
1846-1847 1847-1848		DOLOMITE - Dolomite, 100%, pale yellowish brown to dark yellowish brown, little medium light gray,
1848-1849		mostly fine- to krypto- crystalline, some sucrosic, moderately hard to very hard
1849-1850 1850-1851	26 rpm	
1851-1852 1852-1853	[] . []	
1853-1854		DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, little medium light gray, moslly fine- to krypto- crystalline, some sucrosic, moderately hard to very hard.
1854-1855 1855-1856	<u> </u>	nosily lines to krypto- crystalline, some socrosic, incocation) had to very need.
1856-1857		İ
1857-1858 1858-1859		
1859-1860 1860-1861	<u> </u>	
1961-1862		
1862-1863 1863-1864	Himiniya in Halifani	OOLOMITE - Dolomite, 100%, pale yellowish brown to dark yellowish brown, little medium light gray,
1864-1865		nostly line- to krypto- crystalline, some sucrosic, moderately hard to very hard
1865-1866 1866-1867		
1867-1868 1868-1869	[4 , line	
1869-1870	40 rpm	
1870-1871 1871-1872		
1872-1873		OOLOMITE AND SOME LIMESTONE - Dokomite, 80%, pale yellowish brown to moderate
1873-1874 1874-1875		ellowish brown, sucrosic, some light gray to medium light gray, very-fine crystaltine, moderately hard to hard
1875-1876		mestone, 20%, very pare orange to yellowish gray, dolomitic, fine crystaltine, dolomitic, soft
1876-1877 1877-1878		
1878-1879 1879-1886		
1680-1881		
1881-1882 1882-1883		
1583-1884	[.]	ODCOMITE AND SOME LIMESTONE - Deterrate, 8th at pale yellowish brown to incidenate ellowish brown, sucrosic, some light gray to medium light gray, very fine crystal ine, impoerately hard to hard
1884-1985 1885-1886	- - - - - - - - - -	mestone 20% sery pale crange to serousing ay, doomstic, the crystaine doomstic soft
1536-1887		
1887-1886 1888-1889		
1889-1896	H	
1890-1891 1891-1892		
1892-1893 1893-1894		OLOMITE AND SOME LIMESTONE - Dokumte. 5%, pale yellowish brown to investate
1893-1894 1894-1895		erowish brown, sucrosic, some, ight gray to medium, ight gray, tierly-fine orist aline, moderately hard to hard.
1895-1896 1896-1897	******	mestione (10%), very pare orange to verowish gray, doramitic, fine drystorine, doramitic, scrit
1597-1895		į
1898-1899		

Penetration rate (min/ft):	
Weight On Bit (K lbs):	
Dates Speed (mm):	

Weight On Bit (K			
Rotary Speed (ro	m):		
Depth Below			Description
Pad Level (ft)	10 20	30	
2000-2001		ШШ	
2001-2002			
2002-2003	┞╎╎╎ ╏┼┼┼╏┼┼┼┼┼┼		DOLOMITE AND SOME LIMESTONE - Dolomite, 80%, moderate yellowish brown with little
2004-2005			light gray, very-fine to fine crystalline, hard; Limestone, 20%, very pale drange to yellowish gray, very-line
2005-2006			grained, partially dolomitic, moderately hard.
2006-2007			
2008-2009			
2009-2010		+++++++	
2010-2017			
2012-2013			
2013-2014	╏┼╏ ╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	 	LIMESTONE - Limestone, 100%, very pale orange, oolitic, very-fine to fine grained, soft.
2015-2016			
2015-2017	- - - - - - - - - - - - - - - - - - -	++++++	
2018-2019			
2019-2029		32 rpm	
2020-2021		11111111	·
2022-2023			DOLOMITE AND SOME DOLOMITIC LIMESTONE - Dolomite, 70%, pale yellowish brown to
2023-2024 2024-2025	┠┼ ╏┼┋┼┼┼ ╂╃╃┞╫┼	37 rpm ⇒	dark vellowish brown with little brownish black, very-fine to fine crystalline, hard; Limestone, 30%, very
2025-2026			pale orange to pale yellowish brown, dolomitic, very-fine grained, moderately soft.
2026-2027	╎ ┼┧╏╀ ┇┼╎┼╎ ┩┼┾┌┼┼┼┼┼┼╂┼┼	+++++	
2027-2028 2028-2029	++ + <u> </u> + + + + + + + + + + + + +		
2029-2030			
2030-2031	╏ ╎ ┼╏╏╀┋╏╏╃┼╏╏┼╬╅╀┼┟╬┼┼┠┺┼┼		
2032-2033		∤ Ţ∔ Ţ Ĭ Ĭ	LIMESTONE Limestone, 100%, very pale orange, oolitic, poorly cemented, soft.
2033-2034 2034-2035	┠ ┼ ┆┋┋┋┋┋┋┋	┼┞╀┼┞╂ ┤ ╏	PHILPS LOUP - PHILPSONE 1001 A 101 has created county board comments.
2035-2036			
2036-2037 2037-2038	╎╬┾ ┼╏┋ ┼╄┼╀ ┟ ┽┼┼┼┼┼┼┼┼┼┼	ŧ₩ŧ₩	
2038-2039			
2039-2040		 	
2040-2041 2041-2042	╌┨┼┼┋ ┼┼┼┼┼┼┼┼┼┼┼┼┼		
2042-2043			LIMESTONE – Limestone, 100%, very pale orange, oolitic, poorly cemented, soft.
2043-2044	 -	+++++	LIMESTONE - Linestone, 100%, (c) pare orange, commy person,
2945-2046			
2046-2047			
2047-2048 2848-2049	l Hill in II in thi talatata ta t		
2049-2050		╙┵┵┩	
2050-2051 2051-2052			
2052-2053			LIMESTONE AND VERY LITTLE DOLOMITE - Limestone, 95%, very pale orange, colitic, soft;
2053-2054 2054-2055	4-4-1-4-1-4-1-4-1-1-1-1-1-1-1-1-1-1-1-1	37 /pm -	Dolomite, 5%, grayish brown, sucrosic, moderately hard.
2055-2056	TOTAL CO		
2054-2057	[
2057-2058 2058-2059			
2059-2060			
2060-2061	-		
2062-2063			LIMESTONE AND VERY LITTLE DOLOMITE - Limestone, 95%, very pale orange, colitic, soft;
2063-2064	+++ 	114411	Dolomite, 5%, grayish brown, sucrosic, moderately hard.
2065-2066			
2066-2067	11.1	بإبإبيا	
2067-2068 2068-2069			
2069-2070	F-i		
2076-2071 2071-2072			
2072-2073			LIMESTONE AND VERY LITTLE DOLOMITE - Limestone, 95%, very pale orange, colitic, soft;
2073-2074 2074-2075	Indiana di terretakan		Dolomite, 5%, grayish brown, sucrosic, moderately hard:
2075-2076			
2076-2077 2077-2078	i. []	[
2077-2078			
2079-2086		∤	
2050-2081 2981-2082	1.1.1		
2082-2053			LIMESTONE AND VERY LITTLE DOLOMITE Limestone, 95%, very pale orange, coditic, soft;
2083-2684 2084-2085		37 rpm -	Dolomite 5%, grayish brown, sucrosic imoderately hard
2084-2085	Li		- '
2085-2987			
2087-2088 2088-2089		• • • • • • •	
2089-2098			
2090-2091			
2091-2092 2092-2093		1	F
2993-2094			.IMESTONE - Limestone, 100%, very pale crange, colline, poorly cemented, soft
2094-2095		34 rpm 🙀	
2095-2096 2096-2097		::::::1	J
2097-2098			
2098-2099 2099-2100			
1033-7 100		_	

Penetration rate (min/ft):

Weight On Bit (K ibs):

Weight On bit (* 104): Rotary Speed (rom):				
Depth Below	7	Description		
Pad Level	10 20 30			
2200-2201				
2201-2202 2202-2203		DOLOMETICA DATOTONE AND COME DOLOMETE. Limetone 200/, menunile orange to rale		
2203-2204	34 mm	DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, very pale orange to pale yellowish brown, very-fine grained, dolomitic, soft; Dolomite, 20%, moderate yellowish brown to dark		
2204-2205 2205-2206		vellowish brown, very-fine crystalline, moderately-well cemented, hard.		
2206-2207 2207-2208				
2208-2209				
2209-2210 2210-2211				
2211-2212 2212-2213				
2213-2214		DOLOMITIC LIMESTONE AND LITTLE DOLOMITE- Limestone, 90%, very pale orange, very-fine grained, dolomitic, soft; Dolomite, 10%, pale yellowish brown to moderate yellowish brown,		
2214-2215 2215-2216		very-fine crystalline, hard.		
2216-2217				
2217-2218 2218-2219				
2219-2220 2220-2221				
2221-2222				
2222-2223 2223-2224		DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, very pale orange to pale yellowish brown, dolomitic, very-fine grained, soft to very soft; Dolomite, 20%, moderate yellowish brown		
2224-2225 2225-2226	34 rpm -}	to dark yellowish brown, very-fine crystalline, hard.		
2226-2227				
2227-2228 2228-2229				
2229-2230 2230-2231				
2231-2232 2232-2233				
2233-2234		DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, very pale orange to pale yellowish brown, dolomitic, very-fine grained, soft to very soft; Dolomite, 20%, moderate yellowish brown		
2234-2235 2235-2236		lo dark yellowish brown, very-fine crystalline, hard.		
2236-2237 2237-2238				
2238-2239				
2239-2240 2240-2241				
2241-2242 2242-2243				
2243-2244	36 rpm	DOLOMITE AND LITTLE LIMESTONE - Dolomite, 90%, moderate yellowish brown to pale brown, yery-fine crystalline, sucrosic, hard; Limestone, 10%, very pale orange, very-fine grained, soft.		
2244-2245 2245-2246		The system of the state of the		
2246-2247 2247-2248				
2248-2249 2249-2250				
2250-2251				
2251-2252 2252-2253		and the state of t		
2253-2254 2254-2255		DOLOMITE AND LITTLE LIMESTONE – Dolomite, 90%, moderate yellowish brown to pale brown, very-fine crystalline, sucrosic, hard; Limestone, 10%, very pale orange, very-fine grained, soft.		
2255-2256				
2256-2257 2257-2258				
2258-2259 2259-2260				
2260-2261 2261-2262				
2262-2263		DOLOMITE AND LITTLE LIMESTONE - Dolomite, 90%, moderate yellowish brown to pale brown,		
2263-2264 2264-2265		very-fine crystalline, sucrosic, hard, Limestone, 10%, very pale grange, very-fine grained, soft.		
2265-2266 2266-2267				
2267-2268				
2268-2269 2269-2270				
2270-2271 2271-2272				
227 2-2273 227 3-2274		DOLOMITE AND LITTLE LIMESTONE - Dolomite, 90%, moderate yellowish brown to pale brown,		
2274-2275	34 rpm →	very-fine crystalline, sucrosic, hard, Limestone, 10%, very pale orange, very-fine grained, soft		
2275-2276 2276-2277				
2217-2218 2218-2279				
2279-2280				
2280-2281 2281-2282				
2282-2283 2283-2284		DOLOMITE AND LITTLE LIMESTONE - Dolomie, 9% a moderate yellowish brown to pale brown.		
2284-2285		very-fine crystalline, sucrosic, hard. Limestone, 10%, very pale grange, very-fine grained, soft		
2285-2286 2286-2287				
2287-2258		j		
2288-2289 2289-2298				
2290-2291 2291-2292				
2292-2293		DOLOMHE AND LITTLE LIMESTONE - Defense, we're inclerate yellowish brown to pale brown.		
2293-2294 2294-2295		very-fine crystatine, sucrosic hard. Limestone, 10%, very pale orange, very-fine grained, soft		
2295-2296 2296-2297				
1297-2298				
2298-22 93 2299-2304				

Penetration rate (min/ft):
Weight On Bit (K lbs):

Rotary Speed (re	em):	
Depth Below Pad Level	10 20 30	Description
(ft) 2400-2401		
2401-2402 2402-2403		a training from
2403-2404		DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown with little medium gray, micritic, partially sucrosic, moderately hard.
2404-2405 2405-2406		gray, mann, partially section, meeting, in a
2406-2407		
2407-2408 2408-2409		
2409-2410 2410-2411		
2411-2412		
2412-2413 2413-2414		DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown with little medium
2414-2415		gray, micritic, partially sucrosic, moderately hard.
2415-2416 2416-2417		
2417-2418 2418-2419		
2419-2420		
2420-2421 2421-2422		
2422-2423	32 rpm	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, micritic, hard.
2423-2424 2424-2425		
2425-2426 2426-2427		
2427-2428		·
2428-2429 2429-2430		
2430-2431 2431-2432		
2432-2433		DOLOMITE - Dolomite, 100%, moderate yellowish brown to dark yellowish brown, micritic, hard.
2433-2434 2434-2435		
2435-2436 2436-2437		
2437-2438		
2438-2439 2439-2440		
2440-2441 2441-2442		
2442-2443		DOLOMITE - Dolomite, 100%, moderate yellowish brown to dark yellowish brown, micritic, hard.
2443-2444 2444-2445		DOEOWITE - DOMINING 10074, MORNING VINNER
2445-2446 2446-2447		
2447-2448		
2448-2449 2449-2450		
2450-2451 2451-2452		
2452-2453		DOLOMITE - Dolomite, 100%, dusky yellowish brown, micritic, hard.
2453-2454 2454-2455	42 rpm +	DOCUMENTE - DOMINIA, 10014, 4821, January 1111
2455-2456 2456-2457		
2457-2458		
2458-2459 2459-2460		
2460-2461 2461-2462		
2462-2463		DOLOMITE - Dolomite, 100%, dusky yellowish brown, micritic, bard.
2463-2464 2464-2465		DOCUME DOCUMENT LOS A MINE DE LOS MENTERS MANAGEMENT MA
2465-2466 2466-2467		
2467-2468		
2468-2469 2469-2478		
2470-2471 2471-2472		
2472-2473		DOLOMITE - Dolomite, 100%, dark yellowish brown to dusky yellowish brown, some very light gray
2473-2474 2474-2475	. <u> </u>	to medium dark gray, micrisc, hard
2475-2476 2476-2477		
2476-2477 2477-2478		
2478-2479 2479-2480	: 	
2480-2481		
2481-2482 2482-2483		DOLOMITE - Dolomite, 100° a, dark yellowish brown to dasky yellowish brown, some very light gray
2483-2484 2484-2485	4;11	DOLOMITE - Dolomate, 100%, dark yellowish brown to dasky yellowish brown, seem very light gray, mente, hard
2445-2486		
2485-2487 2487-2488		
2458-2489		
2439-2490 2496-2491		
2491-2492 2492-2493		
2493-2494		OOLOMHE - Dolomite, 100%, dark yellowish brown to dusky yellowish brown, some very light gray to medium days gray mordon had
2494-2495 2495-2496		Transfer and Andrews
2495-2497		
2497-2498 2498-2499		
2499-2509		

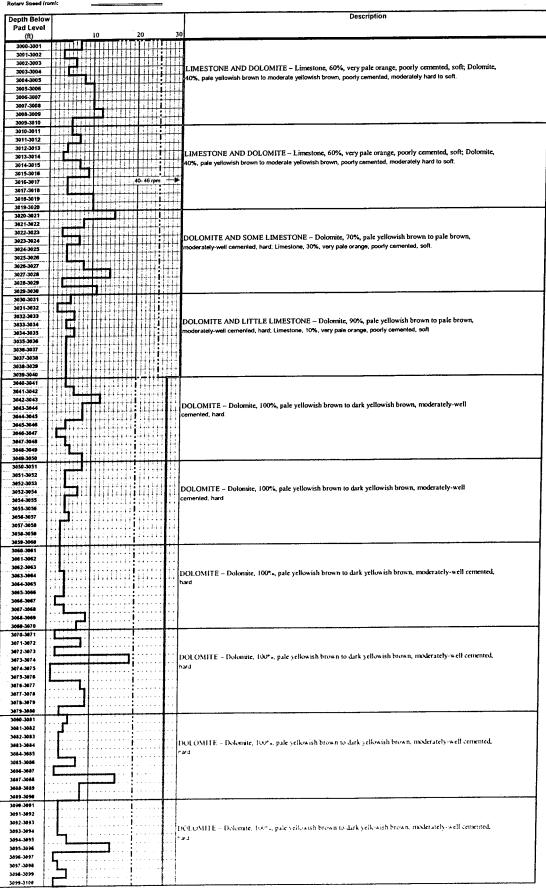
Penetration rate (min/ft):
Weight On Bit (K lbs):

Rotary Speed (n	om):	•		
Depth Below Description				
Pad Level				
(ft) 2600-2601				
2601-2602				
2602-2603 2603-2604		LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to		
2604-2605 2605-2606		moderately well cemented, soft.		
2606-2607		↑		
2607-2608 2608-2609				
2609-2610				
2610-2611 2611-2612		LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to		
2612-2613	36 rpm	moderately well cemented, soft.		
2613-2614 2614-2615		LIMESTONE- Limestone, 100%, yellowish gray, with some smudges of darker material, time grained to		
2615-2615		very fine crystalline, mostly slightly dolomitic, moderately well to well cemented, moderately hard to hard.		
2616-2617 2617-2618				
2618-2619 2619-2620	34 rpm -			
2620-2621				
2621-2622 2622-2623				
2623-2624		LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft.		
2624-2625 2625- 2626				
2626-2627 2627-2628	<u> </u>			
2628-2629		1		
2629-2630 2630-2631				
2631-2632				
2632-2633 2633-2634		LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly		
2634-2635 2635-2636		to moderalely well cemented, soft.		
2636-2637				
2637-2638 2638-2639	┠╫╫┦ ┞┼┼			
2639-2640				
2640-2641 2641-2642				
2642-2643 2643-2644		LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly		
2644-2645		to moderately well cemented, soft.		
2645-2646 2646-2647				
2647-2648				
2648-2649 2649-2650				
2650-2651 2651-2652				
2652-2653		LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly		
2653-2654 2654-2655	34 rpm →	4		
2655-2656 2656-2657				
2657-2658				
2658-2659 2659-2660				
2660-2661				
2661-2662 2662-2683		I have granted and		
2663-2664	ili kin ji kini kan tambi	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft		
2684-2665 2685-2666		'		
2666-2667 2667-2668	.			
2668-2669				
2669-2670 2678-2671				
267 1-2672 267 2-2673				
2673-2674		LIMESTONE: Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly		
2674-2675 2675-2676		to moderately well-cemented, soft		
2676-2677				
2677-2678 2678-2679				
2679-2680				
2680-2681 2681-2682				
2682-2683 2683-2684	L	LIMESTONE-Limestone, 100%, very pale orange, yellowish gray and some grayish orange with		
2684-2685		black specs, fine grained, poorly to moderately well-cemented, signify dolomitic, soft to moderately hard		
2685-2686 2686-2687				
2687-2688				
2688-2689 2689-2698				
2690-2691				
2691-2692 2692-2693				
2693-2694		LIMESTONE: Limestone, Touth, very pale orange, yellowish gray and some grayish orange with class speeds fine grained poorly to moderate, well demented is gotly populated poorly to moderate, hard		
2694-2695 2695-2696		parameter and an income the control of the control		
2696-2697				
2637-2698 2698-2699				
2699-2700				

Penetration rate (min/ft):	
Weight On Bit (K lbs):	

Rotary Speed	(rom):	
Depth Bel Pad Leve (ft)		Description
2800-2801 2801-2802		
2802-2803 2803-2804		LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%, very pale orange, some yellowish gray,
2804-2805 2805-2806		poorly to moderately well cemented, soft: Dolomile, 5%, moderately yellowish brown to dark yellowish brown, micritic, well cemented, hard.
2806-2807		outlines, now.
2807-2808 2808-2809		
2809-2810 2810-2811		
2811-2812 2812-2813		
2813-2814 2814-2815		LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2815-2816 2816-2817		
2817-2818 2818-2819		
2819-2820 2820-2821		
2821-2822		
2822-2823 2823-2824		LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2824-2825 2825-2826		
2826-2827 2827-2828		
2828-2829 2829-2830		
2830-2831 2831-2832		
2832-2833 2833-2834		IMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2834-2835 2835-2838		
2836-2837 2837-2838		
2838-2839 2839-2840		
2840-2841 2841-2842		
2842-2843 2843-2844		IMESTONE. Linearone 100%, usery pole grapus, poorly to product the well commented coff
2844-2845		IMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2845-2848 2846-2847		
2847-2848 2848-2849		
2849-2850 2850-2851		
2851-2852 2852-2853		
2853-2854 2854-2855		MESTONE- Linestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2855-2856 2856-2857	[
2857-2858 2858-2859		
2859-2860 2860-2861		
2861-2862 2862-2863		
2863-2864 2864-2865		MESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2865-2866		
2866-2867 2867-2868	1 1 1 1 1 1 1 1 1 1	
2869-2870		
2879-2871 2871-2872		
2872-2873 2873-2874	Lie	MESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2874-2875 2875-2876	40 rpm ▶	
2876-2877 2877-2878		
2878-2879 2879-2888		
2888-2881 2881-2852	La contraction	
2882-2883 2883-2884		LOMITE AND LIMESTONE- Dolonite, 30%, moderately yellowish brown to pale brown, well
2884-2885		ented moderately hard timestone 30%, well paie brange poorly to moderately well demented soft
2885-2886 2886-2887		
2887-2888 2868-2859		
2859-2898 2896-2891		
2891-2892 2892-2893		
2893-2894 2894-2895	LIM	IESTONE: Limestone, 180%, very pale crange, poorly to moderately well cemented, soft
2895-2984		
2895-2897 2897-2898		
2898-289 9 28 93 -2900		

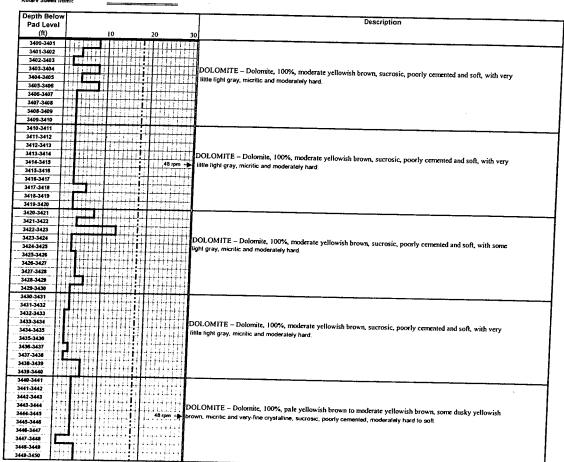
Penetration rate (min/ft):	
Weight On Bit (K lbs):	
Potent Speed (rom):	



						Injection Well No.1	TRATION RATE I
Penetration rat Weight On Bit (
Rotary Speed (rpm):							
Depth Belo						Description	***
Pad Level (ft)		10	20		30		
3200-3201 3201-3202		+++++			#		
3202-3203 3203-3204		 			Н	DOLOMITE - Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gr	ay,
3204-3205 3205-3206				\cdots		poorly cernented and soft, with very few boulder type fragments, very hard.	•
3206-3207		14.	:		#		
3207-3208 3208-3209			:				
3209-3210 3210-3211			!				
3211-3212 3212-3213	⊹		! -	Ш			
3213-3214 3214-3215	 		<u>.</u>	Ш	\parallel	DOLOMITE - Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gra poorly cemented and soft, with very lew boulder type fragments, very hard.	ıy,
3215-3216	╽╏╗╏		!		Ш	period and sold minimum sold of soldier type magnitudes, they make	
3216-3217 3217-3218		†	!				
3218-3219 3219-3220	 		! +	Ш	Ш		
3220-3221 3221-3222			!		+		
3222-3223 3223-3224			ЩП			DOLOMITE - Dolomite, 100%, light ofive gray to dark yellowish brown, some light gray to dark gray	у,
3224-3225 3225-3226			::	48 rpm		poorly cemented and soft, with very few boulder type fragments, very hard.	
3226-3227 3227-3228			•+++				
3228-3229			!###				
3229-3230 3230-3231					#		
3231-3232 3232-3233					1	DOLONUTE DI STAMP I STAMP	
3233-3234 3234-3235					1	DOLOMITE - Dolomite, 100%, moderate yellowish brown, poorly cemented and soft.	
3235-3236 3236-3237			<u> </u>		1		
3237-3238 3238-3239				ШН	\mathbf{H}		
3239-3240 3240-3241					+		
3241-3242 3242-3243			++++	1141	1	A State of the sta	
3243-3244 3244-3245						OLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, oorly cemented and soft	
3245-3246 3246-3247				Ш		No. of the control of	
3247-3248 3248-3249				HH		★ ★ ★ ↑	• •
3249-3250 3250-3251					1		
3251-3252 3252-3253							
3253-3254 3254-3255		#### !		8 rpm 📲		OLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, body cemented and soft	
3255-3256 3256-3257	 	نببا			ľ		
3257-3258	: : : : : : :	!!!			1		
3258-3259 3259-3260		n iii			L		
3260-3261 3261-3262		::::::i			ľ		
3262-3263 3263-3264					DO	OLOMITE - Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray,	
3264-3263 3265-3266			1::::	1111	Po	orly cemented and soft ,	
3266-3267 3267-3268			1::::			34 .	
3269-3270		!	<u> </u>				
3270-3271 3271-3272							
3272-3273 3273-3274			-		DC	DLOMITE - Dolomite, 100%, pale yellowish brown to moderate yellowish brown, poorly cemented,	
3274-3275 3275-3276			1	rpm -	sof		}
3276-3277 3277-3278					ı		
3278-3279							
3279-3280 3280-3281					-		
3281-3282 3282-3283						A THE RESERVE OF THE PROPERTY	[
3283-3284 3284-3285	···L				ĐŨ	DEOMITE - Dolomite, 100%, moderate yellowish brown to dark yellowish brown, well cemented, hard-	. [
3285-3286 3286-3287							ŀ
3287-3288 3288-3289							İ
3289-3290 3290-3291					_		
3291-3292							
3292-3293 3293-3294					DO	LOMHE - Delonite, 100%, moderate vellowish brown to dark yellowish brown, well cemented, hard	- 1
3294-3295 3295-3296							
3296-3297 3297-3298				:::]			1
3298-3299			. !				-

Weight On Bit (K lbs): Rotary Speed (rpm):

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GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE – Limestone, 100%, very pale orange (10YR, 8/2), oolitic, very-fine to fine grained, poorly cemented, soft, slightly vuggy.	RPM: 32 WOB: 15K	2010-2020	10
DOLOMITE AND SOME DOLOMITIC LIMESTONE – Dolomite, 70%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with little brownish black (5YR 2/1), very-fine to fine crystalline, well cemented, hard, partially vuggy; Limestone, 30%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), dolomitic, very-fine grained, moderately-well cemented, soft.	RPM: 37 WOB: 5K	2020-2030	10
LIMESTONE – Limestone, 100%, very pale orange (10YR 8/2), oolitic, slightly vuggy, forams present, poorly cemented, soft, some vugs filled with detritic impurities.	RPM: 37 WOB: 5K Some cement in cuttings.	2030-2050	20
LIMESTONE AND VERY LITTLE DOLOMITE — Limestone, 95%, very pale orange (10YR 8/2), oolitic, slightly vuggy, forams present, poorly cemented, soft, few detritic impurities; Dolomite, 5%, grayish brown (5YR 3/2), sucrosic, vuggy, well cemented, moderately hard.	RPM: 37 WOB: 5K Some cement in cuttings.	2050-2090	40
LIMESTONE – Limestone, 100%, very pale orange (10YR 8/2), oolitic, slightly vuggy, forams present, poorly cemented, soft.	RPM: 34 WOB: 15-20K	2090-2100	10
LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange (10YR 8/2), oolitic, slightly vuggy, forams present, poorly cemented, soft; Dolomite, 50%, pale brown (5YR 5/2) to dusky yellowish brown (10YR 2/2), sucrosic, vuggy, well cemented, moderately hard to hard.	RPM:20 WOB: 15-20K	2100-2120	20
LIMESTONE – Limestone, 100%, very pale orange (10YR 8/2), dolomitic, oolitic, slightly vuggy, foraminiferous, poorly cemented, soft; Dolomite, trace, pale brown (5YR 5/2) to dusky yellowish brown (10YR 2/2), micritic, moderately hard.	RPM: 26 WOB: 20-23K	2120-2150	30
DOLOMITIC LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange (10YR 8/2), dolomitic, oolitic, slightly vuggy, foraminiferous, poorly cemented, moderately soft to soft; Dolomite, 5%, medium gray (N5) to medium dark gray (N4), micritic, hard.	RPM: 26 WOB: 10-15K	2150-2170	20
DOLOMITIC LIMESTONE AND LITTLE DOLOMITE – Limestone, 90%, very pale orange (10YR 8/2), dolomitic, very-fine grained, slightly oolitic, poorly cemented, soft; Dolomite, 10%, pale yellowish brown (10YR 6 2) to moderate yellowish brown (10YR 5 4).	RPM: 28 WOB: 15-20K	2170-2180	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
very-fine crystalline, poorly cemented, moderately hard.			·
DOLOMITE AND VERY LITTLE LIMESTONE — Dolomite, 95%, moderate yellowish brown (10YR 5/4), very-fine crystalline, moderately-well cemented, hard, slightly vuggy; Limestone, 5%, very pale orange (10YR 8/2), partially dolomitic, very-fine grained, poorly cemented, soft, slightly fossiliferous.	RPM: 28 WOB: 10-15K	2180-2200	20
DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), very-fine grained, dolomitic, slightly fossiliferous, poorly cemented, soft; Dolomite, 20%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), very-fine crystalline, moderately-well cemented, hard.	RPM: 34 WOB: 20K	2200-2210	10
DOLOMITIC LIMESTONE AND LITTLE DOLOMITE— Limestone, 90%, very pale orange (10YR 8/2), very-fine grained, dolomitic, slightly fossiliferous, poorly cemented, soft; Dolomite, 10%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very-fine crystalline, moderately- well cemented, hard, vuggy.	WOB: 10K	2210-2220	10
DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), dolomitic, very-fine grained, slightly fossiliferous, poorly cemented, soft to very soft; Dolomite, 20%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), very-fine crystalline, moderately-well cemented, hard.		2220-2240	20
DOLOMITE AND LITTLE LIMESTONE – Dolomite, 90%, moderate yellowish brown (10YR 5/4) to pale brown (5YR 5/2) with trace dark gray (N3), very-fine crystalline, sucrosic, well cemented, hard, slightly vuggy; Limestone, 10%, very pale orange (10YR 8/2), very-fine grained, poorly cemented, soft, slightly foraminiferous.	RPM: 30-42 WOB: 10-20K Core #2 collected from interval 2272.0-2285.0 feet bpl	2240-2330	90
DOLOMITE – Dolomite, 100%, dark yellowish brown (10YR 4/2) and little medium gray (N5), micritic, hard; Limestone, trace, very pale orange (10YR 8/2), partially dolomitic, very-fine grained, moderately-well cemented, moderately hard.	RPM: 30-42 WOB: 10-20K	2330-2340	10

CDOLOGICI OC	DRILLING	DEPTH	THICKNESS
GEOLOGIC LOG	COMMENTS	INTERVAL	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) with little medium gray (N5) to dark gray (N3), micritic, hard, (from 2444-2445 and 2449-2450 feet bpl dolomite is moderately-well cemented, vuggy, and sucrosic); Limestone, trace, very pale orange (10YR 8/2), partially dolomitic, very-fine grained, moderately-well cemented, moderately hard.	RPM: 30-42 WOB: 10-20K Core #3 collected from interval 2341.5-2355.0 feet bpl	2340-2350	10
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) with little medium gray (N5), micritic, partially sucrosic, moderately-well to well cemented, hard, partially vuggy; Limestone, trace, very pale orange (10YR 8/2), partially dolomitic, very-fine grained, moderately-well cemented, moderately hard.	RPM: 34 WOB: 18K	2350-2370	20
DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), micritic, moderately-well cemented, hard, sucrosic, slightly vuggy; Limestone, 30%, very pale orange (10YRE 8/2) to yellowish gray (5Y 7/2), partially dolomitic, very-fine grained, moderately-well cemented, moderately hard.	RPM: 44 WOB: 20K	2370-2400	30
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) with little medium gray (N5), micritic, partially sucrosic, moderately-well to well cemented, moderately hard, partially vuggy; Limestone, trace, very pale orange (10YR 8/2), partially dolomitic, very-fine grained, moderately-well cemented, moderately hard.	RPM: 34 WOB: 20-25K	2400-2420	20
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) with trace amounts of very light gray (N8) to medium dark gray (N4), micritic, hard.	RPM: 32 WOB: 25K	2420-2450	30
DOLOMITE – Dolomite, 100%, dusky yellowish brown (10YR 2/2), micritic, hard; Chert, trace, dark gray (N3), very hard.	RPM: 40-44 WOB: 15-20K	2450-2470	20
DOLOMITE – Dolomite, 100%, dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2), some very light gray (N8) to medium dark gray (N4), micritic, slightly vuggy, hard; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, moderately-well cemented, soft.	RPM: 40-44 WOB: 15-20K	2470-2520	50

CEOLOGICI OC	DRILLING	DEPTH	THICKNESS
GEOLOGIC LOG	COMMENTS	INTERVAL	
·			
DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, dark yellowish brown (10YR 4/2) to dusky yellowish brown (10YR 2/2) and very light gray (N8) to medium dark gray (N4), micritic, well cemented, hard; Limestone, 20%, yellowish gray (5Y 7/2), very fine grained, sucrosic, moderately-well cemented, moderately hard.	RPM: 44 WOB: 15K	2520-2527	7
LIMESTONE AND SOME CHERT– Limestone, 80%, yellowish gray (5Y 7/2) to pale olive (10Y 6/2) with smudges of darker material, slightly dolomitic, fine crystalline, well cemented, moderately hard, few cavities, trace of fossils (forams), moderately- well cemented, moderately hard; Chert, 20%, medium gray (N5), very fine crystalline, very hard.	RPM: 44 WOB: 15K Core #4A collected from interval 2529.0- 2535.6 feet bpl	2527-2536	9
LIMESTONE AND LITTLE CHERT- Limestone, 90%, yellowish gray (5Y 7/2), with some smudges of darker material, fine grained to very- fine crystalline, mostly slightly dolomitic, moderately- well to well cemented, moderately hard to hard, few cavities, trace of fossils (forams); Chert, 10%, medium gray (N5), micritic, very hard, slightly vuggy; Dolomite, trace, olive gray (5Y 3/2), fine crystalline, hard, porous.	RPM: 44 WOB: 10K Core #4B collected from interval 2536.5- 2550.2 feet bpl	2536- 2550	14
LIMESTONE - Limestone, 100%, yellowish gray (5Y 7/2), fine grained to very fine crystalline, slightly dolomitic, poorly to moderately- well cemented, moderately hard to hard, few cavities, trace of fossils (forams); Chert, trace, medium gray (N5), micritic, very hard, slightly vuggy	RPM: 44 WOB: 10K	2550- 2590	40
LIMESTONE- Limestone, 100%, yellowish gray (5Y 7/2), little very pale orange (10YR8/2) and chalky, fine grained, poorly to moderately- well cemented, soft, trace of fossils; Chert, trace, medium gray (N5), very hard.	RPM: 40 WOB: 10-15K Core #5 collected from interval 2602.0-2618.0 ft pl	2590- 2613	23
LIMESTONE- Limestone, 100%, yellowish gray (5Y 7/2), with some smudges of darker material, fine grained to very- fine crystalline, mostly slightly dolomitic, moderately well- to well cemented, moderately hard to hard, trace of fossils.	RPM: 36 WOB: 12K	2613-2618	5
LIMESTONE- Limestone, 100%, yellowish gray (5Y 7/2), little very pale orange (10YR 8/2) and chalky, fine grained, poorly to moderately- well cemented, soft, trace of fossils; Chert, trace, micritic, medium gray (N5), very hard: Clay, trace, white (N9) to yellowish gray (5Y 7/2), calcareous, chalky, very soft, non- plastic.	RPM: 34 WOB: 20K	2618- 2680	62

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
	COMMENTS	INTERVAL	
LIMESTONE- Limestone, 100%, very pale orange (10YR 8/2), yellowish gray (5Y 8/1) and some grayish orange (10YR 7/4) with black (N1) specs, fine grained, poorly to moderately- well cemented, slightly dolomitic, soft to moderately hard, frequent irregular fractures, vuggy, fossiliferous with forams; Chert, trace, olive black (5Y 2/1), very hard.	RPM: 26-32 WOB: 12-17K Core #6 collected from interval 2681.0- 2694.8 ft bpl	2680-2720	40
LIMESTONE- Limestone, 100%, yellowish gray (5Y 7/2), little very pale orange (10YR 8/2) and chalky, partly dolomitic, fine grained, poorly to moderately well-cemented, soft, trace of fossils; Clay, trace, white (N9) to yellowish gray (5Y 7/2), calcareous, chalky, very soft, non-plastic.	RPM: 26-30 WOB: 12-17K	2720-2740	20
LIMESTONE- Limestone, 100%, very pale orange (10YR 8/2), some yellowish gray (5Y 8/1), fine grained, poorly to moderately- well cemented, dolomitic, some grains with forams, vuggy, soft; Chert, trace, pale yellowish brown (10YR 6/2), very hard.	RPM: 30 WOB: 12-15K Core #7 collected from interval 2758.0- 2769.0 ft bpl	2740-2790	50
LIMESTONE AND VERY LITTLE DOLOMITE-Limestone, 95%, very pale orange (10YR 8/2), some yellowish gray (5Y 8/1), fine grained, poorly to moderately- well cemented, slightly dolomitic, some grains with forams, vuggy, soft; Dolomite, 5%, moderately yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), micritic, well cemented, hard; Chert, trace, pale yellowish brown (10YR 6/2), very hard.	RPM: 34-40 WOB: 20-25K	2790-2810	20
LIMESTONE- Limestone, 100%, very pale orange (10YR 8/2), slightly dolomitic, fine grained, poorly to moderately- well cemented, soft, trace of fossils; Dolomite, trace, moderately yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), micritic, well cemented, hard; Marl, trace, white, soft.	RPM: 18-42 WOB: 15-25K	2810-2880	70
DOLOMITE AND LIMESTONE- Dolomite, 70%, moderately yellowish brown (10YR 5/4) to pale brown (5YR 5/2), micritic to sucrosic, well cemented, vuggy, moderately hard; Limestone, 30%, very pale orange (10YR 8/2), slightly dolomitic, fine grained, poorly to moderately- well cemented, soft, trace of fossils.	RPM: 12 WOB: 30K	2880-2890	10
LIMESTONE- Limestone, 100%, very pale orange (10YR 8/2), slightly dolomitic, fine grained, poorly to moderately- well cemented, soft, trace of fossils; Dolomite, trace, moderately yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), micritic, well cemented, hard.	RPM: 10 WOB: 30K Core #8 collected from interval 2890.0- 2903.0 ft bpl	2890-2900	10

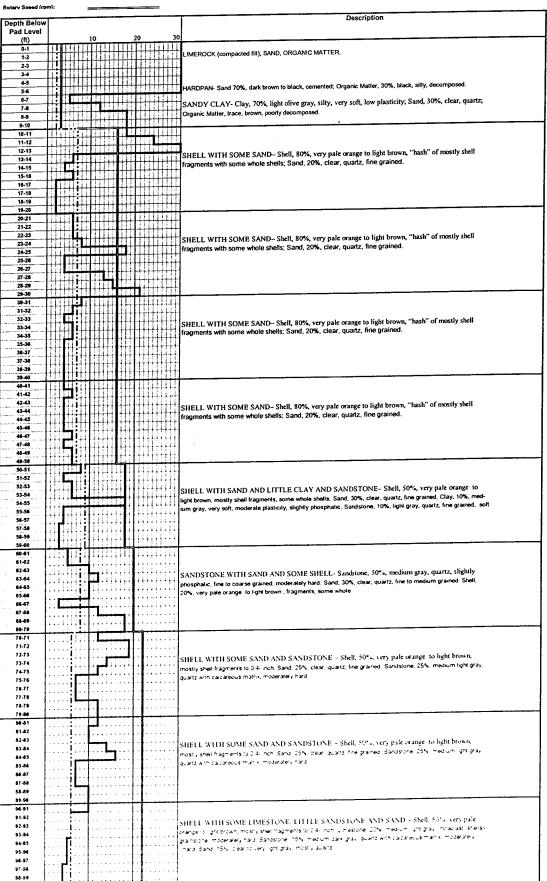
GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
	COMMENTS		
DOLOMITE AND SOME LIMESTONE- Dolomite, 70%, moderately yellowish brown (10YR 5/4) to pale brown (5YR 5/2), micritic to sucrosic, well cemented, vuggy, moderately hard; Limestone, 30%, very pale orange (10YR 8/2), slightly dolomitic, fine grained, poorly to moderately- well cemented, soft, trace of fossils.	RPM: 12 WOB: 32K	2900-2910	10
DOLOMITE AND LIMESTONE- Dolomite, 50%, pale yellowish brown (10YR 6/2) to dark pale brown (10YR 4/2), micritic, well cemented, hard; Limestone, 50%, very pale orange (10YR 8/2), slightly dolomitic, fine grained, poorly to moderately- well cemented, soft, trace of fossils.	RPM: 12 WOB: 32K	2910-2950	40
DOLOMITE AND LIMESTONE- Dolomite, 65%, pale yellowish brown (10YR 6/2) to dark pale brown (10YR 4/2), micritic, well cemented, hard; Limestone, 35%, very pale orange (10YR 8/2), slightly dolomitic, very-fine grained, poorly to moderately- well cemented, soft.	RPM: 38 WOB: 25K	2950-2970	20
DOLOMITE AND LIMESTONE- Dolomite, 50%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), micritic, well cemented, hard; Limestone, 50%, very pale orange (10YR 8/2), slightly dolomitic, fine grained, poorly to moderately-well cemented, soft.	RPM: 40 WOB: 5-25K	2970-2980	10
DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), micritic, partially vuggy, moderately-well to well cemented, hard; Limestone, 15%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), very-fine grained, dolomitic, slightly sparitic, poorly to moderately-well cemented, soft.	RPM: 46 WOB: 5-25K	2980-2990	10
DOLOMITE AND LIMESTONE – Dolomite, 60%, moderate yellowish brown (10YR 4/2), very-fine crystalline, slightly vuggy, moderately-well cemented, hard; Limestone, 40%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, slightly dolomitic, moderately- well cemented, moderately hard.	RPM: 46 WOB: 15K	2990-3000	10
LIMESTONE AND DOLOMITE – Limestone, 60%, very pale orange (10YR 8/2), very-fine grained, slightly dolomitic, poorly cemented, soft; Dolomite, 40%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very-fine crystalline, poorly to moderately-well cemented, moderately hard to soft.	RPM: 46 WOB: 25K	3000-3020	20

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
	COMMITTEN 15	HITERVAL	
DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, pale yellowish brown (10YR 6/2) to pale brown (5YR 5/2), micritic to sucrosic, slightly vuggy, moderately-well cemented, hard; Limestone, 30%, very pale orange (10YR 8/2), fine grained, slightly dolomitic, poorly cemented, soft.	RPM: 40 WOB: 25K	3020-3030	10
DOLOMITE AND LITTLE LIMESTONE – Dolomite, 90%, pale yellowish brown (10YR 6/2) to pale brown (5YR 5/2), micritic to sucrosic, slightly vuggy, moderately-well cemented, hard; Limestone, 10%, very pale orange (10YR 8/2), fine grained, slightly dolomitic, poorly cemented, soft	RPM: 40 WOB: 25K	3030-3040	10
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with some grayish brown (5YR 3/2), micritic, vuggy, moderately-well cemented, hard; Limestone, trace, very pale orange (10YR 8/2), fine grained, slightly dolomitic, poorly cemented, soft.	RPM: 24-30 WOB: 12-30K	3040-3110	70
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dusky yellowish brown (10YR 2/2) and light olive gray (5Y 6/1) to olive gray (5Y 4/1), micritic, primarily compact (10% vuggy), well cemented, hard.	RPM: 40 WOB: 10-15K	3110-3130	20
DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), micritic, primarily vuggy, moderately-well cemented, hard; Limestone, 15%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, dolomitic, moderately-well cemented, moderately hard.	RPM: 36 WOB: 25K	3130-3140	10
DOLOMITE – Dolomite, 100%, mostly pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), little light gray (N7), micritic, little fine crystalline and sucrosic, compact, well cemented, hard.	RPM: 44 WOB: 25K	3140-3150	10
DOLOMITE – Dolomite, 100%, dark yellowish brown (10YR 4/2), very-fine to fine crystalline, mostly sucrosic, some micritic, vuggy, moderately-well cemented, moderately hard to soft; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, dolomitic, moderately hard.	RPM: 44 WOB: 25K	3150-3160	10
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), micritic, little fine crystalline, moderately well cemented, hard to moderately hard; Limestone, trace, very pale orange (10YR 8 2), very-fine grained, dolomitic, moderately well cemented, moderately hard.	RPM: 44 WOB: 25K	3160-3170	10

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
	COMMENTS	INTERVAL	
DOLOMITE – Dolomite, 100%, light olive gray (5Y 5/2) to moderate yellowish brown (10YR 5/4), little light gray (N7), micritic, little fine crystalline, poorly cemented and soft, with numerous boulder type fragments, very hard; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, dolomitic, poorly cemented, soft.	RPM: 48 WOB: 15-20K Dredging.	3170-3180	10
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4), fine crystalline, sucrosic, poorly cemented and soft, with few boulder type fragments, micritic, very hard.	RPM: 48 WOB: 15-20K	3180-3190	10
DOLOMITE – Dolomite, 100%, light olive gray (5Y 5/2) to dark yellowish brown (10YR 4/2), some light gray (N7) to dark gray (N3), micritic, little fine crystalline, poorly cemented and soft, with very few boulder type fragments, very hard; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, dolomitic, poorly cemented, soft.	RPM: 48 WOB: 15-20K	3190-3230	40
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4), fine crystalline, sucrosic, poorly cemented and soft, with very little light gray (N7), micritic and moderately hard.	RPM: 48 WOB: 15-20K	3230-3240	10
DOLOMITE – Dolomite, 100%, light olive gray (5Y 5/2) to dark yellowish brown (10YR 4/2), some light gray (N7) to dark gray (N3), micritic, little fine crystalline, poorly cemented and soft; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, dolomitic, poorly cemented, soft.	RPM: 48 WOB: 15-20K	3240-3270	30
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very-fine crystalline, sucrosic, poorly cemented, soft; Limestone, trace, very pale orange (10YR 8/2), very-fine crystalline, dolomitic, poorly cemented, soft.	RPM: 44 WOB: 20K	3270-3280	10
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), micritic, well cemented, hard; Limestone, trace, very pale orange (10YR 8/2), very -fine crystalline, dolomitic, poorly cemented, soft.	RPM: 44 WOB: 25K	3280-3300	20
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4) and olive gray (5Y 4/1), micritic to very-fine crystalline, slightly vuggy, well cemented, hard.	RPM: 44 WOB: 20K	3300-3310	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), some light gray (N7) to dark gray (N3), micritic to very-fine crystalline, poorly cemented, soft to moderately hard; Limestone, trace, very pale orange (10YR 8/2), very fine grained, dolomitic, poorly cemented, soft.	RPM: 44 WOB: 25K	3310-3320	10
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), micritic to very-fine crystalline, well cemented, hard.	RPM: 44 WOB: 25K	3320-3330	10
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very-fine crystalline, sucrosic, vuggy, poorly cemented, partly micritic, moderately hard to soft; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, dolomitic, poorly cemented, soft.	RPM: 48 WOB: 15- 20K	3330-3360	30
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), little dusky yellowish brown (10YR 2/2), mostly micritic, some very-fine crystalline, sucrosic, vuggy and poorly cemented, moderately hard to soft; Limestone, trace, very pale orange (10YR 8/2), very-fine grained, dolomitic, poorly cemented, soft.	RPM: 48 WOB: 15- 20K	3360-3390	30
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4), fine crystalline, sucrosic, poorly cemented and soft, with very little (some in the interval 3420-3430 ft bpl) light gray (N7), micritic and moderately hard.	RPM: 48 WOB: 15- 20K	3390-3440	50
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), some dusky yellowish brown (10YR 2/2), micritic and very-fine crystalline, sucrosic, vuggy and poorly cemented, moderately hard to soft.	RPM: 48 WOB: 15- 20K	3440-3450	10

Penetration rate (min/ft):
Weight On Bit (K lbs):



Penetration rate (min/ft):	
Weight On Bit (K ibs):	

Rotary Speed Iron	totary Speed (romi):				
Depth Below				Description	
Pad Level (ft)		10	20 3		
200-201		11:1111:1:1	11111111		
201-202 202-203				COLUMN WITH A TIPLY LETTLE CAND. Clay 05% dark greenish orang silty very soft to soft cohesive	
203-204 204-205		+ +		CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive, non-plastic; Sand, 5%, clear, quartz, Shell, trace, very pale orange. Between 185 and 240 ft bpl large	
205-206	lii iiii			(more than 50%) amount of cement fragments in cuttings.	
206-207	 	 			
208-209					
209-210 210-211					
211-212 212-213					
213-214	Hill			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive, non-plastic: Sand, 5%, clear, quartz: Shell, trace, very pale orange. Between 185 and 240 ft bpl large	
214-215 215-216	lii			non-plastic; Sand, 5%, clear, quantz; Sheit, trace, very paie orange. Between 100 and 240 it opinionale (more than 50%) amount of cement fragments in cuttings.	
216-217					
217-218 218-219	 				
219-220					
220-221 221-222					
222-223 223-224	III:4444		1	CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,	
224-225				non-plastic; Sand, 5%, clear, quartz; Sheli, trace, very pale orange. Between 185 and 240 ft bpl large	
225-226	!	+++++++	1+++++++	(more than 50%) amount of cement fragments in cultings.	
227-228			14.7.7.4.14.4		
228-229 229-230					
230-231		11++++++	144444		
232-233				CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,	
233-234 234-235	H:H:	-	44 rpm +	non-plastic; Sand, 5%, clear, quartz; Shelt, trace, very pale orange. Between 185 and 240 ft bpt large	
235-236				(more than 50%) amount of cement fragments in cuttings.	
236-237 237-238					
238-239 239-248	i	11.11.11.11	+++++++		
240-241			14444		
241-242 242-243				Charles and cohering	
243-244 244-245	11:11	144444	11-11-11	CLAY WITH VERY LITTLE SAND Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive, non-plastic; Sand, 6%, clear, quartz, Shell, trace, very pale orange. Between 185 and 240 ft bpl large	
245-244				(more than 50%) amount of cement fragments in cuttings.	
246-247 247-248		11,11,441	1		
248-249		1			
249-250 250-251	H	1:::::::::			
251-252 252-253	4 4 1		1:1::::::		
253-254	11:11:11			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive, non-plastic, Sand, 5%, clear, quartz, Shell, trace, very pale orange. Between 185 and 240 ft bpt large.	
254-255 255-256	i	1	[+	(more than 50%) amount of cement fragments in cultings	
258-257 257-258					
258-259		11,111	1		
259-260 260-261		 	 		
261-262		.,			
262-263 263-264	ir i liggi	liiiiiiiiii		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,	
264-265			1, 111114	non-plastic: Sand, 5%, clear, quartz: Shell, trace, very pale orange. Between 185 and 240 ft bpl large (more than 50%) amount of cement fragments in cultings.	
266-267	i . i			· · · · · · · · · · · · · · · · · · ·	
267-268 268-269					
269-270			 		
270-271 271-272					
212-213				CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,	
274-275				non-plastic Sand, 5%, clear, quartz. Shell, trace, very pale orange. Between 185 and 240 ft bpl large (more than 50%) amount of cement fragments in cuttings.	
275-276 276-277			44 rpm 🏚	руков инак эк из автоски и контон подность с томогда	
277-278					
278-219 279-288	i				
280-281 281-282					
282-283				CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive,	
283-284 284-285		ļi		non-pastic, Sand, 5%, dear, quartz, Sheil, trace, very pale crange, Between 185 and 240 ft bpi large.	
285-286				more than 60% amount of cement fragments in cuttings	
286-287 287-288					
288-289					
289-290 290-291	. i		<u> </u>		
291-292					
292-293 293-294				CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray, silty, very soft to soft, cohesive.	
294-295 295-296	ק! • • • •			nomicrastic Sand, 5%, clear, quartz, Snev, trace, very pale crarge. Between 185 and 242 ft cor, arge, imprection 50%, cambouts of cement fragments in buttings.	
296-297	1!				
297-298 298-299	· [j · · · · · ·				
	1.		1		

Penetration rate (min/ft):	
Weight On Bit (K lbs):	
Rotery Speed (rpm):	

Weight On Bit (K Rotary Speed (ro		
		Description
Depth Below Pad Level		
(ft)	10	0
400-401 401-402		
402-403		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
403-404 404-405		hard, non-plastic; Sand, Irace, clear, quartz, very line grained; Shell, trace, while to very pale orange.
405-406		
406-407 407-408		
407-408 408-409		
409-410		
410-411 411-412		
412-413		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
413-414		hard, non-plastic: Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange.
415-416		
416-417 417-418		
418-419		
419-420 420-421		
421-422		
422-423 421-424	┞ ┦ ╏┼╏╏┼╏┼╏╎╏╎╏ ┼┼┼┼	CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
424-425		hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange.
425-426 426-427	▊ ▗▐▗░▗▐▗▗▗▗ ▗▗▗ ▗▗▗	•
427-428		
428-429 429-430		
430-431		
431-432 432-433		To the second se
433-434		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, while to very pale orange.
434-435 435-436	30 rpm -	
436-437		1
437-438 438-439	▐ ▞▐ ▐ ᡶ┼ <mark>┋</mark> ┼┞┼┆ ┠ ┼┞┼┼┼┆┆┆╏╁┆╏┍┞╽	i
439-440		
440-441 441-442		
442-443		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
443-444		hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, while lo very pale orange.
445-446		
448-447 447-448		
448-449		
449-450 450-451		
451-452		
452-453 453-454		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately
454-455	▋▗▐▐▗▗▐▗▗▋▗▋▋▋▋▗▗▗▐▗▍▊▄▄▐▗▀▘▞▗▘▘ ▘	
455-456 456-457		
457-458	1.14,!!,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	·
458-459 459-460		
460-461		
461-462 462-463		The company of the productive
463-464		CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately hard, non-plastic, Sand, trace, clear, quartz, very fine grained, Shell, trace, while to very pale orange
451-465 465-466	30 /pm →	
468-467		
467-468 468-489		j
469-470		
470-471 471-472		
472-473		CLAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very
473-474 474-475		soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
475-476		
476-477 477-478		
478-479		
479-480 480-481	 - 	
481-482		
482-483 483-484		CLAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very
484-485	[L	soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
485-486 486-487		
487-458		
458-489	l_i	
459-496		
491-492		
497-493 493-494		CLAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayath yellow green, echesive, very
494-495		soft, low plasticity to non-plastic; Sand. 5%, clear, quartz
495-496 496-497		
497-498		
455-499		
499-500	· • • • • • • • • • • • • • • • • • • •	

Penetration rate (min/ft):	
Weight On Bit (K fbs):	

Weight On Bit (K Rotary Speed (rp			
	·····		I Description
Depth Below Pad Level			
(ft)	10	20 30	
600-601 601-602			1
602-603			CLAY - Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft,
603-604 504-605		46 rpm ▶	cohesive, non- plastic.
605-606			
606-607 607-608		 	
608-609			
509-610			
610-611 611-612			
612-613			CLAY - Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft,
613-614 614-615	H . 		cohesive, non- plastic.
615-616			
616-617 617-618	┼ <mark>╏┼┇┼╌</mark> ┍╸╏ ╏╒╘ ┼┼┼		
618-619			
619-620 620-621			
621-622			
522-623 523-624	┼ ╏┼┋┼┼┼┼┼┼┼┼┼ ┆	╎┠┋┋╏╏╏	CLAY - Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft,
624-625		44 rpm 👈	cohesive, non- plastic.
625-628 626-627	+ - - - - - - - - - - - - -	┊┋	
627-628			
628-629 629-630	▐ ▛▋ ┼┋┦┼╿┼┼┨┾ ┆┦ ┼┼┼┼	11111111	
630-631			· · · · · · · · · · · · · · · · · · ·
631-632 632-633		┊╏╘╻ ┼┼┼┼	
633-634			CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH LITTLE SAND Clay, 70%, yellowish gray, calcareous, little sitty, phosphatic, moderately soft to very soft, non-plastic, non-onesive;
634-635 635-636	▋┼┼┋┼┤ ╒ ┼┼╂┼┼┦┼┼┼┼┼	- ┼ ┃┽┢┦┞┧┾╂┼	Limestone, 20%, yellowish gray, soft to moderately hard; Sand, 10%, clear to light gray, mostly detritic.
636-637			
637-638 638-639	 		
639-648			
640-641 641-642	!		
642-643		+ -+++++++	CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, mostly calcareous, very
643-644 644-645		+1:++++++	soft to soft, non-plastic, cohesive; Limestone, 5%, very pale orange to white, fine grained, very soft to soft,
645-646		1444 444	poorly cemented; Shell, 5%, very pale orange to white.
646-647 647-648		3.1 1.1 1 4 4 4 1 1 1	
648-649			
649-658 650-651		 	
651-652			
652-653 653-654			CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, mostly calcareous, very
654-655		. [] .] ! . [] . [soft to soft, non-plastic, cohesive, Limestone, 5%, very pale orange to white, fine grained, very soft to soft, poorly cemented. Shell, 5%, very pale orange to white
655-656 656-657			
657-658			
658-650 659-660			
660-661			
661-662 662-663			The state of the s
663-664		444000	CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, mostly calcareous, very soft to soft, non-plastic, cohesive, Limestone, 5%, very pale orange to while, fine grained, very soft to soft.
664-865 665-666	1.1		poorly cemented. Shell, 5%, very pale orange to white
566-667	1.1		
667-668 668-669	11:		
669-670	- 		
679-671 671-672	1		
672-673	1.1		CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90°s, pale olive, mostly calcareous, very
673-674 674-675	rt i i i i i i i i i i i i i i i i i i i	1	soft to soft, non-prastic, cohestie. Limestone, 5%, very pale orange to white, fine grained, very soft to soft,
675-676	[j		poorly cemented. Shell, 5%, very paie orange to white
676-677 677-678	Inima la como		
678-679			
679-680 680-681	 	1	
681-682			
682-683 683-684			CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND - Clay,
684-685			Chalchise of any cardaneous moderately soft to very soft inchipiastic, non-conessile. Limestone, 25%, jel owan gray, soft to moderately hard, poon, cemented. Sand 5%, clear to light y/ay.
685-696 686-687		1	90 011 9 90 00 00 00 00 00 00 00 00 00 00 00 0
687-688			
584-639 649-690	ļ. <u>İ</u>	ļ	
619-690 690-691	 i 		
691-692		.	
692-693 693-694	1		CLAY WITH LITTLE LIMESTONE - Clay. **)**, mostly pale greensh yelkon mostly calcuteous
694-695			mann Lery soft to soft in grin, conessie inomi passi oto low passi oti, il messone. 10%, gra, sin Lerow green to wante soft, poorni cementes.
695- 696 696-697	lair de ann		
697-698			
698-699 699-700			
037-119			

ARCADIS

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
TOP SOIL- Soil, black, sand with roots and partially decomposed organic matter.	36.5-inch diameter reamer bit and stabilizer assembly. Mud-rotary method.	0 – 0.5	0.5
SAND – Sand, 100%, clear, quartz, fine to medium grained, well sorted, round to sub-rounded; Organic Matter, trace, black to dark brown, decomposed.	RPM: 3-5, WOB: 2-3K	0.5 2.0	1.5
SILTY SAND - Sand, 70%, clear to dusky brown (10YR 2/2), quartz, very fine to fine grained, rounded to sub-rounded; Silt, 30%, dusky brown (10YR 2/2).	RPM: 3-5, WOB: 2-3K	2.0 – 5.0	3.0
HARD PAN—Sand, 70%, dusky brown (10YR 2/2) to black (N1), quartz, very fine to fine grained, rounded to sub-rounded, partly cemented: Organic Matter, 30%, black (N10), silty, decomposed.	RPM: 3-5, WOB: 2-3K	5.0 – 6.0	1.0
SANDY CLAY- Clay, 70%, light olive gray (5Y 6/1), silty, very soft, low plasticity; Sand, 30%, clear, quartz, sub-rounded; Organic Matter, trace, brown, poorly decomposed.	RPM: 3-5, WOB: 2-3K	6.0 – 10.0	4.0
SHELL WITH SOME SAND—Shell, 80%, very pale orange (10YR 8/2) to light brown (5YR 6/4) and medium gray (N5), "hash" of mostly shell fragments to 0.3- inch with some whole shells to 0.8- inch size; Sand, 20%, clear, quartz, fine grained, sub-rounded.	RPM: 7, WOB: 5-7K	10 – 40	30
SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE—Shell, 50%, very pale orange (10YR 8/2) to light brown (5YR 6/4) and medium gray (N5), mostly shell fragments to 0.3- inch with some whole shells to 0.8- inch size; Sand, 30%, clear, quartz, fine grained, sub-rounded; Clay, 10%, medium gray (N5), very soft, moderate plasticity, slightly phosphatic; Sandstone, 10%, light gray (N7), quartz, fine grained, poorly cemented, with numerous shell intraclasts.	RPM: 10, WOB: 10- 12K	40-60	20
SANDSTONE WITH SAND AND SOME SHELL-Sandstone, 50%, medium gray (N5), quartz, some calcareous matrix, , slightly phosphatic, fine to coarse grained, moderately well cemented, numerous shell intraclasts; Sand, 30%, clear, quartz, fine to medium grained, subrounded; Shell, 20%, very pale orange (10YR 8/2) to light brown (5YR 6/4), fragments, some whole bivalves to 0.8 inch.	RPM: 10, WOB: 10K	60-70	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
SHELL WITH SAND, SANDSTONE AND LITTLE CLAY – Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Sand, 25%, clear, quartz, fine grained, subrounded; Sandstone, 25%, medium gray (N5), quartz, fine to medium grained, moderately well cemented, slightly phosphatic with numerous shell intraclasts; Clay, 10%, medium light gray (N6), very soft, medium plasticity.	RPM: 12, WOB 5K	70-80	10
SHELL WITH SOME LIMESTONE AND LITTLE SAND – Shell, 60%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4-inch; Limestone, 25%, medium gray (N5), arenaceous, slightly phosphatic, fine grained, moderately well cemented, with shell intraclasts; Sand, 15%, clear to very light gray (N8), mostly quartz, some calcareous, sub-rounded to sub-angular.	RPM: 12, WOB 5K	80-90	10
SHELL WITH LIMESTONE, SOME SAND AND LITTLE CLAY- Shell, 40%, very pale orange (10YR 8/2) to light brown (5YR 6/4), mostly shell fragments to 0.4- inch; Limestone, 30%, medium gray (N5), arenaceous, slightly phosphatic, fine grained, soft to moderately hard, moderately well cemented with numerous shell intraclasts; Sand, 20%, clear to light gray (N7), quartz, some calcareous, fine to medium grained; Clay, 10%, medium light gray (N6), slightly phosphatic, calcareous, very soft, medium plasticity.	RPM: 23, WOB: 5K	90-120	30
SHELLWITH LIMESTONE AND SOME SAND-Shell, 50%, very pale orange (10YR 8/2), white, light brown (5YR 5/6) to medium gray (N5), tests to 0.3-inch; Limestone, 30%, light olive gray (5Y 6/1), arenaceous and biosparite with numerous shell intraclasts, phosphatic, fine grained, soft to moderately	RPM: 16-22, WOB: 6K	120-170	50
hard, moderately well cemented; Sand, 20%, clear to light gray (N7), quartz and calcareous, very fine to fine grained, sub-rounded to sub-angular; Clay, trace, light olive gray (5Y 6/1), very soft, non- plastic.			

ARCADIS

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE WITH SHELL, SOME CLAY AND LITTLE SAND- Limestone, 50%, yellowish gray (5Y 7/2), biosparitic, with shell intraclasts, slightly phosphatic, vuggy, moderately well cemented; Shell, 25%, very pale orange (10YR 8/2) to light gray ((N7), tests, some larger fragments to 1 inch; Clay, 15%, light olive gray (5Y 5/2), calcareous, soft, nonplastic; Sand, 10%, light gray (N7) to clear, calcareous, detritic, some quartz, fine grained, sub- angular.	RPM: 24, WOB: 4K	170 – 180	10
SANDY CLAY WITH SHELL AND LITTLE LIMESTONE— Clay, 50%, grayish olive (10Y 4/2), silty, slightly phosphatic, very soft to soft, cohesive, non-plastic; Shell, 25%, very pale orange (10YR 8/2) to light brown (5Y 6/4), bivalves, mostly tests to 0.3 inch; Sand, 15%, very light gray (N8), calcareous, detritic, some clear, quartz, very fine to fine grained, sub-rounded; Limestone, 10%, yellowish gray (5Y 7/2), biosparitic, with shell intraclasts, slightly phosphatic, vuggy, moderately well cemented.	RPM: 24, WOB: 4K TOP OF HAWTHORN	180 – 185	5
CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray (5G 4/1) with trace of pale olive (10Y 6/2), silty, very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine grained, sub-rounded; Shell, trace, very pale orange (10YR 8/2), isolated tests to 0.2 inch. Between 185 and 210 ft bpl, large (more than 50%) amount of cement fragments in cuttings. Diminishing with depth and disappearing below 230 ft bpl.	RPM: 20-24, WOB: 9- 10K	185 –360	175
CLAY WITH VERY LITTLE SAND AND LIMESTONE— Clay, 90%, dark greenish gray (5G 4/1) some grayish olive green (5GY 3/2), silty, soft to very soft, very cohesive, non-plastic; Sand, 5%, clear,	RPM: 30, WOB: 5K	360 – 380	20
quartz, fine grained, sub-rounded; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 4/1), arenaceous, phosphatic, shell intraclasts and detritic material present, soft, poorly cemented.		7-	
CLAY – Clay, 100%, grayish yellow green (5GY 7/2) to olive gray (5Y 4/1), silty, slightly phosphatic to phosphatic, trace calcareous (limey), very cohesive, soft to very soft, non-plastic; Sand, trace, clear, quartz, very fine grained, sub-rounded; Shell, trace, white to very pale orange (10YR 8/2), tests up to 0.2 inch.	RPM: 30, WOB: 5K	380 – 440	60

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
CLAY WTH VERY LITTLE LIMESTONE – Clay, 95%, grayish yellow green (5GY 7/2) to olive gray (5Y 4/1), silty, phosphatic, cohesive, soft, low plasticity to non-plastic; Limestone, 5%, yellowish gray (5Y 7/2), phosphatic, soft, moderately well cemented, shell intraclasts; Sand, trace, clear, quartz, very fine grained, sub-rounded.	RPM: 30, WOB: 6K	440 – 460	20 .
CLAY – Clay, 100%, grayish olive (10Y 4/2) to dark greenish gray (5GY 4/1), very phosphatic, highly cohesive, low plasticity; Limestone, trace, yellowish gray (5Y 7/2), arenaceous, soft, moderately cemented; Sand, trace, clear, quartz, sub-rounded, very fine grained.	RPM: 46, WOB: 6-10K	460 – 470	10
CLAY WITH VERY LITTLE LIMESTONE – Clay, 95%, grayish olive (10Y 4/2) to pale olive (10Y 6/2), calcareous, some silty, phosphatic, soft, highly cohesive, low plasticity; Limestone, 5%, grayish yellow green (5GY 7/2) to white (N9), arenaceous, slightly phosphatic, fine grained, microporous, soft, poorly cemented; Sand, trace, clear to light greenish gray (5GY 8/1), quartz and calcareous, very fine to fine grained.	RPM: 48, WOB: 10K	470 - 480	10
CLAY WITH LITTLE LIMESTONE – Clay, 90%, 60% pale olive (10Y 6/2), calcareous (marl), 40% grayish olive (10Y 4/2), silty, phosphatic, very soft to soft, highly cohesive, nonplastic to low plasticity; Limestone, 10%, grayish yellow green (5GY 7/2) to white (N9), arenaceous, slightly phosphatic, fine grained, microporous, soft, poorly cemented; Sand, trace, clear to light greenish gray (5GY 8/1), quartz and calcareous, very fine to fine grained.	RPM: 40-48 WOB: 4-10K	480 -530	50
CLAY, SOME LIMESTONE AND LITTLE SAND – Clay, 80%, pale greenish yellow (10Y 8/2) to yellowish gray (5Y 7/2), very soft to soft, calcareous,	RPM: 40-48 WOB: 4-10K	530 –540	10
some silty, highly phosphatic, non-plastic, cohesive; Limestone, 15%, yellowish gray (5Y 7/2), arenaceous, phosphatic, fine grained, soft, poorly cemented; Sand, 5%, light gray (N7) to clear, mostly calcareous, detritic, some quartz, very fine to fine grained, sub- rounded to angular.			

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
CALCAREOUS CLAY (MARL) WITH LIMESTONE AND LITTLE SAND AND SHELL – Clay, 60%, mostly pale greenish yellow (10Y 8/2), calcareous (marl), some grayish olive green (5GY 3/2), silty, highly phosphatic, very soft to soft, non-plastic, cohesive; Limestone, 30%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), pelisparitic grainstone, highly phosphatic, fine grained, very soft to soft, poorly cemented; Sand, 5%, vey pale orange (10Y 8/2) to clear, mostly calcareous, detritic, some quartz, very fine to coarse grained, sub-rounded to angular; Shell, 5%, very pale orange (10 YR 8/2), tests to 0.2 inch.	RPM: 40-48 WOB: 4-10K	540 – 550	10
CLAY- Clay, 100%, dusky yellow green (5GY 5/2), silty, slightly calcareous, very slightly phosphatic, soft to hard, low to medium plasticity; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), pelisparitic grainstone, highly phosphatic, fine grained, very soft to soft, poorly cemented; Sand, trace, clear, quartz, very fine grained, sub-rounded; Shell, trace, very pale orange (10 YR 8/2), single tests to 0.2 inch.	RPM: 24-28 WOB: 6-10K	550 – 570	20
CLAY – Clay, 100%, grayish olive (10Y 4/2), silty to dusky yellow (5Y 6/4), calcareous, very phosphatic, very soft to hard, highly cohesive, low plasticity to non- plastic; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), sporadic small fragments of pelisparitic grainstone, phosphatic, fine grained, very soft to soft, poorly cemented; Sand, trace, clear, quartz, very fine grained, sub-rounded; Shell, trace, very pale orange (10 YR 8/2), single tests to 0.1 inch.	RPM: 24-28 WOB: 6-10K	570-580	10
CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, 80% pale olive (10Y 6/2), calcareous (marl), 20% grayish olive green (5GY 3/2), silty, highly phosphatic, very soft to soft, non-plastic, cohesive; Limestone, 5%, very pale orange (10YR 8/2) to white (N9), arenaceous, some oolitic grainstone, phosphatic, fine grained, very soft to soft, poorly cemented; Shell, 5%, vey pale orange (10Y 8/2) to white (N9), tests to 0.1 inch; Sand, trace, clear, quartz, very fine to fine grained, sub-rounded.	RPM: 44-48 WOB: 6-10K	580-640	60

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay, 70%, 90% yellowish gray (5Y 7/2), calcareous, 10% grayish olive (10Y 4/2), silty, phosphatic, moderately soft to very soft, non-plastic, non-cohesive; Limestone, 25%, yellowish gray (5Y 7/2), oolitic grainstone, phosphatic, fine grained, soft to moderately hard, poorly cemented; Sand, 5%, clear to light gray, mostly calcareous, detritic, some quartz, very fine to fine grained, sub-rounded to angular.	RPM: 46, WOB: 5K	640 – 660	20
CALCAREOUS CLAY (MARL), LIMESTONE AND SAND – Clay, 35%, yellowish gray (5Y 7/2), calcareous, phosphatic, very soft to soft, non-plastic, non-cohesive; Limestone, 35%, yellowish gray (5Y 7/2), arenaceous, phosphatic, fine grained, soft, poorly to moderately well cemented; Sand, 30%, clear, quartz, to light gray, calcareous, detritic, very fine to fine grained, sub-rounded to angular.	RPM: 42, WOB: 6K	660 – 690	30
CALCAREOUS CLAY (MARL) WITH LIMESTONE, SOME SAND AND LITTLE SHELL-Clay, 50%, pale olive (10Y 6/2), trace of pale blue (5PB), calcareous, phosphatic, very soft, non-plastic, slightly cohesive; Limestone, 25%, yellowish gray (5Y 7/2) to dark gray (N3), arenaceous, phosphatic, slightly vuggy, fine grained, soft to very soft, poorly cemented; Sand, 20%, clear, quartz, to light gray, calcareous, detritic, very fine to medium grained, subrounded to angular; Shell, 5%, very pale orange (10YR 8/2), tests to 0.2 inch.	RPM: 28, WOB: 6-8K	690 – 700	10
CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE—Clay, 80%, pale olive (10Y 6/2), mostly calcareous (marl), slightly silty, phosphatic, phosphatic, very soft to soft, non-plastic,	RPM: 28, WOB: 6-8K	700-735	35
cohesive; Sand, 15%, clear, quartz, to light gray, calcareous, detritic, very fine to medium grained, subrounded to angular; Limestone, 5%, very pale orange (10YR 8/2) to light gray (N7), arenaceous some oolitic grainstone, phosphatic, fine grained, very soft to soft, poorly cemented; Shell, trace, very pale orange (10YR 8/2), single tests to 0.3 inch.			

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
CLAYEY LIMESTONE WITH SOME SAND – Limestone, 50%, very pale orange (10YR 8/2) to light gray (N7), biosparitic, some arenaceous, fine to medium grained, soft to moderately hard, poorly to moderately well cemented, fossiliferous, with trace of forams; Clay, 30%, light greenish gray (5GY 8/1), trace of white (N9), calcareous (marl), very soft,), chalky, phosphatic, non-plastic; Sand, 20%, very light gray (N8), calcareous, detritic, very little clear, quartz, very fine to medium grained, sub-rounded to sub-angular; Shell, trace, very pale orange, (10YR 8/2), tests to 0.2 inch.	RPM: 28, WOB: 6-8K	735 – 740	5
LIMESTONE WITH SOME SAND AND LITTLE CLAY- Limestone, 70%, very pale orange (10YR 8/2) to light gray (N7), biosparitic, some arenaceous, fine to medium grained, soft to moderately hard, poorly to moderately well cemented, fossiliferous, with trace of forams; Sand, 20%, very light gray (N8), calcareous, detritic, very little clear, quartz, very fine to medium grained, sub-rounded to sub-angular; Clay, 10%, light olive gray (5GY 6/1), trace of white (N9), very soft, calcareous (marl), chalky, phosphatic, non-plastic; Shell, trace, very pale orange, (10YR 8/2), tests to 0.2 inch	RPM: 28, WOB: 6-8K	740 – 755	15
LIMESTONE WITH VERY LITTLE CLAY AND SHELL- Limestone, 90%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic grainstone, fossiliferous with forams and shell intraclasts, phosphatic, moderately hard, moderately well cemented, vuggy, porous; Clay, 5% to trace at the bottom, yellowish gray (5Y 7/2), calcareous (marl), slightly phosphatic, very soft, non- plastic; Shell, 5%, very pale orange (10YR 8/2) to white (N9), tests to 0.3 inch.	RPM: 28, WOB: 6-8K	755-760	5
LIMESTONE – Limestone, 100%, yellowish gray (5Y 7/2), sparry grainstone with trace of light gray (N7) arenaceous, very slightly phosphatic, trace of fossils, soft to very soft, poorly cemented, vuggy, porous; Clay, trace, yellowish gray (5Y 7/2), calcareous, very soft, non- plastic; Chert, trace, olive gray, micrcrystalline, very hard.	Bit plugging-off. Cement cuttings in sample RPM: 20-32, WOB: 4-6K	760 – 780	20

GEOLOGIC LOG	DRILLING	DEPTH	THICKNESS
	COMMENTS	INTERVAL	
LIMESTONE WITH LITTLE CLAY AND SAND-Limestone, 80%, yellowish gray (5Y 7/2), sparry grainstone, very slightly phosphatic, trace of fossils, very soft, poorly cemented, vuggy, porous; Clay, 10%, yellowish gray (5Y 7/2), calcareous, very soft, non-plastic; Sand, 10%, yellowish gray (5Y 7/2), calcareous, detritic, fine to medium grained, subrounded.	Bit plugging-off. Cement cuttings in sample RPM: 20-32, WOB: 4-6K	780 – 790	10
LIMESTONE – Limestone, 100%, yellowish gray (5Y 7/2), sparry grainstone with trace of light gray (N7) arenaceous, very slightly phosphatic, trace of fossils, soft, poorly to moderately well cemented, vuggy, porous.	Trace of cement. RPM: 20-32, WOB: 5K	790 – 810	20
LIMESTONE – Limestone, 100%, yellowish gray (5Y 7/2), biosparitic grainstone, very slightly phosphatic, fossilferous, with forams, soft to moderately hard, poorly to moderately well cemented, vuggy, porous.	RPM: 42, WOB: 5K	810 – 840	30
LIMESTONE – Limestone, 100%; 90% yellowish gray (5Y 7/2), biosparitic, highly fossilferous (disc shaped, crinoids), with large amounts of foraminifera, soft to moderately hard, poorly to moderately well cemented, vuggy, porous; 10%, light gray (N7) to medium light gray (N6), microcrystalline, moderately hard, partly dolomitic.	RPM: 42, WOB: 5K	840 –910	70
LIMESTONE WITH LITTLE DOLOMITE – Limestone, 90%; 70% very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic grainstone, highly fossilferous (disc shaped, crinoids), with large amounts of foraminifera, soft to moderately hard, poorly to moderately well cemented, fine grained; 30% yellowish gray (5Y 7/2), dolomitic, finely crystalline, slightly vuggy, moderately hard; Dolomite, 10%, very light gray (N8) to pale yellowish brown (10YR 6/2), microcrystalline to finely crystalline,	RPM: 32, WOB: 10K	910 – 920	10
hard. LIMESTONE – Limestone, 100%; 60% yellowish gray (5Y 7/2), biosparitic, highly fossilferous (disc shaped, crinoids), with large amounts of foraminifera, very soft to moderately hard, poorly to moderately well cemented, vuggy, porous; 40% yellowish gray (5Y 7/2), dolomitic, finely crystalline, slightly vuggy, moderately hard.	RPM: 32, WOB: 10K	920 –980	60

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITIC LIMESTONE AND LITTLE DOLOMITE- Limestone, 85%; 70% yellowish gray (5Y 7/2), dolomitic, finely crystalline, slightly vuggy, moderately hard; 30% yellowish gray (5Y 7/2), biosparitic, fossilferous (disc shaped, crinoids), with some foraminifera, slightly dolomitic, very soft to moderately hard, poorly to moderately well cemented, vuggy, porous; Dolomite, 15%, grayish orange (10YR 7/4) to medium gray (N5), finely crystalline to microcrystalline, moderately hard, slightly vuggy.	RPM: 32, WOB: 10K	980 –1000	20
LIMESTONE–Limestone, 100%, yellowish gray (5Y 8/1) to very light gray (N8), oolitic, fine grained, moderately well cemented, fossiliferous (gastropods and disc shaped), slightly vuggy. Dolomite, trace, medium light gray (N6), moderately well cemented, moderately hard.	RPM: 32, WOB: 8K	1000-1020	20
LIMESTONE-Limestone, 100%, grayish orange (10YR 7/4), oolitic, fine grained, soft, poorly cemented, slightly vuggy, some forams present.	RPM: 32, WOB: 8K	1020-1030	10
LIMESTONE–Limestone, 100%, 90% yellowish gray (5Y 8/1), 10% light gray (N7), oolitic, fine grained, moderately well cemented, slightly fossiliferous (gastropods and disc shaped), slightly vuggy.	RPM: 36, WOB: 3K	1030-1040	10
LIMESTONE AND LITTLE DOLOMITE – Limestone, 90%, very pale orange (10YR 8/2) to yellowish gray (5Y 8/1), oolitic, fine grained, soft, poorly to moderately well cemented, vuggy, porous, fossiliferous; Dolomite, 10%, dark gray (N3) to medium gray (N5), very fine crystalline, hard, slightly vuggy.	RPM: 36, WOB: 3K	1040-1050	10
LIMESTONE WITH VERY LITTLE DOLOMITE AND CLAY (MARL) – Limestone, 90%, 70% yellowish gray (5Y 8/1), oolitic, soft, poorly cemented, vuggy, porous, slightly fosiliferous, 30% very light gray (N8), dolomitic, fine crystalline, slightly vuggy, moderately hard, moderately cemented; Dolomite, 5%, medium light gray (N6), fine crystalline, hard, slightly vuggy; Clay (Marl), 5%, yellowish gray (5Y 8/1) to white (N9), soft, very calcareous, cohesive.	RPM: 36, WOB: 8K	1050-1060	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
	COMMENTS	HVIERVIE	
LIMESTONE WITH VERY LITTLE DOLOMITE—Limestone, 90%, yellowish gray (5Y 7/2) to pale yellowish brown (10YR 6/2), very fine grained, partially dolomitic, poorly to moderately-well cemented, slightly vuggy; Clayey Limestone, 5%, yellowish gray (5Y 7/2), very fine grained, soft, slightly cohesive; Dolomite, 5%, brownish black (5YR 2/1), very-fine crystalline, hard.	RPM: 36, WOB: 8K	1060-1070	10
LIMESTONE – Limestone, 100%, yellowish gray (5Y 7/2) to very pale orange (10YR 8/2), very fine grained, primarily poorly cemented (small amount moderately-well cemented), vuggy.	RPM: 34, WOB: 8K	1070-1100	30
LIMESTONE – Limestone, 100%, light gray (N7), very fine grained, well cemented, slightly vuggy.	RPM: 42, WOB: 5-10K	1100-1110	10
LIMESTONE – Limestone, 95%, very light gray (N8) to light gray (N7) with trace amounts of dark gray (N3), very fine grained, poorly to moderately cemented, vuggy; Clayey Limestone, 5%, very light gray (N8) to light gray (N7), soft, slightly cohesive.	RPM: 42, WOB: 5-10K	1110-1120	10
LIMESTONE – Limestone, 100%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, poorly to moderately cemented, moderately soft, vuggy, slightly fossiliferous; trace light gray (N7) to medium gray (N5), very fine grained, moderately well cemented.	RPM: 40-42 WOB: 5-10K	1120-1130	10
CLAYEY LIMESTONE AND LIMESTONE — Clayey Limestone, 60%, very light gray (N8) to light gray (N7), very fine grained, soft, slightly cohesive; Limestone, 40%, light gray (N7) to medium gray (N5), very fine grained, poorly to moderately-well cemented, vuggy.	RPM: 40-42 WOB: 5-10K	1130-1140	10
LIMESTONE AND SOME DOLOMITE – Limestone, 85%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, poorly to moderately cemented, slightly vuggy; Dolomite, 15%, moderate yellowish brown (10YR 5/4), very fine	RPM: 40-42 WOB: 5-10K	1140-1150	10
crystalline, slightly vuggy, hard. LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2) with little light gray (N7), very fine grained, slightly fossiliferous; Dolomite, 5%, moderate yellowish brown (10YR 5/4), very fine crystalline, well cemented.	RPM: 40, WOB: 5-10K	1150-1160	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, poorly to moderately cemented, slightly dolomitic, vuggy; Dolomite, 30%, moderate yellowish brown (10YR 5/4) to dark gray (N3), very fine crystalline, moderately well cemented.	RPM: 40, WOB: 5-10K	1160-1170	10
DOLOMITE AND LITTLE LIMESTONE— Dolomite, 85%, pale yellowish brown (10YR 6/2), very-fine crystalline, slightly calcareous, slightly vuggy, well cemented; Limestone, 15%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very- fine grained, poorly to moderately cemented.	RPM: 44, WOB: 8K	1170-1200	30
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) and medium light gray (N6) to medium dark gray (N4), very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, moderately well cemented.	RPM: 45-46, WOB: 5-10K	1200-1240	40
LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange (10YR 8/2) and very light gray (N8), very fine grained, dolomitic, slighty vuggy, moderately well cemented; Dolomite, 30%, moderate yellowish brown (10YR 5/4) and medium dark gray (N4), very fine crystalline, well cemented, hard.	RPM: 45, WOB: 5-10K	1240-1260	20
LIMESTONE – Limestone, 100%, yellowish gray (5Y 7/2) to pale yellowish brown (10YR 6/2), very fine grained, dolomitic, slightly fossiliferous, vuggy, moderately cemented.	RPM: 26, WOB: 10-15K	1260-1280	20
DOLOMITE-Dolomite, 100%, 90% grayish orange pink (5YR 7/2), moderately well cemented, moderately hard, crystalline, 10% dark gray, well cemented, hard, microcrystalline; Clay, trace, medium dark gray (N4), moderately soft, cohesive.	RPM: 28 WOB: 10-15K	1280-1290	10
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, medium gray (N5), some grayish orange (10YR 7/4), very finely crystalline to microcrystalline, moderately hard to hard; Limestone, 5%, very pale orange (10YR 8/2), grainstone, soft, moderately well cemented.	RPM: 28, WOB: 5-10K	1290-1300	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE- Dolomite, 100%, light gray (N7) to grayish orange (10YR 7/4), sucritic to microcrystalline, vuggy, well cemented, moderately hard to hard; Limestone, trace, very pale orange (10YR 8/2), soft, poorly cemented.	RPM: 40, WOB: 15K	1300-1320	20
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4), sucritic to microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange (10YR 8/2), grainstone, soft, moderately well cemented.	RPM: 40, WOB: 15K Frequent bit chatter.	1320-1360	40
DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, grayish orange pink (5YR 7/2) to light brown (5YR 6/4) with some light gray (N7), microcrystalline, vuggy, moderately hard to hard; Limestone, 15%, very pale orange (10YR 8/2), grainstone, some forams, soft, poorly cemented.	RPM: 40-46 WOB: 15K	1360-1380	20
DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, 60% light brownish gray (5YR 6/1) and 40% light gray (N7), microcrystalline to cryptocrystalline, vuggy, moderately hard to hard; Limestone, 20%, very pale orange (10YR 8/2), grainstone, some forams, soft, poorly cemented.	RPM: 46, WOB: 15K	1380-1390	10
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, dark yellowish orange (10YR 6/6) to pale yellowish brown (10YR 6/2) with some light gray (N7) and dark gray (N4), microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange (10YR 8/2), grainstone, some forams, soft, poorly cemented.	RPM: 46, WOB: 15K	1390-1420	30
LIMESTONE AND SOME CLAY – Limestone, 80%, 90% yellowish gray (5y 8/1), very calcareous, grainstone, moderately well cemented, moderately	RPM: 42 WOB: 10-15K	1420-1430	10
hard, vuggy; 10% very light gray (N8), clayey limestone with other detritic impurities, moderately soft, poorly cemented, vuggy; Clay, 20%, greenish gray (5G 6/1) to medium gray (N5), slightly calcareous, soft to very soft; Dolomite, trace, dark gray (N3), microcrystalline, vyggy, well cemented, moderately hard to hard.			

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, pale yellowish brown (10YR 6/2) to pale brown (5Y 5/2), finely crystalline to microcrystalline, well cemented, moderately hard; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), grainstone, fine grained, moderately soft, poorly cemented, vuggy, porous; Clay, trace, greenish gray (5G 6/1) to medium gray (N5), slightly calcareous, soft.	RPM: 44, WOB: 15K	1430-1440	10
LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 90%, very pale orange (10YR 8/2) to very light gray (N8), fine grained, soft, poorly cemented; Dolomite, 10%, pale yellowish brown (10YR 6/2) to medium dark gray (N4), microcrystalline, compact, well cemented, hard.	RPM42, WOB: 15K	1440-1450	10
DOLOMITE WITH VERY LITTLE LIMESTONE — Dolomite, 95%, light brown (5YR 6/4) to dark yellowish brown (10YR 4/2), finely crystalline, vuggy, moderately soft; a few dark gray (N3), sucrosic to microcrystalline, moderately hard to hard, very slightly vuggy; Limestone, 5%, very pale orange (10YR 8/2), fine grained, moderately soft, poorly cemented.	RPM: 40-42, WOB:15K	1450-1490	40
DOLOMITE WITH LITTLE LIMESTONE – Dolomite, 90%, medium light gray (N6) to dark gray (N3), some light brownish gray (5YR 6/1) to pale yellowish brown (10YR 6/2), crystalline, moderately hard, vuggy; Limestone, 10%, very pale orange (10YR 8/2), fine grained, soft, poorly cemented; Clay (Marl), trace, white (N9), very soft, slightly cohesive.	RPM: 40-45 WOB: 15K	1490-1500	10
LIMESTONE AND DOLOMITE – Limestone, 60%, yellowish gray (5Y 7/2), very fine grained, vuggy, partially dolomitic, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown (10YR 5/4), microcrystalline to very fine crystalline, vuggy, poorly to moderately cemented.	RPM: 45, WOB: 15K	1500-1510	10
DOLOMITE – Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) and medium light gray (N6) to medium dark gray (N4), microcrystalline to very fine crystalline, partially vuggy, contains some limestone inclusions, moderately-well cemented.	RPM: 45, WOB: 15K	1510-1520	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE AND DOLOMITE – Limestone, 60%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), very fine grained, dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown (10YR 5/4) and medium gray (N5), microcrystalline to very fine crystalline, poorly to moderately cemented, partially vuggy.	RPM: 27, WOB: 5-10K	1520-1560	40
LIMESTONE – Limestone, 80%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), very fine grained, fossiliferous, dolomitic, poorly to moderately cemented, slightly vuggy; Dolomite, 20%, medium light gray (N6) to medium dark gray (N4), microcrystalline, multiple limestone inclusions and fossils, moderately cemented.	RPM: 27, WOB: 15K	1560-1570	10
DOLOMITE AND LIMESTONE – Dolomite, 75%, moderate yellowish brown (10YR 5/4), microcrystalline, hard, well cemented; Limestone, 25%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, fossiliferous, dolomitic, mixed with medium gray dolomite, poorly cemented.	RPM: 27, WOB: 15K	1570-1580	10
DOLOMITE – Dolomite, 95%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4) and medium light gray (N6), microcrystalline to very-fine crystalline, well cemented, slightly vuggy; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, poorly cemented.	RPM: 26, WOB: 10K	1580-1590	10
DOLOMITE AND LIMESTONE – Dolomite, 80%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) and medium light gray (N6) to medium dark gray (N4), microcrystalline to very fine crystalline, slightly vuggy, well cemented; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray	RPM: 27 WOB: 15-20K	1590-1620	30
(5Y 7/2), very fine grained, poorly cemented. DOLOMITE AND LIMESTONE – Dolomite, 70%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very-fine grained to fine grained, moderately-well cemented, vuggy; Limestone, 30%, very pale orange (10YR 8/2), very fine grained, poorly cemented.	RPM: 28, WOB: 20K	1620-1630	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE AND DOLOMITIC LIMESTONE WITH VERY LITTLE DOLOMITE – Limestone, 75%, yellowish gray (5Y 8/1) to very pale orange (10YR 8/2), fine grained, fosiliferous, slightly vuggy, moderately soft to soft, moderately cemented; Dolomitic limestone, 20%, very pale orange (10YR 8/2) to pale yellowish brown (10YR 6/2), well cemented, moderately hard; Dolomite, 5%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), microcrystalline to very-fine crystalline, slightly vuggy, well cemented, moderately hard to hard.	RPM: 36, WOB: 15K	1630-1640	10
DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, dark yellowish orange (10YR 6/6) to moderate yellowish brown (10YR 5/4) and some dark gray (N3), sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), fine grained, fossiliferous, slightly vuggy, moderately cemented.	RPM: 36, WOB: 15K	1640-1650	10
DOLOMITE AND LIMESTONE – Dolomite, 50%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) and some dark gray (N3), sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 50%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), fine grained, fossiliferous, slightly vuggy, moderately cemented.	RPM: 36 WOB: 5-10K	1650-1660	10
LIMESTONE AND SOME DOLOMITIC LIMESTONE-Limestone, 70%, yellowish gray (5Y 8/1) to very pale orange (10YR 8/2), fine grained, fossiliferous, vuggy, moderately cemented, moderately soft; Dolomitic limestone, 30%, very light gray (N8) to medium light gray (N6), crystalline to fine crystalline, vuggy, well cemented, moderately hard to hard	RPM: 36, WOB: 5-10K	1660-1670	10
hard. DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) and some medium light gray (N6) to dark gray (N3), sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), fine grained, fossiliferous, slightly vuggy, moderately cemented.	RPM: 36, WOB: 5-10K	1670-1690	20

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE-Dolomite, 100%, light brownish gray (5YR 6/1) to moderate yellowish brown (10YR 5/4), sucrosic to fine crystalline, vuggy to compact, well	RPM: 44, WOB: 20K	1690-1710	20
cemented, moderately hard to hard; Limestone, trace, white (N9) to yellowish gray (5Y 8/1), fine grained, vuggy, poorly cemented, soft.			
DOLOMITE WITH LITTLE LIMESTONE- Dolomite, 90%, light brownish gray (5YR 6/1) to moderate yellowish brown (10YR 5/4) and some dark gray N3) in the bottom of interval, sucrosic to fine crystalline, vuggy to compact, well cemented, moderately hard to hard; Limestone, 10%, white (N9)	RPM: 48, WOB: 20k	1710-1730	20
to yellowish gray (5Y 8/1), fine grained, vuggy, poorly cemented, soft.			
DOLOMITE WITH VERY LITTLE LIMESTONE- Dolomite, 95%, 50% light brownish gray (5YR 6/1) to moderate yellowish brown (10YR 5/4) and 50% dark gray (N3), fine crystalline, vuggy to compact, well cemented, moderately hard to hard; Limestone, 5%, white (N9) to yellowish gray (5Y 8/1), fine grained, vuggy, poorly cemented, soft	RPM: 48, WOB: 20K	1730-1740	10
DOLOMITE WITH LITTLE LIMESTONE- Dolomite, 90%, moderate yellowish brown (10YR 5/4), sucrosic to fine crystalline, vuggy, well cemented, hard; Limestone, 10%, white (N9) to yellowish gray (5Y 8/1), fine grained, vuggy, poorly cemented, soft.	RPM: 48, WOB: 20	1740-1750	10
LIMESTONE AND DOLOMITE-Limestone, 50%, very pale orange (10YR 8/2), fine grained, vuggy, moderately well cemented, moderately hard; Dolomite, 50%, dark yellowish orange, (10YR 6/6), microcrystalline, vuggy, well cemented moderately hard to hard.	RPM: 48, WOB: 20K	1750-1760	10
DOLOMITE AND VERY LITTLE LIMESTONE-Dolomite, 100%, 80% light gray (N7) to dark gray (N3), 20% moderate yellowish brown (10YR 5/4), microcrystalline, vuggy, well cemented, hard; Limestone, trace, very pale orange (10YR 8/2), fine grained, fossiliferous, vuggy, moderately cemented, soft.	RPM: 46, WOB: 20K	1760-1770	10
DOLOMITE-Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), microcrystalline, vuggy, well cemented, hard.	RPM: 46-48, WOB: 20	1770-1790	20

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE AND VERY LITTLE LIMESTONE- Dolomite, 95%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), microcrystalline, vuggy, well cemented, hard; Limestone, 5%, very pale orange (10YR 8/2), fine grained, fossiliferous, vuggy, moderately cemented, soft.	RPM: 48, WOB: 20K	1790-1800	10
DOLOMITE-Dolomite, 100%, 50% pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), 50% medium gray (N5) to dark gray (N3), microcrystalline, vuggy, well cemented, hard; Limestone, trace, very pale orange (10YR 8/2), fine grained, fossiliferous, vuggy, moderately cemented, soft.	RPM: 44-46 WOB: 20K	1800-1810	10
DOLOMITE – Dolomite, 100%, 80% pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), very-fine crystalline, vuggy, well cemented, 20% medium gray (N5) to grayish black (N2), very fine crystalline, slightly vuggy, well cemented.	RPM: 34, WOB: 20K	1810-1820	10
DOLOMITE – Dolomite, 85%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with trace amounts of medium gray (N5) to medium dark gray (N4), very-fine crystalline, vuggy; Limestone, 15%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, poorly cemented.	RPM: 34, WOB: 20K	1820-1830	10
DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with trace amounts of medium gray (N5) to medium dark gray (N4), very-fine crystalline, vuggy; Limestone, 30%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, poorly cemented.	RPM: 34, WOB: 20K	1830-1840	10
DOLOMITE – Dolomite, 80%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with trace amounts of medium gray (N5) to medium dark gray (N4), very-fine crystalline, vuggy; Limestone, 20%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, slightly fossiliferous, poorly cemented.	RPM: 44 WOB: 15K	1840-1850	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITIC LIMESTONE – Dolomitic Limestone, 95%, pale yellowish brown (10YR 6/2) to medium light gray (N6), microcrystalline, well cemented; Limestone, 5%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, poorly cemented; Dolomite, trace, moderate yellowish brown (10YR 5/4), vuggy, very fine crystalline.	RPM: 44 WOB: 15-20K	1850-1860	10
DOLOMITE – Dolomite, 85%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with trace amounts of medium gray (N5) to medium dark gray (N4), very-fine crystalline, vuggy; Limestone, 15%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, poorly cemented, partially dolomitic.	RPM: 44 WOB: 15-20K	1860-1870	10
DOLOMITE AND LIMESTONE – Dolomite, 65%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very-fine crystalline, vuggy, moderately cemented; Limestone, 35%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), partially crystalline, dolomitic, poorly to moderately cemented.	RPM: 44 WOB: 15-20K	1870-1880	10
LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, partially very-fine crystalline, slightly dolomitic; Dolomite, 50%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/4), very fine to fine crystalline, vuggy, moderately-well cemented.	RPM: 37 WOB: 10-20K	1880-1910	30
DOLOMITE AND LIMESTONE – Dolomite, 75%, pale yellowish brown (10YR 6/2) to moderate yellowish brown (10YR 5/5), very-fine crystalline, vuggy; Limestone, 25%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, slightly fossiliferous, poorly cemented.	RPM: 37 WOB: 10-20K	1910-1920	20
DOLOMITE – Dolomite, 70%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) with trace amounts of medium dark gray (N4) to grayish black (N2), very-fine crystalline, vuggy; Limestone, 30%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, partially crystalline, poorly cemented.	RPM: 37, WOB: 10K	1920-1960	40

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE – Dolomite, 95%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), microcrystalline to very-fine crystalline, porous, vuggy, moderately to well cemented; Limestone, 5%, very pale orange (10YR 8/2), very fine grained, poorly cemented.	RPM: 37, WOB: 10K	1960-1970	10
DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 90%, very pale orange (10YR 8/2) to pale yellowish brown (10 YR 6/2), very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10 YR 4/2) and little medium dark gray (N4), very-fine crystalline, vuggy, unconsolidated (mixed with the limestone).	RPM: 47, WOB: 5-10K	1970-1990	20
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), microcrystalline to very-fine crystalline, porous, vuggy, moderately to well cemented; Limestone, trace, very pale orange (10YR 8/2), very fine grained, poorly cemented.	RPM: 47, WOB: 5-10K	1990-2000	10
DOLOMITE AND SOME DOLOMITIC LIMESTONE – Dolomite, 85%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), very-fine to fine crystalline, vuggy, multiple limestone inclusions, moderately to well cemented; Dolomitic Limestone, 15%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine to fine grained, partially crystalline, slightly fossiliferous, poorly cemented, vuggy.	RPM: 47, WOB: 5-10K	2000-2010	10
DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 90%, very pale orange (10YR 8/2) to pale yellowish brown (10 YR 6/2), very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10 YR 4/2) and little medium dark gray (N4), very fine crystalline, vuggy, moderately hard.	RPM: 44, WOB: 5-10K	2010-2020	10

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITIC LIMESTONE, LIMESTONE AND SOME DOLOMITE- Dolomitic limestone, 50%, pale yellowish brown (10YR 6/2), to medium dark gray (N4), fine grained, dolomitic, fossiliferous, vuggy, well cemented, moderately hard; Limestone, 40%, very pale orange (10YR 8/2), oolitic, slightly vuggy, moderately cemented, soft; Dolomite, 10%, moderate brown (5YR 4/4), microcrystalline, vuggy, well cemented, hard.	RPM: 44, WOB: 5-10K	2020-2030	10
LIMESTONE AND LITTLE DOLOMITE- Limestone, 95%, very pale orange (10YR 8/2), oolitic, slightly dolomitic, slightly vuggy, moderately well cemented, soft; Dolomite, 5%, moderate brown (5YR 4/4), microcrystalline, vuggy, well cemented, hard.	RPM: 44, WOB: 5-10K	2030-2050	20
LIMESTONE-Limestone, 100%, very pale orange (10YR 8/2), oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.	RPM: 40-46, WOB: 5-10K	2050-2110	60
DOLOMITIC LIMESTONE AND DOLOMITE — Limestone, 50%, very pale orange (10YR 8/2) to pale yellowish brown (10 YR 6/2), fine grained, dolomitic, fossiliferous, vuggy, well cemented, moderately hard; Dolomite, 50%, grayish brown (5YR 3/2) to medium dark gray (N4), fine crystalline, vuggy, well cemented, moderately hard to hard.	RPM: 44, WOB: 10K	2110-2120	10
LIMESTONE-Limestone, 100%, very pale orange (10YR 8/2), oolitic, slightly dolomitic in the upper portion of interval, foraminiferous, slightly vuggy, moderately cemented, soft; Dolomite, trace, moderate brown (5YR 4/4), microcrystalline, vuggy, hard.	RPM: 44, WOB: 8K	2120-2160	40
LIMESTONE AND DOLOMITE-Limestone, 60%, very pale orange 910YR 8/2) to grayish orange (10YR 7/4), oolitic, foraminiferous, vuggy, moderately cemented, soft; Dolomite, 40%, grayish orange (10YR 7/4) to pale yellowish brown (10YR 6/2), some medium gray (N5), sucrosic to microcrystalline, vuggy, calcitic, well cemented, moderately hard to hard.	RPM: 46, WOB: 10K	2160-2170	10

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GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
LIMESTONE -Limestone, 100%, very pale orange (10YR 8/2) to grayish orange (10YR 7/4), oolitic, foraminiferous, vuggy, moderately cemented, soft; Dolomite, trace, moderate brown (5YR 4/4) to dark gray (N3), microcrystalline, hard.	RPM: 46, WOB: 10K	2170-2180	10
DOLOMITE-Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), sucrosic to microcrystalline, vuggy, well cemented, hard.	RPM: 40-48 WOB: 10-20K	2180-2210	30
LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange 910YR 8/2) to grayish orange (10YR 7/4), oolitic, foraminiferous, vuggy, moderately cemented, soft; Dolomite, 50%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), sucrosic to microcrystalline, vuggy, well cemented, hard.	RPM: 44, WOB: 10-20	2210-2240	30
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), sucrosic to microcrystalline, calcitic, some forams present, vuggy, well cemented, hard; Limestone, 5%, very pale orange (10YR 8/2) to grayish orange (10YR 7/4), oolitic, foraminiferous, vuggy, moderately cemented, soft.	RPM: 42-46 WOB: 20K	2240-2280	.40
DOLOMITE AND SOME LIMESTONE – Dolomite, 75%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), microcrystalline, vuggy, well cemented, hard; Limestone, 25%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, partially dolomitic, poorly cemented.	RPM: 42, WOB: 20-22K	2280-2300	20
DOLOMITE – Dolomite, 100%, moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), microcrystalline, slightly vuggy, well cemented, hard; Limestone, trace, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, partially dolomitic, poorly cemented.	RPM: 42, WOB: 20-22K	2300-2320	20
DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, medium gray (N5) and moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2), microcrystalline, well cemented, hard; Limestone, 30%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very fine grained, partially dolomitic, poorly cemented.	RPM: 42, WOB: 20-22K	2320-2330	10

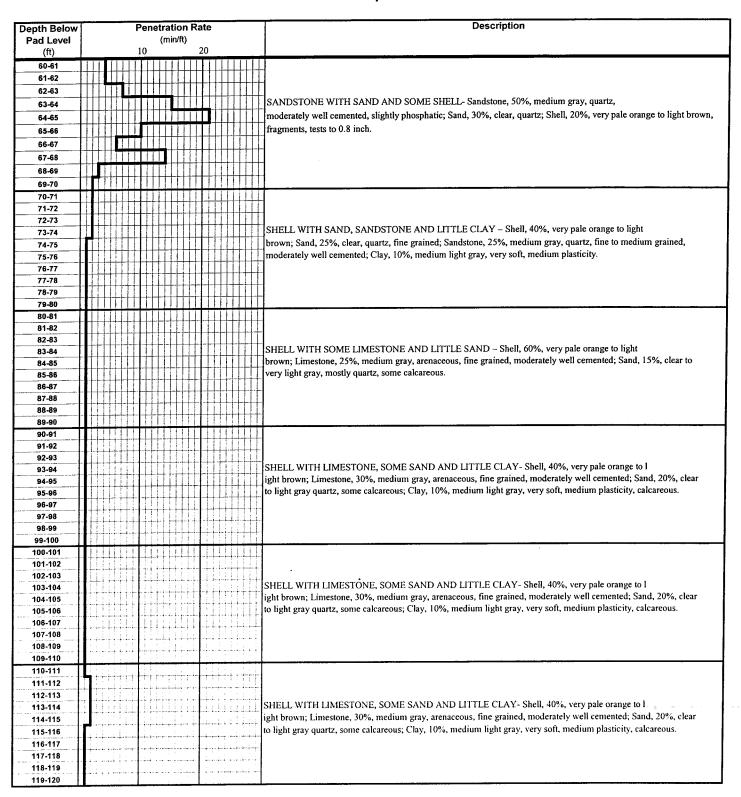
GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) and little medium light gray (N6), microcrystalline to very-fine crystalline, moderately to well cemented; Limestone, 15%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, partially crystalline, slightly fossiliferous, partially dolomitic, poorly to moderately cemented.	RPM: 42, WOB: 20-22K	2330-2340	10
DOLOMITE AND LITTLE LIMESTONE—Dolomite, 90%, moderate yellowish brown (10YR 5/4) to dusky yellowish brown (10YR 2/2), microcrystalline, slightly vuggy, well cemented, hard; Limestone, 10%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), very-fine grained, partially dolomitic, poorly cemented.	RPM: 42, WOB: 20-22K	2340-2350	10

[&]quot;RPM" denotes rotation speed in "revolutions per minute."
"WOB" denotes "weight on the bit" in thousands of pounds per square inch.



Depth Below	Т	Penetration Rate					Description											
Pad Level (ft)		(min/ft) 10 20																
0-1	╀	i	T	1	П	17	T	1			П	1	T	П	11	iΙ	_	SAND – Sand, 100%, clear, quartz, fine to medium grained, well sorted.
1-2	+	+	H	+	H	${\dagger}$	\parallel	+	Н	+	#	\parallel	#	H	\forall	H	1	Drains 200/0, clour, quare, and w mountain grained, Well 301104.
2-3	Ť	Ť		Ť	Ħ	Ħ	Ħ	Ť	Т	Ħ	Ħ	Ħ	Ħ	Ħ	Ħ	Ħ	Ť	SILTY SAND - Sand, 70%, clear to dusky brown, quartz, very fine to fine grained; Silt, 30%, dusky
3-4	T	Ť	П	T	Ħ	1.1			П	T	\prod					\prod		brown.
4-5		I		Ţ							П			\prod	П			
5-6				1								\prod	П		Ш	Ш		HARD PAN
6-7		1	Ц	4	Ц	Ш	$\perp \mid$	11	Ш	4	Ш	Ш	Ш	Ц	\perp	H	Ц	
7-8	Н	1	Ц	1	H	Н	Н	4	Щ	+	#	Н	H	H	₩	H	+	SANDY CLAY- Clay, 70%, light olive gray, silty, very soft, low plasticity; Sand, 30%, clear, quartz.
8-9 9-10	Н	+	Н	+	H	Н	Н	+	+	+	⊬	+	H	H	H	+	+	
10-11	Н	+	H	H	H	₩	Н	H	Н	÷	H	Н	+	H	₩	╁	H	
11-12	H	\dagger		t	1	H	H	Ħ		Ť	Ħ	T	1	H	H	\parallel	Ħ	
12-13	Ħ	+	H	t	7	H	Ħ	H	††	t	\parallel		+	H	Ħ	Н	П	
13-14	H	t		Ť.	1	H	H	Ħ	\forall	+		+		H	$\dagger \dagger$		Н	SHELL WITH SOME SAND- Shell, 80%, very pale orange to light brown and medium gray;
14-15	Ħ	t	H	T	T	П	Ħ	11	П	T	П	T	П		П	П		Sand, 20%, clear, quartz, fine grained.
15-16		1			1		Ŀ	\prod	П		Ш		П	П	П	П	П	
16-17	Ц	Ĺ	П	\perp	1	П	Ц	\prod	\prod	\perp	Щ		Щ	Ц.	$\!$	\sqcup	$\downarrow \mid$	
17-18	H	Ļ	4	\parallel	1	μ	\coprod	H	#	4	Ш	1	4	4	oxdapprox	#	\parallel	
18-19	H	4	4	4	+	H	H	H	#	\mathbb{H}	Ш	+	1	4	1	-	H	
19-20	H	+	1	Н	+	11	H	#	H	+	Н	+	4	+	H	H	H	The state of the s
20-21	H	+	+	┩╢	+	H	H	H	+	+	\mathbb{H}	+	+	-	H	╁┼	H	
21-22 22-23	H	+	\mathbb{H}	H	+	+	H	++	$^{+}$	+	H	+	- -	+	$^{+}$	\vdash	H	
23-24	H	r	+	H	\dagger	+	†	Ħ	#	+	H	+	+	+	$\dagger \dagger$	\vdash	$\dagger I$	
24-25	H	t	+	Ħ	+	†	H	#	\dagger	\dagger	\forall	\dagger	+	+	\vdash		Ħ	SHELL WITH SOME SAND- Shell, 80%, very pale orange to light brown and medium gray;
25-26	H	Ī	1		Ī		П	Π	\prod	\parallel	\top	П	\top	1	П			Sand, 20%, clear, quartz, fine grained.
26-27	H	Ħ	1	H	T	IT			\prod	\parallel	I	T		_				•
27-28			1						\prod			П	П					
28-29					I			\coprod	П		Ш	Ш	Ш			1	Ц	
29-30	\coprod		1	\prod	ĺ			Щ	\prod	П		Ц					Ц	
30-31	П	П	Ī	П	I	I	\prod	П	H	П	Д	П	П		ĻĒ	4	\prod	
31-32	H	H	1	H	H	4	\vdash	1+	#	H	\parallel	\parallel	\mathbb{H}	+	4	+	\parallel	
32-33 33-34	\mathbb{H}	H	ł	H	+	+	H	H	1	H	+	+	+	+	+	+	H	
34-35	H	H	ŀ	H	+	+	H	H	H	$\dagger\dagger$	+	H	+		+	+	1	SHELL WITH SOME SAND- Shell, 80%, very pale orange to light brown and medium gray;
35-36	1	H	t	H	H	t	1	\sqcap	$\dagger \dagger$	1	\parallel	Ħ	\parallel	H	\top	+	-	Sand, 20%, clear, quartz, fine grained.
36-37	1	П		I		I			ĽΓ		П	П						
37-38		l	I		T					L		П	П	П	I			
38-39	L	П	ľ	Π	L		L	Ш	Ш	1	Ш	Ц	Ш	1	4	4	Ц	
39-40		Ц	1		L	1	4	Ш	Ц		Ш	\sqcup	Ш	! !	Ш	Ш	4	
40-41		H	+	ĻĻ	ı	+1	1	H-	-	++	-	-	11	- -	- -	+		
41-42	į -	1	+	H	H	+	4		ŀŀ	ŀŀ	1+	H	H	+		-	-	
42-43	+	H	1	+	H	+	+		H	ŀŀ	- - -	1	H	1-1		+-	.	SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE- Shell, 50%, very pale orange
43-44	+	H	H	4		+	+	-	-	H	11	H			+			o light brown and medium gray, mostly shell fragments; Sand, 30%, clear, quartz, fine grained; Clay, 10%, medium
44-45 45-46	•	H	+	H	ŀ		+-		Ė	<u> </u>	H	+		++	++	-!		ray, very soft, moderate plasticity, slightly phosphatic; Sandstone, 10%, light gray, quartz, fine grained, poorly
46-47		Ħ	+	÷			+	- !	<u>.</u> .		÷÷	1	. 1 1 -	1	† †		- 4 -	emented.
47-48	+	1	11	Ť	•		-				11		Ħ	* †			1	•
48-49	Ť	it	+-		Ħ	П							÷	Ť,		1		1
49-50	+	Ţ		1				-•-			- +	1	+-+-		+ +	÷		
50-51		1		+		┪		-			11				: :	T	T	
51-52	1	Г			11						1		*	1-1				
52-53		+						-		Ť	===== :		1-1-			Π		
53-54	i i		ľ					. [.						1.5	1	11		SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE– Shell, 50%, very pale orange
54-55									7 .							: "		light brown and medium gray , mostly shell fragments; Sand, 30%, clear, quartz, fine grained;Clay, 10%, medium
55-56]	· ·					١.	i				- 1 -	ray, very soft, moderate plasticity, slightly phosphatic; Sandstone, 10%, light gray, quartz, fine grained, poorly
56-57	.;l					.	;	. :					֥				c	emented.
57-58		Ļ	: 1	-	••			4						• • •		: -	1	ı
58-59			ı	-							; - ; -						1	
59-60			L			_				_		Щ					Ļ	







Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
120-121		
121-122		
122-123		17 17 17 17 17 17 17 17 17 17 17 17 17 1
123-124		SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white, light brown to
124-125		medium gray; Limestone, 30%, light olive gray, arenaceous and biosparite, fine grained, moderately well cemented;
125-126		Sand, 20%, clear to light gray, quartz and calcareous, very fine to fine grained; Clay, trace, light olive gray, very soft,
126-127	▋ ▗▗▗▗▗▗▗ ▗▗▗▗▗▗▗▗	non- plastic.
127-128	▋▍▗▗▗▗▗▗ ▗▗▗▗▗	4
128-129	▊▞▗▝▞▗▘▞▗▘▋	
129-130		
130-131 131-132	▊▎▗░ ▋▎ ▘ ▍▍ ▘ ▍	
132-133		
133-134	▊ ┤ ┊ ┤┼┼┼┼┼╂┆┼┼┼┼┼	SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white, light brown to
134-135	▊┤╁╎╎╎┆┆┼╀┼┼┼	medium gray; Limestone, 30%, light olive gray, arenaceous and biosparite, fine grained, moderately well cemented;
135-136		Sand, 20%, clear to light gray, quartz and calcareous, very fine to fine grained; Clay, trace, light olive gray, very soft,
136-137		non- plastic.
137-138		
138-139		
139-140		
140-141	▊ ┾ ┆┆┆┆┆┆┆┆┆ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
141-142	▊╎┧┇┆╎┆╡┆ ╏┊╎┆┿┼┼ ╏ ┞┼┼┼┼	
142-143	▊ ┼ ┊╎╎╎╎╎ ┼┼┼┼	SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white, light brown to
143-144 144-145	▊╎╎┤╎╎╎╎╎ ┼┼╂ ╏┼╏╏╏╏╏ ┼┼╂┼╂╃┼┼╂┼┼┼┼	medium gray; Limestone, 30%, light olive gray, arenaceous and biosparite, fine grained, moderately well cemented;
145-146	▊┤┊╎╎┊╎┆╎┆┆┆ ┼┼┼┼┼┼┼┼┼┼┼┼	Sand, 20%, clear to light gray, quartz and calcareous, very fine to fine grained; Clay, trace, light olive gray, very soft,
146-147	▊┤┤╎┆┆┆┆╏┼┦╎╎┆┆┤╎ ┠ ╏ ┼┤┞ [╏] ┼┼	non- plastic.
147-148	▊▎▗▗▗▗▗▗▗▗▗▗▗▗	
148-149		
149-150		
150-151		
151-152		
152-153	▊▁▗▗▗▗▗▗▗▗▗▗	SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white, light brown to
153-154	▊▃▗▃▗▗▗▗▗▗▃	medium gray; Limestone, 30%, light olive gray, arenaceous and biosparite, fine grained, moderately well cemented;
154-155	▊┼╌┼╎╌┼╀╀┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	Sand, 20%, clear to light gray, quartz and calcareous, very fine to fine grained; Trace, light olive gray, very soft,
155-156	<u>▊</u> ┽ ╎╎╎┊┊ ┼┼┼┼┼	non-plastic.
156-157 157-158	▊┤┵┟╃╏┼┼╀┼┼┼┼┼┼┼┼┼┼┼┼┼	nor pusito.
158-159	▊┤┊╎┼┼┤┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼╏┼┼╬╬╬	
159-160	▊ ┼╁╄╬╫╫	
160-161		
161-162		
162-163		
163-164		CONTRACTOR AND COMP CAMP COMP CAMP COMP
164-165	<u>▊┇┼┼┊┼┞┊╏┠┊┆╀╄</u> ┆┼┼╀┨┼┞┼┞┼┼┼┼┼	SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white, light brown to
165-166	<u>▊</u> ╪┆╬╬╬╫╫┸	medium gray; Limestone, 30%, light olive gray, arenaceous and biosparite, fine grained, moderately well cemented; Sand, 20%, clear to light gray, quartz and calcareous, very fine to fine grained; Clay, trace, light olive gray, very soft,
166-167	▋ ╂ ▗ ╏╅┋┇┋┋	non-plastic.
167-168	▊ ▞ ▗▘ ▞▗▗▗▗▗▗▗▗▗ ▊▞▗▞▗▗▗▗▗▗▗▗▗ ▊▞▗▞▗▞▗▗▗▗▗▗	non- piastic.
168-169 169-170	┠┼┼┞╬┊═╌┃┼┟╬┼╬┼╏┼╏┼╬┼┼┼┋	
170-171		
171-172	<u>▊</u> ┼┆┤┆┼┞┆┼╏┼┼┞┆╬╬╬╬╬╬╬	
172-173		
173-174		LIMESTONE WITH SHELL, SOME CLAY AND LITTLE SAND- Limestone, 50%, yellowish gray,
174-175		biosparitic; Shell, 25%, very pale orange to light gray; Clay, 15%, light olive gray, calcareous, soft, non-plastic; —
175-176		Sand, 10%, light gray to clear, calcareous, some quartz, fine grained.
176-177		
177-178		1
178-179		
179-180		



Depth Below	Penetration Rate	Description		
Pad Level	(min/ft)			
(ft)	10 20			
180-181		SANDY CLAY WITH SHELL AND LITTLE LIMESTONE- Clay, 50%, grayish olive, silty,		
181-182		slightly phosphatic, very soft to soft, cohesive, non-plastic; Shell, 25%, very pale orange to light brown; Sand, 15%,		
182-183		very light gray, calcareous, some clear, quartz, very fine to fine grained; Limestone, 10%, yellowish gray, biosparitic,		
183-184	▊┆┧┆┇┇┆┇┇┆┇┆┆┆┆┆	moderately well cemented.		
184-185				
185-186	<u>▋╎┆╎╏╎╎╎╏╎┆╎┆┆┼┼┼┼┼┼┼┼┼┼┼┼┼</u>	CT AN AUGUST AND A LITTLE CAND. Class 050/ deals accomish mass of pale olive city.		
186-187		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
187-188		very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine grained; Shell, trace, isolated tests to 0.2 inch. Cement dominating in cuttings.		
188-189	▊ ▗▕▗▗▗▗▗▗▗ ▗	grained; shell, flace, isolated tests to 0.2 inch. Celifert dominating in catchings.		
189-190				
190-191	▊▋▕▗▎▍▍ ▗▐▗▋ ▗ ▐▗			
191-192	┇╏┆┋┋┋┊┋┋┋			
192-193	▊▞▗▗▗▗▗▗▗ ▐▗ ▗ ▗▗▗▗	CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray with trace of pale olive, silty,		
193-194 194-195	▊▎▕▗▕▗▕▗ ▊ ▕ ▋▍	very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
195-196	▊▎▗▗▗▗▗▗ ▗▗▗▗▗▗▗	grained; Shell, trace, isolated tests to 0.2 inch. Cement dominating in cuttings.		
195-196	▊▎▐▕▕▕▕▕▕ ▐ ▕ ▘▋▐▜▐▜▜▜			
197-198	▊┼┊┊┊┼┼┼┼╂┼┼┼┼			
198-199	▊▎░░░░░░░░░░			
199-200				
200-201				
201-202				
202-203				
203-204		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
204-205		very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
205-206		grained; Shell, trace, isolated tests to 0.2 inch. Cement dominating in cuttings.		
206-207	▊ <u>▗▗▗┆┆╎╏</u> ╏┼┼┼┼┼┼┼┼┼┼			
207-208	▊▁┆▁┆┴┆┼╎╏┼┤┼┼┼┼┼┼┼┼┼┼┼┼			
208-209	▋▃▗▃▗▃▗▃▗▃▃▃			
209-210				
210-211	<u>▊┤┤╎╎┼╎╎╏</u> ╁┤╎┼┼┼┼┼			
211-212	▊▃▗▃▗▃▗▃▗▃▗▃▗▃			
212-213	┇╏┊┊┊┊┊ ┾┾┼╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼	CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
213-214 214-215	┇╏╒╒ ╫╫╫	very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
215-216		grained; Shell, trace, isolated tests to 0.2 inch. Cement present in cuttings.		
216-217				
217-218	▊╁╀╀╫╂╫╂╫			
218-219	▊╁╁╘╂┟╁╁╂╏╂╁╘╁╁╂╂╁╏┼╟			
219-220	▊▋▗▘▞▞▍▍▍▍▍▍▍			
220-221				
221-222				
222-223				
223-224		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
224-225		very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
225-226		grained; Shell, trace, isolated tests to 0.2 inch. Cement present in cuttings.		
226-227		<u> </u>		
227-228				
228-229	 			
229-230				
230-231	▊▗▍▄ ▄▄▄▄▐ ▗ ▋▃▋▃▗▐▃▗▐▃▃▐▃	-		
231-232				
232-233		CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
233-234	┠┊╞╬╀╃┼┠┶┊┾╒┈┆┼┠┈╒┼╌┼	very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
234-235	<u>▊</u> ╪ ╞ ┋╀┼┼┞┠┼╟┊┼┼╟┼┸┡╂┼┆┞╧┆╘	grained; Shell, trace, isolated tests to 0.2 inch.		
235-236		granica, onen, nace, isolated tests to v.2 men.		
236-237				
237-238	HE			
238-239		-		
239-240	<u> </u>	<u>. L </u>		



Depth Below	Penetration Ra	te	Description		
Pad Level	(min/ft)				
(ft)	102	0			
240-241					
241-242					
242-243					
243-244			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
244-245			very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
245-246			grained; Shell, trace, isolated tests to 0.2 inch.		
246-247					
247-248					
248-249		 			
249-250					
250-251		<u> </u>			
251-252		<u> </u>			
252-253			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
253-254			very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
254-255	▋╎╎┼┼┼┼┼┼┼	 	grained; Shell, trace, isolated tests to 0.2 inch.		
255-256	<u>▋┆┼┼╎╎┼</u> ┼╎╏┼┤┼┼┼┼┼┼┼	╎┼┼┼┼┼┼┼┼	grameu, onen, uace, isolateu tesis to 0.2 men.		
256-257	▋┆╎╎╎╎┆╎╏ ╬┼┼┼┼┼┼	┟╫╫╫╫			
257-258	┇┋┊┊┋┋┋	 			
258-259	▋ ▍ ╎╎┼╎┼┼┞╏┼┼┼┼┼┼				
259-260	▋┊┊┊┊┊┊┋┋	╒┋┋			
260-261	▋} ┵┼┼┼┼┼┼	┤┤┤╡ ┼┼┼┼┼			
261-262	▋╡┆┊╡┆╎╏ ╂┾╇┼╫┿	╒┩┋┋ ┼			
262-263	▊┦┊╕╏┊ ┼┼┼┼┪ ╏╏╏ ┼┼┼┼┼	 	CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
263-264 264-265	▊╞╎┊╠┼╎╎ ╬	╒╏╏╏╏	very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
265-266	▊▍▍▞▍ ┤┼ ╏ ┞┼┼┼┼┼	╎╏ ┼┼┼	grained; Shell, trace, isolated tests to 0.2 inch.		
266-267	▊▍▍┊ ╎┼┼┼┼	 			
267-268	▋┤╎╎┼┼┼┼┼				
268-269					
269-270					
270-271					
271-272					
272-273					
273-274			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
274-275			very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
275-276			grained; Shell, trace, isolated tests to 0.2 inch.		
276-277					
277-278					
278-279					
279-280					
280-281	<u></u>				
281-282	▋╁╁╏┆╏┸╂┆┠╏┆┼┼┼┼┼┼┼				
282-283	▋ ፟፟፟፟ ╏ ┆┼┼┼┼┼┼┼┼		CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray with trace of pale olive, silty,		
283-284	<u>▊┆┼</u> ╪╬┟┼┆╟ ┠ ╬┞┾┼╩╬┞┼	╎╎╎╎┆╎┆ ┼	very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
284-285	▋ ┵╪╏╚╃╫┞╃┠┞╬┼╀┸╙┿╀╬╽	+ - + - - -	grained; Shell, trace, isolated tests to 0.2 inch.		
285-286	▋ ┆ ┊┊┊ ┆┼┼┆┨╁┼┤┼╬┼┞┆┼┤		gramen, onen, nace, isolaten tesis to 0.2 men.		
286-287	<u></u> ▋▍ ░ ┆╎┼┆╏	┝╅╧┾╕╞╀╅╄┼			
287-288	 -				
288-289	▊ ╪ ┆ ┼┼┼┼┼┼┼				
289-290		Harris			
290-291	!				
291-292	▋ ▕ ▃▃░ ▋ ▐ <mark>▐┼╸╤┋</mark> ┡┋		CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray with trace of pale olive, silty,		
292-293	!				
293-294	╂┼┼┼┼┼┼┼	 	very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
294-295	╉ ╘╏┼┼ ┼┼┼┼┼┼┼┼┼┼┼┼	++++++	grained; Shell, trace, isolated tests to 0.2 inch.		
295-296			<u> </u>		
296-297	I				
297-298	.				
298-299					
299-300		<u> </u>			



Depth Below	Penetration Rate	e	Description		
Pad Level	(min/ft)				
(ft)	10 20				
300-301 301-302	┠ <u>╫╀┼┼┼┼┼┼</u>				
302-303	┠┋╎╎╏╎╬╏ ┼┼┼┼┼┼┼┼┼┼	┞╏╏╏╏			
303-304			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
304-305			very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
305-306			grained; Shell, trace, isolated tests to 0.2 inch.		
306-307					
307-308 308-309					
309-310					
310-311					
311-312					
312-313					
313-314			CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray with trace of pale olive, silty,		
314-315			very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
315-316			grained; Shell, trace, isolated tests to 0.2 inch.		
316-317	<u>┤</u> ╎╏╏┼┼┼┼┞┼┼╎╎╎╎				
317-318 318-319	┼╎╏╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼	┤┤┤ ┼┼┼┼			
318-319	╶ ┼┼╏╎╎╎┼┞╃┼┼┼┼┼┼┼┼	+++++++			
320-321		++++++++			
321-322			•		
322-323					
323-324			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty,		
324-325			very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
325-326 326-327	┼ ┢┿┩ ┤┼┼┼┼╏╁┼┼┼┼┼┼┼┼	┼┼┼┼┼╏	grained; Shell, trace, isolated tests to 0.2 inch.		
327-328	┼╂┼┦┼┼┼┼┼┼┼┼┼┼┼┼┼┼	 			
328-329		 			
329-330					
330-331					
331-332	┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	111111			
332-333	┊ ╏┦┼┼┼┼┼┼┼┼┼┼┼┼┼┼	+++++++	TLAY WITH VERY LITTLE CAND. Clay 050/ deals executed constitute these of selections of the		
333-334 334-335	╎╏╏╏╏╏╏╏╏╏╏╏		CLAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray with trace of pale olive, silty, very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
335-336	╂╏┼┼┼┼┼┼┼╟╟┼┼┼┼┼┼┼┼┼┼		grained; Shell, trace, isolated tests to 0.2 inch.		
336-337					
337-338					
338-339	┆╏ ╁┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	 			
339-340		 			
340-341 341-342	┼┠┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	++++++			
342-343	┢┩┊ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	<u> </u>			
343-344	┇╬╬╫╬╬╫╫	+++++ c	LAY WITH VERY LITTLE SAND – Clay, 95%, dark greenish gray with trace of pale olive, silty,		
344-345			ery soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
345-346		g	rained; Shell, trace, isolated tests to 0.2 inch.		
346-347					
347-348					
348-349 349-350					
350-351					
351-352					
352-353					
353-354			CLAY WITH VERY LITTLE SAND - Clay, 95%, dark greenish gray with trace of pale olive, silty, very soft to soft, cohesive to very cohesive, non-plastic; Sand, 5%, clear, quartz, slightly phosphatic, very fine		
354-355					
355-356		gi	rained; Shell, trace, isolated tests to 0.2 inch.		
356-357 357-358			į.		
358-359					
359-360		:			
333 300					



Double Delevil	Penetration Rate	Description	
Depth Below		Description	
Pad Level (ft)	(min/ft) 10 20		
	10 20		
360-361	┇╎╎┊╎╎┊╎╏╎╞╎┆╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
361-362 362-363	▊┤▗┤▗╏┊ ╏┾╂ ╎╸╏┍╘		
362-363	▊ ┼┼┼ ╏╏╏ ┼╂┼┼┼┼┼	CLAY WITH VERY LITTLE SAND AND LIMESTONE— Clay, 90%, dark greenish gray, some	
364-365		grayish olive green), silty, soft to very soft, very cohesive, non-plastic; Sand, 5%, clear, quartz, fine grained,	
365-366	▊ ▍▞▞▞▗▗ ▗▗▗▗▗▗▗▗▗▗	sub-rounded; Limestone, trace, very pale orange to yellowish gray soft, poorly cemented, phosphatic.	
366-367	▊ ▍ ╃┤╫╫╫╫	Sub-tourised, Editional, autor, for place transfer to personal gray being people to the sub-	
367-368	▊▃▃▃▃		
368-369			
369-370			
370-371			
371-372			
372-373			
373-374		CLAY WITH VERY LITTLE SAND AND LIMESTONE– Clay, 90%, dark greenish gray, some	
374-375		grayish olive green), silty, soft to very soft, very cohesive, non-plastic; Sand, 5%, clear, quartz, fine grained,	
375-376		sub-rounded; Limestone, trace, very pale orange to yellowish gray soft, poorly cemented, phosphatic.	
376-377			
377-378			
378-379			
379-380			
380-381			
381-382			
382-383			
383-384		CLAY Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft,	
384-385	<u>┖╶</u> ┇╌╏╌╎╌┋╏╌┇┆╏┼┼┼┼┼┼┼┼┼┼┼┼	non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.	
385-386			
386-387	<u>┠╃╄╀╀╀╃╀╃╃╃╃╀╀┼┼╃</u>		
387-388	┇╃┇┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩┩		
388-389	┇╕┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋		
389-390			
390-391	┠┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
391-392	┠┼┼╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
392-393 393-394	┠┼┼╀╫┼┼┼┼╂┼┼┼┼┼┼┼┼╂╂┼┼┼┼┼	CLAY Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft,	
393-394		non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.	
395-396	┠═┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	ion passes, cana, alace, occur, quanta, etc.) sine grames, const, and years, and the constant of the canal	
396-397	<u>╒╫╒╫╫╫╫╫</u>		
397-398			
398-399	┠ ╏ ┼╏┼┼┼┼┼┞╽╎┼┼┆┼┼┼┼ <mark></mark> ╁┆┼┼┼┼┼┼┼		
399-400	<u>┎╒┾┼┼╫┼┼╏</u>		
400-401			
401-402			
402-403			
403-404		CLAY Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft,	
404-405		non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.	
405-406			
406-407			
407-408			
408-409			
409-410			
410-411			
411-412			
412-413		CLAY Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft,	
413-414			
414-415		non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.	
415-416			
416-417			
417-418			
418-419			
419-420			

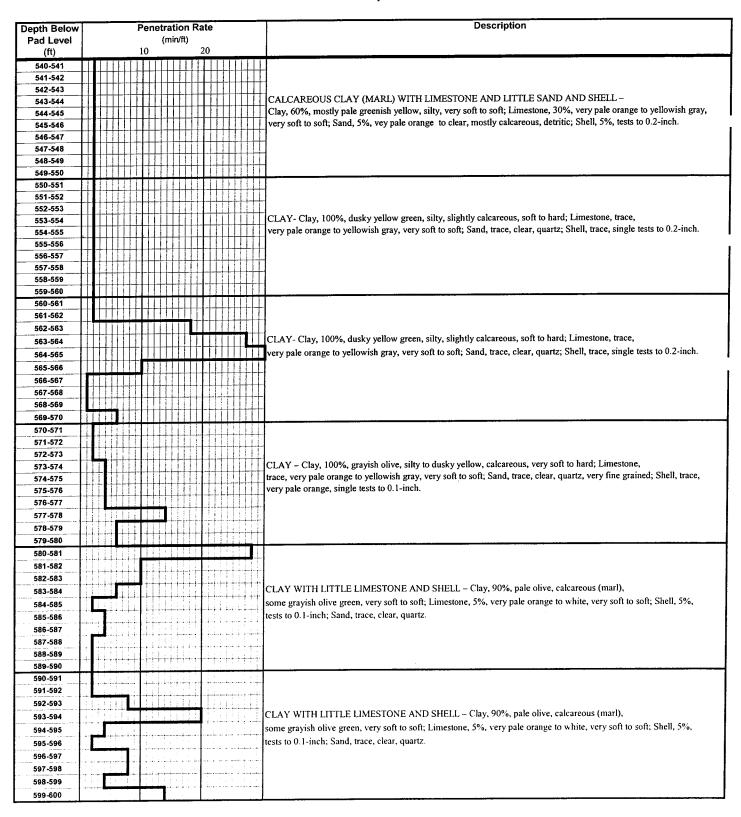


Depth Below	Penetration Rate		Description
Pad Level	(min/ft)		
(ft)	10 20		
420-421			
421-422			
422-423			
423-424		$\Pi\Pi\Pi$	CLAY Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft,
424-425	▐▊▍▍▍▍▍▍▍▍▍▍▍▍▍	$\Pi\Pi\Pi$	non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
425-426	▊▍▍▍▍▍▍▍▍		
426-427	▕▊▎▗▗▘▘▘▘ ▍▍▍▍▘ ▘ ▘▍	$\Box\Box\Box$	
427-428			
428-429			
429-430			
430-431			
431-432			
432-433			
433-434			CLAY Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft,
434-435			non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
435-436			
436-437			
437-438			
438-439			
439-440			
440-441			
441-442			
442-443			
443-444			CLAY WTH VERY LITTLE LIMESTONE - Clay, 95%, grayish yellow green to olive
444-445			gray, cohesive, soft, low plasticity to non-plastic, phosphatic; Limestone, 5%, yellowish gray, soft; Sand, trace,
445-446		ЩП	clear, quartz.
446-447			
447-448			
448-449			
449-450		ШШ	
450-451			
451-452			
452-453			
453-454			CLAY WTH VERY LITTLE LIMESTONE - Clay, 95%, grayish yellow green to olive
454-455			gray, cohesive, soft, low plasticity to non-plastic, phosphatic; Limestone, 5%, yellowish gray, soft; Sand, trace,
455-456			clear, quartz.
456-457			
457-458			
458-459			
459-460			
460-461			
461-462			
462-463			
463-464			CLAY - Clay, 100%, grayish olive to dark greenish gray, highly cohesive, low plasticity, very
464-465		ШШ	phosphatic; Limestone, trace, yellowish gray, arenaceous, soft, moderately cemented; Sand, trace, clear, quartz.
465-466			
466-467			
467-468		النبانا	
468-469			
469-470		الليا	
470-471			
471-472			
472-473			
473-474			CLAY WITH VERY LITTLE LIMESTONE – Clay, 95%, grayish olive to pale olive, calcareous,
474-475			some silty, phosphatic, soft, highly cohesive, low plasticity; Limestone, 5%, grayish yellow green to white,
475-476			fine grained, soft, poorly cemented, slightly phosphatic; Sand, trace, quartz and calcareous.
476-477	++++++++++++++++++++++++++++++++++++++		
477-478	· · · · · · · · · · · · · · · · · · ·	: 	
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478-479			
479-480		للنالل	



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
480-481	<u>┆┆┆┇┆╷┆</u> ┇╷┼	
481-482	<u>┊┊┇╻┇</u>	
482-483	<u>╶╀┼┼┼╏╀╀┧╀┼┼┼┼┼┼┼┼┼</u> ┼	CLAY WITH LITTLE LIMESTONE. Clay 000/ pale clive to gravish clive calcarague and city
483-484		CLAY WITH LITTLE LIMESTONE – Clay, 90%, pale olive to grayish olive, calcareous and silty, phosphatic, very soft to soft; Limestone, 10%, grayish yellow green to white, soft, poorly cemented, slightly
484-485		phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
485-486	┤┤╎╎╏╎╎╏ ┼┼┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	phosphatic, Sand, face, clear to fight greenish gray, quarte and calcareous, very fine to fine granted.
486-487 487-488	┊ ┼┼┼╂┼┼┼┼┼	
488-489	┤╎╎╎ ┫╎╎┼╂┼┼╎╎┼┼┼╂┞┼┼┼	
489-490	╶┊┊┊┋ ╅┼ ╒ ╏┼┼┼	
490-491		
491-492	▕▕▕▕▕▕▝ ▀ ▍▕▕▐ ▋▞▍▍▍▍▍▍▍▍▍▍▍▍▍▍	
492-493		
493-494		CLAY WITH LITTLE LIMESTONE – Clay, 90%, pale olive to grayish olive, calcareous and silty,
494-495		phosphatic, very soft to soft; Limestone, 10%, grayish yellow green to white, soft, poorly cemented, slightly
495-496		phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
496-497		
497-498		
498-499	<u>┆╎┆╎┆╎┆╎╏╏╏</u> ┆╎╎╎╎╎┆	
499-500		
500-501	<u> </u>	
501-502	┊┆┆┆╎╎╎╏╏┆ ┼┼┦	
502-503	<u>╶┼╀╀╁┾╁</u> ┩╂╂┼╁╂┼┼╂╁┼┼╂	CLAV WITH LITTLE LIMESTONE. Clav. 000/ male alive to gravith alive colograpus and city.
503-504		CLAY WITH LITTLE LIMESTONE - Clay, 90%, pale olive to grayish olive, calcareous and silty,
504-505		phosphatic, very soft to soft; Limestone, 10%, grayish yellow green to white, soft, poorly cemented, slightly
505-506	┊╏ ╒╪╃╃┼┼╏┊╎╎┼┼ ┼┼┼╂┼┼┼┼┼┼┼	phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
506-507	<u>╀</u> ╏┼╫┼┼┼┼┼┼┼	
507-508	<i>╀┢╃┼┼┼┼┼┼</i> ╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
508-509	╎╏╎╎╎╎┊┊ ┋┼╏┼╎┼┼┼┼┼╏┼┼┼┼┼┼┼	
509-510		
510-511	┊ ┢┷┩╎┼╀┼╎╏╎┞┼┼┼┼┼┞┼╏┼┼┼┼┼╏	
511-512	┆ ╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
512-513 513-514	┆╏┤╎┼┼┊╎┆╏╃╅┦╏╎┆╘ ┼┼┼┼┼┼┼┼	CLAY WITH LITTLE LIMESTONE – Clay, 90%, pale olive to grayish olive, calcareous and silty,
514-515		phosphatic, very soft to soft; Limestone, 10%, grayish yellow green to white, soft, poorly cemented, slightly
515-516	<u> </u>	phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
516-517	///	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
517-518	┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼	
518-519	┼╟╌╎╒┼╎┊┼┠┼┟┆┼┞┧┆┼┠┋┧┊┼┼┼┼┼╢	
519-520	┼╂┼┼┼┼┼┼╂┢┿┼┼┼┼┼╂┼┼╂	
520-521		
521-522		
522-523		
523-524		CLAY WITH LITTLE LIMESTONE - Clay, 90%, pale olive to grayish olive, calcareous and silty,
524-525	+ B - + + + + + + + + + + + + + + + + +	shosphatic, very soft to soft, Limestone, 10%, grayish yellow green to white, soft, poorly cemented, slightly
525-526	<u> </u>	phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
526-527	┆┫╩╤╗┼╩╩╬┠╤╬╌┸╗╬╤╬╂╏╒╒╍╗╬╂╧┠┼╽	
527-528		
528-529	┞ ┠╸ ┆┆╠╎┆ ┠┼┊┞┆╬╀╇┼╸┼╏┼┆┼┼┼┼┼┼	
529-530 530-531		
531-532 532-533	┟╂╌╧╌┼╌╌┠╧┼╧╌┵╸╏┼┆╏┵┼╧╌┼┨	
532-533	1	CLAY, SOME LIMESTONE AND LITTLE SAND – Clay, 80%, pale greenish yellow to yellowish
534-535		gray, very soft to soft, calcareous, some silty; Limestone, 15%, yellowish gray, arenaceous, soft, poorly cemented;
535-536		Sand, 5%, clear to light gray, mostly calcareous, some quartz.
536-537		
537-538		
538-539		
539-540		







Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
600-601		<u> </u>
601-602		
602-603		
603-604		CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl),
604-605		some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%,
605-606		tests to 0.1-inch; Sand, trace, clear, quartz.
606-607		
607-608		
608-609		
609-610		
610-611		
611-612		
612-613		
613-614		CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl),
614-615		some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%,
615-616		tests to 0.1-inch; Sand, trace, clear, quartz.
616-617		
617-618		
618-619	<u>▊▎┆┆┆┆┆┆┧┆╻┆</u>	
619-620		
620-621	▋ ╎╎╎╎╎╎╎╏╎╎┧╎╎┆┆┆┆┆	
621-622	<u>▋▎▕▗</u> ┆┆┆┆┆╏┆╏┆╏┆┆┆	
622-623	<u>▊╃╏╏╏</u> ╏┼	CV AN AUGUS AUGUS E L'INFERTONE AND CHELL Class COOK and a disse and annual (march)
623-624	<u>▊▍▗▗▗▗</u> ▗▗▗▗▗▗	CLAY WITH LITTLE LIMESTONE AND SHELL - Clay, 90%, pale olive, calcareous (marl),
624-625	▊ ▗▘ ▗▘▘	some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%,
625-626	▋ ┽┦┼┦┿┾┼ ╏ ┼┤┼╈╬┼┼┼╏╬┿╬┼┼	tests to 0.1-inch; Sand, trace, clear, quartz.
626-627	▋ ╎┡╫╫╫	
627-628	┇┆┊╎╎╎┊┊ ╏ ┊╎┆╏┼┼┼┼╏ ┼┼┼┼┼┼	4
628-629	▋┤╎╎╎┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	1
629-630		
630-631	┇ ┼┼┼┼┼┼┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
631-632	▊ ┼┼┼┼┼┼┼╁╎┼┼ ┆ ┝┼┼┼╂╏╂┼┼┼┼┼┼┼	
632-633 633-634	▊ ╎╎╎┩┼┼┼┼┞╟┼┼┼┼┼┼┼┼┼┞╒┼┼╎┼┼┼┼┼	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl),
634-635	▋┤╎╎╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%,
635-636	▊ ┤ ╎╎╎╎┊ ┦┫┼╎╎┼┼┼┼┼╟╏╎┼┼┼┼┼┼┼	tests to 0.1-inch; Sand, trace, clear, quartz.
636-637		
637-638		
638-639	▊ ┼╀╬╫╫╬╫╫	
639-640	▋ ₹₭₣₭₺₭₭₭₿₭₭₭₿₺₭₭₭₭₭	
640-641		
641-642	▋ ╞╬╫╫╫╫	
642-643		
643-644		CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay,
644-645		70%, yellowish gray, calcareous, little grayish olive), silty, moderately soft to very soft; Limestone, 25%, yellowish
645-646		gray, soft to moderately hard; Sand, 5%, clear to light gray.
646-647		
647-648		
648-649		
649-650		
650-651		
651-652		
652-653		
653-654		CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND - Clay,
654-655		70%, yellowish gray, calcareous, little grayish olive), silty, moderately soft to very soft; Limestone, 25%, yellowish
655-656		gray, soft to moderately hard; Sand, 5%, clear to light gray.
656-657		
657-658		
658-659		
659-660		



Depth Below	Penetration F	late	Description	
Pad Level	(min/ft)			
(ft)	10	20		
660-661				
661-662	▐ ▎▞▐▞▍			
662-663	▐ ╁┼┼┼┼┼╁╂┼┼┼┼┼		1	
	▊┊┼┼┼┼┼┼┋┋ ┼╁╁┼┼┼		CALCAREOUS CLAY (MARL), LIMESTONE AND SAND - Clay, 35%, yellowish gray,	
663-664	█┆╎╎╎╏╏╎╏┋┊╏┋ ╟╫╫╫	╒╏┋┋┋┋	calcareous, very soft to soft; Limestone, 35%, yellowish gray, soft; Sand, 30%, clear, quartz, to light gray,	
664-665	▐ ┆ ╏ ┆┼┼┼┼┼┼			
665-666	▋ ▍▍▍▍▍	╂┼┼┼┼┼	calcareous, detritic.	
666-667		4		
667-668				
668-669				
669-670				
670-671				
671-672				
672-673				
673-674			CALCAREOUS CLAY (MARL), LIMESTONE AND SAND – Clay, 35%, yellowish gray,	
674-675	<u>▐▗▕▕▕▕</u> ▍ ▕▕		calcareous, very soft to soft; Limestone, 35%, yellowish gray, soft; Sand, 30%, clear, quartz, to light gray,	
675-676			calcareous, detritic.	
676-677	▋▎▕▕▕▕▕ ┆ ┆┆	 		
677-678	▐▕▕▗ ▎ ▕░░ ┼┼╂┞┼┼┼┼┞	 		
678-679	▊┼┆┦┦╬╬┆╏┾┡╄╿╿┡	11:11:11		
	▊╎┊┆┆┆ ┼┼┼┼╂ ╟┼╎╏┡ ┼┼	┨┋┋╏ ┼┼┼┼┼┼┼		
679-680	▋▎┆╽┆┆┆┆┆┡	╂┼┼┼┼┼┼┼		
680-681	▋ ▍ ┤╎╎┼┼┼┼┞╄╬╬╬	╂╀┼┼┼┼┼		
681-682	▋╎┼┼┼┼┼┼┼	╂┼┼┼┼┼┼		
682-683	┇┤┼╎╎╎┼┼┼┼┼┼┼┼┼┼┼		CAN CARROLL CLAY (AAR) AND CONTRANT CLAY (AND CONTRANT)	
683-684		.	CALCAREOUS CLAY (MARL), LIMESTONE AND SAND – Clay, 35%, yellowish gray,	
684-685		- - - - - - - -	calcareous, very soft to soft; Limestone, 35%, yellowish gray, soft; Sand, 30%, clear, quartz, to light gray,	
685-686		1111111	calcareous, detritic.	
686-687		1111111		
687-688				
688-689				
689-690				
690-691				
691-692		- - - - - - - - - - - - - - - - - - -		
692-693	▊ ┤ ╡ ┼┼┼┼┼┼┼┼┼┼┼			
	▊ ┤ ╏╏╏╏╏		CALCAREOUS CLAY (MARL) WITH LIMESTONE, SOME SAND AND LITTLE SHELL- Clay,	
693-694	▋╎┊╎ ╬┼┼┼┼╂┼┼┼┼┼┼┼┼┼┼	╊┼┼┼┼┼┼	50%, pale olive, calcareous, very soft; Limestone, 25%, yellowish gray to dark gray, soft to very soft; Sand, 20%,	
694-695	┨ ┼╞┼┼┼┼┼┼╂┼┼┼┼┼┼┼┼	▐▕▕▝ ▍	clear, quartz, to light gray, calcareous; Shell, 5%, very pale orange, tests to 0.2- inch.	
695-696	▊ ▗▙▗▙▗▙▗▙▗▙▗▙▗▙▗▙▗▙▗▙▗▙▗▙▃ ▗▃	╂┼┾┼┼┼┼┼┼	creat, quarte, to light gray, careacous, onen, 576, very pare crange, seas to 500 mem	
696-697	▊┤┊┊ ╀┼┼┼┼┼┼┼	╂┾┼┼┼┼┼┼		
697-698	<u>▊÷┼</u> ┼┊┤┼┼╏┼┼┼┼┼┼┼┼	· <u>┣</u> ╪┼┼┼┼┼┼┼┼		
698-699	┠╁┼┟┼┼╟┼┼┠┼┼┼┼┼┼┼	$\mathbf{H} + \mathbf{H} + \mathbf{H} + \mathbf{H}$		
699-700				
700-701		1444444		
701-702				
702-703				
703-704			CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE- Clay, 80%, pale olive, very soft	
704-705			to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft	
705-706			to soft; Shell, trace, very pale orange, single tests to 0.3- inch.	
706-707		11,11,11,11		
707-708				
708-709		1		
709-710	.			
	₿┤┈┈┈┼┈	 		
710-711	[]	1		
711-712	Ⅰ;			
712-713		اندنبند با	CLAN WITH COME CAND AND VEDVIITHE LIMESTONE. Class 900/ mala aliva variant	
713-714		المنجنة أحاجلها	CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE- Clay, 80%, pale olive, very soft	
714-715	<u>Luitilailia la la la la la la la la la la la la la</u>		to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft	
715-716			to soft; Shell, trace, very pale orange, single tests to 0.3- inch.	
716-717				
717-718				
	<u> </u>			
718-719				
719-720	1	1		



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
720-721		
721-722		
722-723		Class (2004) and a plant of the control of the cont
723-724		CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE - Clay, 80%, pale olive, very soft
724-725		to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft
725-726		to soft; Shell, trace, very pale orange, single tests to 0.3- inch.
726-727	 	-
727-728	[-
728-729	╀╂┼┼╎┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	1
729-730		
730-731 731-732	┆ ╟┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE—Clay, 80%, pale olive, very soft
731-732	╎ ┠┼┼╎┼┼┼┼╏┼┼╎┼┼┼┼┼┼┼┼	to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft
732-733	┊ ┠┼┤╎╎╎┼┆╏┼╎┆┼┼┆┼┼╏┼┞┆┆	to soft; Shell, trace, very pale orange, single tests to 0.3- inch.
734-735	╁╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
735-736		
736-737		CLAYEY LIMESTONE WITH SOME SAND Limestone, 50%, very pale orange to light gray,
737-738		soft to moderately hard cemented, fossiliferous; Clay, 30%, light greenish gray, calcareous (marl), very soft; Sand,
738-739		20%, very light gray, calcareous, detritic; Shell, trace, very pale orange, tests to 0.2-inch.
739-740		
740-741		
741-742	<u> </u>	
742-743	┆ ╟ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	LIMESTONE WITH SOME SAND AND LITTLE CLAY— Limestone, 70%, very pale orange to
743-744	┊╫┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	light gray, soft to moderately hard, fossiliferous, with trace of forams; Sand, 20%, very light gray, calcareous,
744-745	┊ <u>╃┼┼┼╀┼┼┼╂┼</u> ┼┼┼┼┼┼┼┼╂╂┼┼┼┼┼┼┼┼	detritic; Clay, 10%, light olive gray, very soft, calcareous (marl); Shell, trace, very pale orange, tests to 0.2-inch
745-746	┊ ╏╎┤┊╎╎╎ ┠┼┼┼┼┼┼┼┼╏╬┼┼┞┼┼	dealine, omy, 1070, ngm onto gray, 101, 500, onto the control of t
746-747 747-748	┞ ╏╎┊┊┊┊┊┋┊┊ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	1
747-748	┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
749-750	┇ ╫┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
750-751		
751-752	<u>▊</u> ╡┼┤╁╬┧┊╏┋┆╎┼┞╅╏┼╀╏┼╏┼┞┤	LIMESTONE WITH SOME SAND AND LITTLE CLAY—Limestone, 70%, very pale orange to
752-753		light gray, soft to moderately hard, fossiliferous, with trace of forams; Sand, 20%, very light gray, calcareous,
753-754		detritic; Clay, 10%, light olive gray, very soft, calcareous (marl); Shell, trace, very pale orange, tests to 0.2-inch
754-755		
755-756		THE PROPERTY OF THE PARTY OF TH
756-757	<u>▋▎▍▎▍▎▍┞</u> ╏┆ ╏ ┆┆┆┆┆	LIMESTONE WITH VERY LITTLE CLAY AND SHELL- Limestone, 90%, very pale orange to yellowish gray (5Y 7/2), fossiliferous, moderately hard; Clay, 5% to trace at the bottom, yellowish gray,
757-758	▊ ▗ ▗▗▗▗▗▗▗▗▗ ▊	yellowish gray (5Y 7/2), tossiliterous, moderately hard; Clay, 5% to trace at the bottom, yenowish gray, calcareous (marl), very soft; Shell, 5%, very pale orange to white, tests to 0.3-inch.
758-759	┡ ╅ ┊╎┆┊┊╏┊╏┆┆╎┆┊┊ ┼╂ ┆┆┆╏ ┆┼┼┼┼	carcarcous (mari), very sort, onen, 576, very pare trange to writte, tests to 0.5-men.
759-760		
760-761	▊ ▗╏┊┆┆┆┆ ┼┼┼┼┼┼┼	
761-762	▊┆┊┆┆┆┆┆┆╏╎┆╸┆┤┆ ┼┼ ╿ ┼┼┼┼┼┼┼┼┼┼┼┼	
762-763	┇┼┟┼┼┼╞┟┧╏╬ ╒┼┼┼┼┼┼╂╂╂┼┼┼┼┼┼	LIMESTONE - Limestone, 100%, yellowish gray, slightly phospahtic, soft, poorly cmented; Clay, trace, olive gray,
763-764	┇╎┊╎┋ ┽┼╂╂╀╀╫┼┼┼┼╂╂╂┼╬┿┼┼┼	microcrystalline, very hard.
764-765 765-766	█ ▗▗▗ ▗▗▗▗▗▗▗▗▗▗ ▊	
765-766	▊ ▎ ▐▗▗▗ ▊▃▗▗▗ ▊▃▗▗▗ ▊▃▗▗ ▊▃▗ ▊▃▗ ▊▃▗ ▊▃▗ ▊▃▗	
767-768		1
768-769		
769-770		
770-771		
771-772		
772-773		Political Character Charac
773-774		LIMESTONE - Limestone, 100%, yellowish gray, slightly phospahtic, soft, poorly cmented; Clay, trace, olive gray,
774-775		microcrystalline, very hard.
775-776		
776-777		
777-778	<u> </u>	
778-779		
779-780		L



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
780-781 781-782	┇┼┼╏╏┼┼╏╏╏╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
782-783	▊┤╎┊┊┊┊┊┊ ╊╃╂╃╅┼┼┼┼┼┼┼┼	
783-784		LIMESTONE WITH LITTLE CLAY AND SAND - Limestone, 80%, yellowish gray, sparry grainstone, poorly
784-785		cemented, porous; Clay, 10%, yellowish gray, calcareous, non-plastic; Sand, 10%, yellowish gray, calcareous, fine
785-786		to medium grained.
786-787		
787-788	▊┤┆┆┆┆┆┆┆┆╎╎┆┆┆┆┆ ┼	
788-789	▊┤╎┊┤┊┤┊┤╏╎╏┤┪╎╏╏╏╏╏	
789-790 790-791	▊▐▞▗▕▗▘▍▞▋ ▍▍ ▍ ▍▍ ▍ ▘▍▍	
791-792		
792-793		
793-794		LIMESTONE - Limestone, 100%, yellowish gray, sparry grainstone, trace of fossils, vuggy, porous.
794-795	┇┊┆┊┊┊┊┊┋┋┋┋┋┋┋┋┋┋┋┋┋┋	
795-796	┇╎╎╎╎╎╎╎╎╎╎╎╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼	
796-797 797-798	▊┤╎╒╎┊╎┊╎╏╒╏┆╏┆╏	
797-798	▊ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
799-800		
800-801		
801-802		
802-803	▋┤┆┊┆┆┆┆╎╏╎╃ ╎┼ ┆╏╎ ╇┩	LIMESTONE - Limestone, 100%, yellowish gray, sparry grainstone, trace of fossils, vuggy, porous.
803-804 804-805	▊┼┊╎┊┊ ┦┼╃┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	MITEOTOTIC MINORATOR JOSEPH SERVICE CONTROL OF THE PROPERTY OF
804-805	▊ ╂ ╎╏┟╎╏╏╏╏╏╏╏	
806-807		
807-808		
808-809		
809-810		
810-811	┇┊┊┊┊┊┊┊┋ ┪┼╏┼┼┼┼┼┼╏┼┼┼┼┼┼┼┼	
811-812	▊▗┊┆┆ ┆┼┼┼┼┼┼┼┼┼┼┼┼	
812-813	┇┆┊┊┆┊┆┆╏┢┊┆╎┊ ┼╂┼╂┼╂┼┼┼┼┼┼┼	LIMESTONE - Limestone, 100%, yellowish gray, biosparitic grainstone, fossiliferous, vuggy, porous.
813-814	▊╎┊╎┊┆┊┊┋╏┊┆┊ ┼┼┼┼┼┼ ╏┋┊ ╏┼┼┼┼┼	LINIES 1011 - Liniestone, 100/4, Jonotton Brall, crospanio Branstone, 10000010000, 1-001, F
814-815	▊┤┊╎┊┊╎┊┩┆ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
815-816 816-817	▊┤┽╎┊╪╎╎╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
816-817 817-818	▊┤┊ ╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
818-819	▊ ┼┼╏┼┼╏╌╏╂┼┼┼┼┼┼┼┞╏╏╂┼╢╬╂┼╟	
819-820	<u>▊</u> ╁ ╏╏╏╏╏╏╏╏╏	
820-821		
821-822		
822-823		
823-824		LIMESTONE - Limestone, 100%, yellowish gray, biosparitic grainstone, fossiliferous, vuggy, porous.
824-825		
825-826		
826-827		
827-828		
828-829	<u>▊▃░▕▃▃</u> ▃▐ <u>▐▃</u> ▃▘ ▕ ▊	
829-830		
830-831		
831-832		
832-833		LIMESTONE - Limestone, 100%, yellowish gray, biosparitic grainstone, fossiliferous, vuggy, porous.
833-834		ETHEOTOTAL - Emiliatoric, 1997s, Jenorian Brah, orospania Bramatoria, resemble and
834-835		
835-836		
836-837		
837-838	▋ ▕ ▃▍▘ ▁▗▗ ▍▐▗▗▘▘▞▘	
838-839		
839-840	<u> </u>	



Depth Below	F	enet			ate				Description
Pad Level	(min/ft) 10 20								
(ft)		10	TTT	111	20 1 1	11	П		
840-841		+++	$+\!+\!+$	+++	H	+	╀	+	-
841-842		Ш	111	Ш	\mathbb{H}	4	11	#	4
842-843		$\sqcup \sqcup$	Ш	111	Н	11	Н	4	1000 0000 II il ann hinneitic kielle feeriliferene program porone 109/ light
843-844		ШШ	Ш	Ш	Ц	Ш	Ш	4	LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
844-845		Ш			Ц	Ш.	Ш	Ш.	gray to medium light gray, microcrystalline, partly dolomitic.
845-846		Ш	Ш	Ш	Ш	Ш	Ш	Ш	4
846-847			Ш	Ш	Ц	Щ	Ш	11	
847-848		\coprod	Ш	Ш	Н	4	Ш	4	4
848-849		Ш		Ш	Ц	Ш.	Ш	4	
849-850				Ш	Ш			Ш	
850-851				Ш	П	Ш	Ш	Ш	
851-852			Ш	Ш	Ц		Ш	Ш	
852-853		Ш		Ш	П	Ш	Ш	Щ	100/ link
853-854		Ш		Ш	Ш	Ш	Ш	Ш	LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
854-855		Ш	Ш	111	Ц	11	1	11	
855-856		Ш	Ш	Ш	Ц	11	Ш	1	
856-857		Ш	Ш	Ш	Ц	11	Ц.	4	_
857-858		Ш	Ш	444	Ц	Ш.	1		-
858-859		\coprod	Ш	111	\sqcup	#	Ц.	\perp	<u> </u>
859-860		Щ	Ш	Ш	Ц	4	Щ	4	
860-861		Ш	Ш	44	11	11	1	+	-
861-862		Ш	Ш	+	Н	#	Н	+ -	-
862-863		$\sqcup \sqcup$	Ш	Ш	H	#	H	$+\!\!+$	LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
863-864	$\{-1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,$	$\sqcup \sqcup$	+++	$+\!+\!+$	H	#	H	#	LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparine, highly lossimerous, vaggy, potous, 100% iight
864-865	╂┼┼┼┼┼┼		$+\!+\!+$	+++	H	₩	\vdash	$+\!\!+$	-[
865-866	8 44444	HH	\mathbb{H}		H	++	+	$+\!\!+$	-
866-867	▋ ┤ ┼┼┼┼┼	HH	+++	+++	H	+	+	++-	-
867-868			+	+++	Н	┼┼	+	+	-
868-869	╂┼┼┼┼┼	╁┼┼	+++	+++	H	++	+	+	-
869-870		HH	Н	+++	Н	┼┼╴		+	
870-871	▋┼┾┼┼┼┼	+++	+++	+++	Н	+	+	++	-
871-872 872-873	╉┼┼┼┼┼┼┼	+++	+++	+++	H	+	H	+	-
873-874	▋ ▍ ┼┊┼┼┤	H + H	111	+++	H	Ħ		++	LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
874-875			+++	111	H	+		††	1
875-876			+	+++	П	+		+	1
876-877			\Box	111	H	\top		11	- - -
877-878				111	11	П		П	
878-879		1	111	Hi	\Box	11		11	
879-880			TH	111	П	П	П	T	
880-881			Ш		П				
881-882			TIT	$\Pi \Gamma$				Π	
882-883		Ш	TIT	111	П	Ш		П	
883-884					П	Ш		Ш	LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
884-885			Ш					П	
885-886				lП				.11.	
886-887					[41.		44.	
887-888			ΙЩ	.111		-		11.	
888-889		L		444		11.			
889-890			Ш		Ш		Ш		
890-891				1	1			4	
891-892		1111		44.	 	1.1.	_	1.	
892-893		.	111	444	L.	Ш			TOOK ONE LINE TOOK ONE WHICH THE LINE THE TOOK ONE TOOK INDIVIDUAL TOOK INDIVI
893-894			Ш,	14.	14.	111			LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
894-895		Lil	Ш	444		4	LL.		
895-896				11	Ш				
896-897		<u> </u>			L				
897-898	I	.		.i.,	Li.				
898-899				·	L			1	
899-900		1	115	- 1	L		1		



Depth Below		Penetration R	ate	Description
Pad Level		(min/ft)		
(ft)		10	20	
900-901			<u> </u>	
901-902		<u> </u>		
902-903		<u> </u>		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
903-904		 		LIMESTONE - Limestone, 100%, 30% yellowish gray, otospartic, highly tossimerous, vaggy, porous, 10% light
904-905				
905-906	41111	 		
906-907	┷┇┼┼┼┼			
907-908	+			
908-909				
909-910				
910-911	┼╂┼┼┼┼	┊┋┋┋	++++++	
911-912	┼╂┼┼┼	 		•
912-913 913-914	┼╂┼┼┼┼	 	- 	LIMESTONE WITH LITTLE DOLOMITE - Limestone, 90%, 70% very pale orange to yellowish gray, biosparitic
914-915	╅╂┼┼┼┼	├┤┋╎ ┼┼┼┼┼┼┼	 	grainstone, highly fossiliferous, fine grained, 30% yellowish gray, dolomitic, finely crystalline, slightly vuggy;
915-916	╫╫╫	 	1	Dolomite, 10%, very light gray microcrystalline to very-fine crystalline.
916-917	╅╫┼┼┼	<u> </u>	1111111	
917-918	+ + + + + + + + + + + + + + + + + + + +	▎ ▐▐▐▐ ▐▐ ▐ ▐		
918-919	╅╏┼┼┼┼			
919-920				
920-921				
921-922	 			
922-923				4007
923-924				LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40%
924-925			111111111	yellowish gray, dolomitic, fine crystalline, slightly vuggy.
925-926		<u> </u>	414411	
926-927			-	
927-928	41444		_{_{+}+++++++++++++++++++++++++++++++++	
928-929		 	╂┼┼┼┼┼┼┼	
929-930			- 	
930-931	.1111444	┊┼╂┼┼┼┼┼┼┼	-}-}-	
931-932	┵┇┼┼┼┼			
932-933			╂╅╁╁╬╬	LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40%
933-934 934-935	+ +++	╎╏╏╏		yellowish gray, dolomitic, fine crystalline, slightly vuggy.
935-936	+++++	╎ ╏┩┤┤┼┼	1+1++++	,
936-937	╅╅┼╁╁		1::::::::::::::::::::::::::::::::::::::	
937-938		+++++++		
938-939	` ! 			
939-940				
940-941				
941-942	+1++++			
942-943				100/
943-944			1 1 1 1 1 1 1 1 1 1 1 1	LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40%
944-945			11444	yellowish gray, dolomitic, fine crystalline, slightly vuggy.
945-946			1	
946-947				
947-948		11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
948-949		. 111111111		
949-950				
950-951			_ + + + + + + + + + + + + + + + + + + +	
951-952				
952-953				LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40%
953-954			-	yellowish gray, dolomitic, fine crystalline, slightly ruggy.
954-955			1	yenowish gray, downing, thic crystaline, sugnery (456).
955-956		i	.	
956-957				
957-958				
958-959				
959-960				



Depth Below		Penetration Ra	ate	Description
Pad Level		(min/ft)		
(ft)			20	
960-961				
	╂┼╂┼┼┼┼	- [╂┼┼┼┼┼┼┼	
961-962	╀╂┼┼	▐┋┋ ┼┼┼┼┼┞┼	┨╎┋┋ ┼┼┼┼	
962-963	\Box	╌ ┇┋╏ ┼┼┼┼┼┼┼┼	┩┦┦┦┦┼┼┼ ┦	LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40%
963-964		-1-1-1-1-1-1-1	╇╎┼┼┼ ┼┼┼┼	LIMESTONE - Linestone, 100%, 00% yearowing gray, prosparate, nighty tosamerous, vaggy, perous, 100%
964-965		<u> </u>	<u> </u>	yellowish gray, dolomitic, fine crystalline, slightly vuggy.
965-966				
966-967				
967-968				
968-969				
969-970				
970-971				
971-972	╫╫┼	 	 	
	┊┋ ┋┼┼┼	╂┼┼┼┼┼	 	
972-973	▎ ▋▍▍▍	┨ ┼┼┼┼┼┼	╂┼┼┼┼┼┼	LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40%
973-974	┼╂┼┼┼	▐ ╏╏┼┼┼┞┞┼┼┞		yellowish gray, dolomitic, fine crystalline, slightly vuggy.
974-975	╁╀┋╁┼┼┼┼	- - - - - - - - - - - - - - - - - - - 	╂┼┼┼┼┼┼┼╢	yenowien Braj, actoritate, title or journals, engine, 1465).
975-976	╽ ╏┋╅┧╏┧		┨┤┊┊┊╎╏╇┿ ┨	
976-977		++++++	<u>╂╎┼╀╎╎┼┼┞</u> ┃	
977-978			<u> </u>	
978-979				
979-980				
980-981				
981-982	┼┼┋┼┼┼┼			
982-983	┼┼┋┼┼┼┼	-1 -1-1-1-1-1	<u> </u>	
983-984	┤┋ ┼┼┼┼	╂┼┼┼┼┼┼┼	 	DOLOMITIC LIMESTONE AND LITTLE DOLOMITE - Limestone, 85%, 70% yellowish gray, dolomitic, fine
	╀	- - - - - - - -	 	crystalline, 30% yellowish gray, biosparitic, fossiliferous, slightly dolomitic, vuggy, porous; Dolomite, 15%, grayish
984-985	╁┼┠┾┼┼┼┼	-╂┤ ╎┞ ┤┼┼┼┼┼	╂┼┼┼┼┼┼┼┼	orange to medium gray, microcrystalline to very-fine crystalline, slightly vuggy.
985-986	╀╂┼┼┼┼	╂┼┼┼┼┼┼┼	╂┼┼┼┼┼┼┼	orange to mediam graf, microstysamme to very and experience, and
986-987	╎ ╏╏┼┡┼┼	- ┠ -┼┼┼┼┼┼┼┼	╂╀┼┼┼┼┼	
987-988	<u> </u>		┨┼╀┼┼┼┼┼┼	
988-989		1441444		
989-990				
990-991				
991-992				
992-993	▆▀▍▍▍▍	 		
	▋┝┆╎╞ ┼┼	╂┼┼┼┼┼┼┼┼	╂┼┼┼┼┼┼┼	DOLOMITIC LIMESTONE AND LITTLE DOLOMITE - Limestone, 85%, 70% yellowish gray, dolomitic, fine
993-994	▊┼┼┼┼┼	- 	╂┼┼┼┼┼┼┼	crystalline, 30% yellowish gray, biosparitic, fossiliferous, slightly dolomitic, vuggy, porous; Dolomite, 15%, grayish
994-995	▋┼┼┼┼┼		· [orange to medium gray, microcrystalline to very-fine crystalline, slightly vuggy.
995-996		╂┾┼┼┼┼┼	╂┼┼┼┼┼	orange to meeting gray, meroerysamme to very time crysamme, originary 1-289.
996-997			1	
997-998				
998-999				
999-1000				
1000-1001	11			
	┼╏┼┞┼┼┼	1::::::::::::::::::::::::::::::::::::::	1	
1001-1002			╂┼┼┼┼┼┼	
1002-1003	.	╂╀┼┼┼┼┼┼	╂┼╎┼┼┼┼┼┼┪	LIMESTONE - Limestone, 100%, yellowish gray to very light gray, fine grained, fossiliferous; Dolomite, trace,
1003-1004		111111		
1004-1005				medium light gray, moderately well cemented.
1005-1006				
1006-1007				
1007-1008		1::::::::::::::::::::::::::::::::::::::		
	-	11	h: 1	
1008-1009	.	HHEFF	14++++++1	
1009-1010		44444		
1010-1011				
1011-1012			1	
1012-1013				
1013-1014				LIMESTONE - Limestone, 100%, yellowish gray to very light gray, fine grained, fossiliferous; Dolomite, trace,
1014-1015	 		1	medium light gray, moderately well cemented.
	f			
1015-1016	I L		1	
1016-1017	Įi. i ši	11		
1017-1018	L	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1	1-1	
1018-1019	L	1	1	



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
1020-1021		
1020-1021	▊┤┊╏╏╏╏╏╏╏╏	
1021-1022		
1023-1024		LIMESTONE - Limestone, 100%, grayish orange, fine grained, poorly cemented, slightly vuggy.
1024-1025		
1025-1026		
1026-1027		
1027-1028		
1028-1029		
1029-1030		
1030-1031		
1031-1032	▋ ▍ ▃▍▍▃▍▋▍▍ ▕ ┆░▃▍▍▊▐▝░░┼	
1032-1033	┇┇┇┇╒╒	LIMESTONE - Limestone, 100%, yellowish gray to light gray, fine grained, moderately well cemented, slightly
1033-1034	▊ ▍ ┆┆┆┆┆	fossiliferous, slightly vuggy.
1034-1035	▊▃▗▗▗▗▗▗▗▗ ▗▗ ▗ ▗▗	1000,1110,110
1035-1036 1036-1037	▊┼╏╏╬╏╏┪╏ ╁┼┼┼┼┼┼┼┼┼┼	1
1036-1037	▊▎▞░░░░░░░░ ▞░ ░ ░	1
1037-1038	▊┤┧┼╎┼┼╎┼┇┤╎╏ ┼┼┼┼┼┼┼┼┼┼╂┼┼┼	1
1039-1040		
1040-1041		
1041-1042		
1042-1043		- CONTROL OF THE POLICY CONTROL A STATE OF THE POLICY CONTROL OF T
1043-1044		LIMESTONE AND LITTLE DOLOMITE – Limestone, 90%, very pale orange to yellowish gray, oolitic, soft, vuggy, porous, fossiliferous; Dolomite, 10%, dark gray to medium gray, very fine crystalline, hard.
1044-1045		porous, tossiliterous; Dolomite, 10%, dark gray to intedium gray, very line crystamine, hard.
1045-1046		-
1046-1047	▋ ▗▕▕▕▗ ▎ ▕▕	
1047-1048	▋┼╎╌╎┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1048-1049	▊┼┊┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1049-1050 1050-1051	▊▎▘░░░░░░░ ░░	
1051-1052	╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1052-1053		000, 000, 11, 11, 0
1053-1054		LIMESTONE WITH VERY LITTLE DOLOMITE AND CLAY (MARL) – Limestone, 90%, 70% yellowish gray, soft;
1054-1055		30% very light gray, dolomitic, fine crystalline, moderately hard; Dolomite, 5%, medium light gray, fine crystalline,
1055-1056		hard; Clay (Marl), 5%, yellowish gray to white, soft, very calcareous, cohesive.
1056-1057		
1057-1058	┛ ┵┼┆┼┼╀┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1058-1059	▊ ┆┆┊┊┊┊ ╃┆╏╧┤╪┼┢┼╪┲┾┠┶┽┦╬┝┿╅╵┼	
1059-1060		
1060-1061	┡ ╪╬╬╬╬╬╬╫	-
1061-1062	▐ ╏╫╫╗╫╒┩╏╫╫╫	
1062-1063	 ┋┋╡┊┋═╅╄╋ ╃┩┊╚┼┊╗╏┼┠┊┼┼╞┼┼┆┼	LIMESTONE WITH VERY LITTLE DOLOMITE- Limestone, 90%, yellowish gray to pale yellowish brown, very fine
1063-1064	╀╏┼┼┼┼┼┼╏┼┼┟┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	grained, partially dolomitic; Clayey Limestone, 5%, yellowish gray, very fine grained, soft; Dolomite, 5%, brownish
1064-1065	┊ ╏┾┾╃╅╫┼┋┠╀┢┿┝┷┼┯┸┸╏┋╬╬╝╒ ^{┿┉╏╏}	black, very-fine crystalline, hard.
1065-1066		
1066-1067		
1067-1068 1068-1069		
1069-1070		
1069-1070		
1070-1071		
1071-1072		
1073-1074		LIMESTONE - Limestone, 100%, yellowish gray to very pale orange, very fine grained, vuggy.
1074-1075		
1075-1076		
1076-1077		
1077-1078		
1078-1079		
1079-1080		



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
1080-1081		
1081-1082	▊┤╎┤╏┊╎┆┆╏┆┆ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	H
1082-1083	▊▗▗▗▗▗▗▗ ▗▗▗▗▗▗	LIMESTONE – Limestone, 100%, yellowish gray to very pale orange, very fine grained, vuggy.
1083-1084 1084-1085	▊ ┼ ▞▞▍▞ ▞▍ ▞	Linesone, 10076, jenomon graj to 1013 paro otanigo, 1013 into grantos, 10083.
1085-1086	▊ ┼ ┊┊┊┊	
1086-1087		
1087-1088		
1088-1089		
1089-1090		<u> </u>
1090-1091		_
1091-1092		
1092-1093	<u>┇┧╏╂┧┇┇</u> ╏╏╏┩╏	LIMESTONE – Limestone, 100%, yellowish gray to very pale orange, very fine grained, vuggy.
1093-1094	▊╏╞┋┇┋ ┋	LIMESTONE - Limestone, 100%, yenowish gray to very pare orange, very fine granted, veggy.
1094-1095 1095-1096	▊▋▍▐▐▐▐ ▐ ▐	
1095-1096	<u>▊</u> ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	1
1097-1098		
1098-1099		
1099-1100		
1100-1101		
1101-1102	▊ ▎ ▎ ▗▗▗▗▗▗▗▗	_
1102-1103	▊┤┤┤╎╎╎┊ ╊┤┼ ╎╎┆ ┼┼┼╂┼	LIMESTONE – Limestone, 100%, light gray, very fine grained, well cemented, slightly vuggy
1103-1104 1104-1105		LIMESTONE - Limestone, 1907s, right gray, very fine grained, went contented, originary (1986)
1105-1106		-
1106-1107		•
1107-1108		
1108-1109		
1109-1110		
1110-1111	┇╸┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	-
1111-1112	▊▄▗▘▍▗▝▗▗ ▗▗▗▗ ▗	-
1112-1113 1113-1114	┠┼┊┼╁┼┼┼┼┟┼┼┼┼┼┼┼┼┼	LIMESTONE - Limestone, 95%, very light gray to light gray with trace amounts of dark gray, very fine grained;
1114-1115		Clayey Limestone, 5%, very light gray to light gray, soft, slightly cohesive.
1115-1116		
1116-1117		
1117-1118		
1118-1119		_
1119-1120		
1120-1121	┖┤┋╏┩╏	
1121-1122	┠┽╃╃┼╃┈╫╂┼┼┼┼┼┼┼┼┼	-
1122-1123 1123-1124	┠┼┼┼┼┼┼┼╂╃┼┼┼┼┞┞┇┨┼┼┼╠╗┤┼	LIMESTONE Limestone, 100%, very pale orange to yellowish gray, very fine grained, moderately soft, vuggy,
1124-1125	┠┼┟┼╁┼╁┼╁┼┼┼┼┼┼┼	trace light gray to medium gray, very fine grained, moderately well cemented.
1125-1126		
1126-1127		
1127-1128		
1128-1129		
1129-1130		
1130-1131	<u>▐▗╞</u> ╅┊┼┼┞╏┠╏┼┼┡╸╬┼┼ ╿ ┆┼╏┼┼┼┼	
1131-1132 1132-1133		
1133-1134		CLAYEY LIMESTONE AND LIMESTONE - Clayey Limestone, 60%, very light gray to light gray, very fine grained,
1134-1135	┠╸╏╒╒┋╒┋	soft, slightly cohesive; Limestone, 40%, light gray to medium gray, very-fine grained, poorly to moderately-well
1135-1136		cemented, vuggy.
1136-1137		
1137-1138		
1138-1139		
1139-1140		



Depth Below	Penetration Rate (min/ft)	Description
Pad Level (ft)	10 20	
1140-1141		
1141-1142		
1142-1143		250/
1143-1144		LIMESTONE AND SOME DOLOMITE – Limestone, 85%, very pale orange to yellowish gray, very fine grained, poorly to moderately cemented, slightly vuggy; Dolomite, 15%, moderate yellowish brown, very-fine crystalline,
1144-1145		slightly vuggy, hard.
1145-1146		Isological Argentia Argentia (1997)
1146-1147	▋ ▗▗▗▗▗▗ ▗▗▗▗	
1147-1148	▝▀▀ ▋░░░░░░░	
1148-1149	╡┦╏┋╧ ┪ ╏┤╏╏╏╏╏╏ ┼	•
1149-1150		
1150-1151 1151-1152	╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1152-1153		
1153-1154		LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange to yellowish gray with little
1154-1155		light gray, very fine grained, slightly fossiliferous; Dolomite, 5%, moderate yellowish brown, very fine crystalline,
1155-1156		well cemented.
1156-1157	▋ ┆┆┆┆┆┆┆┇╏┆┆┆┆┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1157-1158	▐╎┆┆┆┆┆╏ ┼╇┇┼┼┼┼┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼	-
1158-1159	▊╎┆┆╎┆╎╎ ┼┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	-
1159-1160		
1160-1161	╎┢┿┋╬╬┩ ╬╏╬╂╂┼┼┼┼╀╬╂┼╂┼┼┼┼┼┼┼┼┼┼┼	
1161-1162	╌ ┇┼ ╒╎╎┼┼┼╏┋┋ ┼┼┼┼┼┼┼┼┼┼┼	
1162-1163 1163-1164	╎╏┤┊╎╎╎╎╏ ╏┼┼┼╎┼┼┼	LIMESTONE AND SOME DOLOMITE - Limestone, 70%, very pale orange to yellowish gray, very fine grained,
1164-1165		poorly to moderately cemented, slightly dolomitic, vuggy; Dolomite, 30%, moderate yellowish brown to dark gray,
1165-1166		very-fine crystalline, moderately well cemented.
1166-1167		
1167-1168		
1168-1169	 ┇ ┋ ┊┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	
1169-1170		
1170-1171	╡╏ ┩┩	
1171-1172	┦┼╏╌┦┼┞┼╏┼┼╏┼┼┼┼┼┼┼┼	
1172-1173 1173-1174	┤┊┋┊┊┊┋┋┋	DOLOMITE AND LITTLE LIMESTONE- Dolomite, 85%, pale yellowish brown, very-fine crystalline, slightly calcareous,
1174-1175		slightly vuggy, well cemented; Limestone, 15%, very pale orange to yellowish gray, very-fine grained, poorly to
1175-1176		moderately cemented.
1176-1177		
1177-1178		
1178-1179	<u></u>	
1179-1180	▗ ▐▐▗ [▗] ╏ ▗ ┇	
1180-1181	╶╁╌┠┼╶┟┝┼┼┾┠┼╤╏┼┼┼┼┼╏╏┼┼┼┼┼┼	
1181-1182	╶ ╫┼ <mark>╟</mark> ┼┼┼┼┼┼╫╟┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1182-1183 1183-1184	╅╇╟┾┼┼┼┼┟╫┼┼┼┼┼┼┼┼┼	DOLOMITE AND LITTLE LIMESTONE- Dolomite, 85%, pale yellowish brown, very-fine crystalline, slightly calcareous,
1184-1185	┼ ┞╏┆ ┪	slightly vuggy, well cemented; Limestone, 15%, very pale orange to yellowish gray, very-fine grained, poorly to
1185-1186		moderately cemented.
1186-1187		
1187-1188		
1188-1189		
1189-1190		
1190-1191		
1191-1192		
1192-1193		The same of the sa
1193-1194		DOLOMITE AND LITTLE LIMESTONE- Dolomite, 85%, pale yellowish brown, very-fine crystalline, slightly calcareous, slightly vuggy, well cemented; Limestone, 15%, very pale orange to yellowish gray, very-fine grained, poorly to
1194-1195		
1195-1196		moderately cemented.
1196-1197		
1197-1198		
1198-1199		
1199-1200		<u> </u>



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	Societa
(ft)	10 20	
1200-1201		
1201-1202	▊ ▗▗▗ ▀▗ ▋▗▗▗▗▗▗▗ ▗	
1202-1203		•
1203-1204		DOLOMITE AND VERY LITTLE LIMESTONE- Dolomite, 95%, moderate yellowish brown to dark yellowish brown
1204-1205		and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale
1205-1206		orange to yellowish gray, very fine grained, moderately well cemented.
1206-1207		
1207-1208		
1208-1209		
1209-1210		
1210-1211		
1211-1212		
1212-1213	╻╶╶╏╏╎╎╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼	DOLOMITE AND VERY LITTLE LIMESTONE- Dolomite, 95%, moderate yellowish brown to dark yellowish brown
1213-1214		and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale
1214-1215		orange to yellowish gray, very fine grained, moderately well cemented.
1215-1216	╏╎╎╎┢╬┿┼┦╎╏╎╎╎╎╎╏ ┼┼┼┼┼┼┼┼╏	orange to yenowish gray, very fine granicu, moueratory well centented.
1216-1217 1217-1218	╂┾┼┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1218-1219	╂╀┼┼╫┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1219-1220		
1220-1221		
1221-1222		
1222-1223		
1223-1224		DOLOMITE AND VERY LITTLE LIMESTONE- Dolomite, 95%, moderate yellowish brown to dark yellowish brown
1224-1225		and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale
1225-1226	┇ ╌┩ ┇╬╬╬ ┪┊┆╏┦╃┼┼┼┼┼┼┼┼┼	orange to yellowish gray, very fine grained, moderately well cemented.
1226-1227		
1227-1228	┠┋┢╇╇╬╇╇╇ ╃┼┼┼┋┼┼╅╂╂┼┼┼┼┼┼┼	
1228-1229	┠╌┡╇╇╬╬╬┪ ╬╫┼┼┼┼┼	
1230-1231		
1231-1232		
1232-1233		
1233-1234		DOLOMITE AND VERY LITTLE LIMESTONE- Dolomite, 95%, moderate yellowish brown to dark yellowish brown
1234-1235		and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale
1235-1236		orange to yellowish gray, very fine grained, moderately well cemented.
1236-1237		
1237-1238	▊ ┆ <mark>┢┵┵┵┵┷╃</mark> ┩┦╫┼┩┼┞┼╢┼┼┼┼┼┼┼┼	
1238-1239	┠┊╇┷┷┪╏┋┼╏┊╎┼╎┼┆┼┆┼╏┼┼┼┼┼	
1239-1240		
1240-1241	┞ ╎ ┢ ╃┿╃ ┩╀╞ ┆╏┊╏ ┼┼┼┼╟	·
1241-1242	┠┊╏╤┼╏╏┾┼╏┼┼╏┼┼╏┼┼	
1242-1243 1243-1244	┠╀ ╏╏ ┩╫┼╃┼╀╂╫╫╫	IMESTONE AND SOME DOLOMITE - Limestone, 70%, very pale orange and very light gray, very fine grained,
1244-1245		lolomitic, slighty vuggy, moderately well cemented; Dolomite, 30%, moderate yellowish brown and medium dark
1245-1246		утау, very-fine crystalline, well cemented, hard.
1246-1247		
1247-1248		
1248-1249		
1249-1250	╚	
1250-1251	╟╫╫┼┾┼┼╫╢	
1251-1252 1252-1253		
1252-1255		IMESTONE AND SOME DOLOMITE - Limestone, 70%, very pale orange and very light gray, very fine grained,
1254-1255		olomitic, slighty vuggy, moderately well cemented; Dolomite, 30%, moderate yellowish brown and medium dark
1255-1256	g	ray, very-fine crystalline, well cemented, hard.
1256-1257		
1257-1258		
1258-1259		
1259-1260		



Depth Belov	Penetration	Rate	Description
Pad Level	(min/ft)		
(ft) 1260-1261	10	20	
1261-1262	▋	╀╂╂┼┼╂┼┼┼┼	-
1262-1263	▗ ▋▗▗▗ ▗▊▗▗ ▗▋▗ ▗▋ ▗▋ ▗▋ ▗▋ ▗▋ ▍ ▍ ▍ ▍ ▍ ▍ ▍ ▍ ▍	 	
1263-1264			LIMESTONE - Limestone, 100%, yellowish gray to pale yellowish brown, very fine grained, dolomitic, slightly
1264-1265			fossiliferous, vuggy, moderately cemented.
1265-1266	▐▐▐ ▗▊▊▊	!	
1266-1267 1267-1268		+++++++++	
1268-1269	╂┼╀┼╂┼┼┼┼┼┼┼┼┼		
1269-1270	╂╀┼ ╎┠ ┼┼┼┼┼┼┼┼		
1270-1271			
1271-1272			
1272-1273	╁┼┼┼┋ ┼┼┼┼┼╂┼┼┼┼	╟╫╫╫╫╫	TIN FECTION IN THE
1273-1274 1274-1275	╂┼┼╂╫┼┼┼╂┼┼┼┼┼	┞╏╏ ┼┼┼┼┼┼	LIMESTONE – Limestone, 100%, yellowish gray to pale yellowish brown, very fine grained, dolomitic, slightly
1275-1276	╏╎╎╏┡┿┿┿ ┪╎┤╏╎╎		fossiliferous, vuggy, moderately cemented.
1276-1277	╏╎┟╏╏╏╏╏╏		
1277-1278	╏┼╎╏╏╏╏╏┇		
1278-1279	┇ <u>┆┆╏</u> ┼┼┼┼┼┼┼		
1279-1280			
1280-1281			
1281-1282	┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋		
1282-1283	╏╣╏╏╏╏╏╏╏		DOLONITE D. 1. 1. 1000 CON.
1283-1284			DOLOMITE-Dolomite, 100%, 90% grayish orange pink, moderately hard, crystalline; 10% dark gray, well
1284-1285 1285-1286	┠╫╫╫╫╫╫ ╒╇┩ ┼┼┼┼┼	++++++++	cemented, hard, microcrystalline; Clay, trace, medium dark gray, moderately soft, cohesive.
1286-1287	┠═┼┼┼┼┼┼┼┼┼┼	++++++	
1287-1288		<u> </u>	
1288-1289			
1289-1290			
1290-1291		<u> </u>	
1291-1292 1292-1293		+	
1293-1294		++++++++++	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, medium gray, some grayish orange, very finely
1294-1295		+ ++++++	crystalline to microcrystalline, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1295-1296		† -	or your mercer your mile, indectainty hard to hard, Emissione, 576, very pare orange, gramstone, soft.
1296-1297			
1297-1298			
1298-1299			
1299-1300			
1300-1301	·}-		
1301-1302 1302-1303	┊┢╃┩ ┼┼┼┼ ╿╎┼┆ ┼┼┼┼		
1302-1303		·- · · · · · · · · · ·	DOLOMITE- Dolomite, 100%, light gray to grayish orange, sucritic to microcrystalline, moderately hard to hard;
1304-1305	-1 -1		Limestone, trace, very pale orange, soft.
1305-1306			
1306-1307			i
1307-1308	. []		
1308-1309			İ
1309-1310 1310-1311	 	 	
1310-1311	+		·
1312-1313			
1313-1314			DOLOMITE- Dolomite, 100%, light gray to grayish orange, sucritic to microcrystalline, moderately hard to hard;
1314-1315			imestone, trace, very pale orange, soft.
1315-1316			
1316-1317			
1317-1318	 		
1318-1319 1319-1320		f-:	
1318-1320		<u> </u>	



Depth Below	Penetration Rate	Description
Pad Level	(min/ft)	
(ft)	10 20	
1320-1321		
1321-1322	▊ ┼┆┼┼┆┆┼┩┆┼┆┼┆┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1322-1323	▐ ┼ ┊╎┆┊┊┆╏ ┊┼┼┼┼┼┼┼┼┼	
1323-1324		DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to
1324-1325	▝▘	microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1325-1326	╎╎┇╬┩╏┊╎╏╎╏╎╎╎╎╎┼┼╏╏┼┼┞ ┼┼┼	· · · · · · · · · · · · · · · · · · ·
	┢┿╃╏╏╏╏╏╏╏╏╏╏╏╏╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1326-1327 1327-1328	▊┤┊┊┊┞┊┆╏╏┆╘ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1327-1328	▊╎┆╎┆┆┊┊┊ ╂ ╎┆┆╎╎┆╏ ┼╂┼┼┼┼	
1329-1329	▊▎░▍░░░░░	
1329-1330	▊ ▎ ▍ ▎▗▗▘▗▘▗▘▗▘▗▘	
1330-1331	▐╎┊╎╎╎┊┊ ┩┼ ┊┆┆	
1332-1333		
1333-1334	▊ ┆ ┊┊┆┆┊┆┆ ╏┼┼┼┼┼┆┆┆┆╏╗┼┼	DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to
1334-1335		microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1335-1336		
1336-1337		
1337-1338		
1338-1339		
1339-1340		
1340-1341		
1341-1342		•
1342-1343		The state of the s
1343-1344		DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to
1344-1345		microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1345-1346	<u> </u>	
1346-1347	<u> </u>	
1347-1348	┇┇┇┋	
1348-1349	┇┢╘┇┩ ┇╏╏╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1349-1350		
1350-1351	┊ ╏┆┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1351-1352	┆ <u>╟╫╫╫╫╫╫</u>	
1352-1353	┊ ┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to
1353-1354	┊ ╫╫╫╫╫	microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1354-1355	┊ ╫╫╫╫	innervery standard, rugger, moderater, made to made, Eminestend, 570, 1917 paid visuage, grandering, 111.
1355-1356	┊ ╏╫╫╫╫╫	
1356-1357	┼╏┵┩┼┼┾┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	
1357-1358 1358-1359	┊ ╏╏┩╃╎┼╎╏╏┼╏╏┼╏╏╏╏ ╬╬╬	
	▐ ╇╈┋┼┼┼┧╢╏┼┼┼┼┼┼┼┼╀┼╀┼╀┼┼┼┼┼┼┼┼┼┼	
1359-1360		
1360-1361	╶╏╒┩ ╏╫ ┩╇╃┩╏┋╏╬╫┼┼┼┋┋┩╏╇╃╃┼┼ ┼┼┼┼	
1361-1362	╶ ┾┼┼ ╏┼┼┼┼┤┼┼┼┼┼┼┼┼┼╏┼┼┼ ╏	
1362-1363 1363-1364	╄╏┋ ╫╫╫╫	DOLOMITE AND SOME LIMESTONE - Dolomite, 85%, grayish orange pink to light brown, microcrystalline,
1364-1365	╫ ┈ ┋╫╫╫	vuggy, moderately hard to hard; Limestone, 15%, very pale orange, grainstone, some forams, soft.
1385-1366	╫ ╒	
1366-1367	╡┇ ┊╂ ┼┼┼┼┼┩┆┆┼┼┼┼╌┼┪╁┼┆	
1367-1368		
1368-1369		
1369-1370	+++++++ 	
1370-1371		
1371-1372		
1372-1373	÷ ₽₽₽₽₽₽₽ ₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽₽	
1372-1373	╌ <u>┠╁┵┼┾</u> ╀╀┼╏┇╏┼┼┼╏╗╸┼╢┾┼╬┼┼	DOLOMITE AND SOME LIMESTONE - Dolomite, 85%, grayish orange pink to light brown, microcrystalline,
1373-1374		vuggy, moderately hard to hard; Limestone, 15%, very pale orange, grainstone, some forams, soft.
1374-1375		
1375-1376		
1376-1377		
1378-1379		
1379-1380		



South Baland	Penetration Rate	Description	
Depth Below	(min/ft)	·	
Pad Level (ft)	10 20		
1380-1381	▐▊ ┤ ┊ ╏┼┼┼┼┼┼┼┼┼		
1381-1382	▗▐ ▞ ▗ ▗▞▗ ▘ ▞▞	•	
1383-1384	▕▐ ▞ ▗ ╎ ╎ ╏┼┼┼┼┼┼┼┼	DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, 60% light brownish gray and 40% light gray,	
1384-1385	╎╏╎╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	microcrystalline to cryptocrystalline, vuggy, moderately hard to hard; Limestone, 20%, very pale orange,	
1385-1386		grainstone, soft.	
1386-1387 1387-1388		,	
1388-1389	╫╫╫╫╫	·	
1389-1390	┼╂┼╎┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
1389-1390	┦╏┤╎╫╎┊╎╏ ┼┼┼┼┼┼┼┼┼ ╏ ┞┼┼┼┼┼┼		
1390-1391			
1390-1391			
1391-1392	╫		
1392-1393	╃ ╫╫╫╫╫	DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, dark yellowish orange to pale yellowish brown,	
1393-1394	┼┠╎┼┼┼┼┼┼╂┟┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, some forams, soft,	
1395-1396	┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
1395-1397	▕▕▀▞▗░▞▞▞ ▋ ▕▕▕▍▍ ▍▍▍▍▍▍▍▍▍▍▍▋ ▗		
	┤╎╎╎╎╎╏┡┿┿╈╬╬╬╬╬		
1397-1398	╶╎╎╎╎╎╎╏╏╎╎╏┋╬╇╇╇┩╎╎╽╎╎┊ ┼┼┤		
1398-1399	╶╎╎┢┧┾╏┾╬╋┿╬╬┩ ╀┼┼┼╂┼┼┼┼┼┼┼┼		
1399-1400	╶ ┆┆┋┊┆┊╏┊╏┊╏┊╏┊╏		
1400-1401	╺		
1401-1402	▊┆╏┆╎┆╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
1402-1403	<u>▊▗╏┆╏</u> ┆╏	DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, dark yellowish orange to pale yellowish brown,	
1403-1404	┸	microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, some forams, soft,	
1404-1405	<u>▋▃▎▗▃▎▃▍</u>	microcrystalline, vuggy, moderately naru to naru, Liniestone, 576, very paie orange, granistone, some totallin	
1405-1406	▐▕▕▗┆┆┆┆┊┆┆┆		
1406-1407	┸╌┼┼┼┼┼┼		
1407-1408	▐▐▞▗▐▗▊▊▊		
1408-1409	<u>╶</u> ┇┇┇┇┇┇		
1409-1410			
1410-1411			
1411-1412	<u>╶╏</u>		
1412-1413		DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, dark yellowish orange to pale yellowish brown,	
1413-1414		microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, some forams, soft,	
1414-1415	<u></u>	microcrystalime, vuggy, moderately hard to hard, Efficience, 5%, very pare orange, grandene, comments, com	
1415-1416	<u> </u>		
1416-1417	<u> </u>		
1417-1418	<u>╶</u> ┇┇┩┩┩		
1418-1419	<u>╶┆┫</u> ┊┟┼┼╀┋┼╂╬╏┼╀╬┼┼┼┼╀		
1419-1420			
1420-1421	<u>╶┸┫╁┸╁┵╂┽╄</u> ┼┼┼┼┼┼┼┼╂┽┼┼┼┼┼┼┼┼┼┼┼┼┼┼		
1421-1422	<u>╶</u> ┆ ┫┼ ╿┼┼┼╀╃┫┼┼┼┼┾┈┼╀┼╄╒┼┼┼┼┼		
1422-1423	│ ┆ ┫ ┆╡ ┆┞ ┆╏╒ ╂┾┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	LIMESTONE AND SOME CLAY - Limestone, 80%, 90% yellowish gray, very calcareous, grainstone, moderately	
1423-1424	╎ ┇ <mark>┇╌┊┊┼┼╏┼┊</mark> ╁┼┼┪┼┋┼┼╏┼┼	hard, vuggy; 10% very light gray, clayey limestone, moderately soft; Clay, 20%, greenish gray to medium gray,	
1424-1425	╒┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	slightly calcareous, soft to very soft.	
1425-1426	│ ┇ <mark>┋╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒</mark>	anging calculous, son to long som	
1426-1427	ĹĬ ŧ ĬĬĬŢĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸĸ		
1427-1428	┍┋┩┪╶╫┇┞╃╼┞ ╬ ╅┾╄╣╇╂ ╝┞╇╬╒╅╸╒╬╩ ╬		
1428-1429	<u>╒</u>		
1429-1430			
1430-1431	▎ <mark>▄▋</mark> ▄░▄▃▗▗░▍ ▞ ▄▘▞▗ᡫ▖▍░▗▘░▞▗▜▞		
1431-1432	 	-	
1432-1433	╒┆┫┋╏ ┇┼╃╒┡╒┋╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	DOLOMITE AND SOME LOMESTONE - Dolomite, 80%, pale yellowish brown, finely crystalline to	
1433-1434	▐▗ ▗▊▞▗▗▗▗▗▗▗▗▗▗ ▗▗▗▗▗▗▗▗▗▗▗▗▗ ▗▗	microcrystalline, well cemented, moderately hard; Limestone, 20%, very pale orange to yellowish gray, grainstone,	
1434-1435		fine grained, moderately soft, poorly cemented, vuggy, porous.	
1435-1436		Time Grames, moderately sorty poorly committee, 1866), pro	
1436-1437			
1437-1438			
1438-1439			



Depth Below	Γ				Pe	ne			n l	Ra	te					Description
Pad Level							(m	in/1	ft)		_					
(ft)	L				10)				2	0					
1440-1441	П	П	П	11	ŢŢ	П	П	П		П	Т	1	П	\prod	Τ	
1441-1442	┼ ┨	Ħ	+	$\dagger \dagger$	$\dagger \dagger$	$\dagger \dagger$	††	Ħ	††	T	1	1	\sqcap	T	T	
1442-1443		H	Ħ	+	$\dagger \dagger$	$\dagger \dagger$	††	П	11	П	\top	1	71	П	T	
1443-1444	╁	H	\parallel	††	$\dagger\dagger$	\dagger	$\dagger\dagger$	Ħ	+	Ħ	\dagger	1	$\dagger \dagger$	\parallel	1	LIMESTONE AND VERY LITTLE DOLOMITE - Limestone, 90%, very pale orange to very light gray, fine grained,
1444-1445	H	H	H	+	11	Ħ	Ħ	Ħ	$\dagger \dagger$	\dagger	+		\top	Ħ	T	soft, poorly cemented; Dolomite, 10%, pale yellowish brown to medium dark gray, microcrystalline, compact, well
1445-1446	H	Н	+	+	H	tt	\forall	Ħ	+	Н	†		\forall	Ħ	T	cemented, hard.
1446-1447	H	H	Н	++	+	$\dagger \dagger$	Ħ	††	Ħ	+	+	+	\Box	11	T	
1447-1448	Н	H	Н	+	H	+	Ħ	$\dagger\dagger$	H	+	$^{+}$	+	Н	11	+	
1448-1449	┼┼╂	H	Н	++	H	Ħ	H	††	+	†	†	\top	H	\top	T	
1449-1450	Н	H	Н	+	H	$^{++}$	$\dagger\dagger$	H	H	†	$^{+}$	+	Н	+1	t	
	₩	H	H	╁	H	₩	╁	H	+	+	+	+	+	++	+	
1450-1451	Н	Н	Н	╫	+	$^{++}$	H	++	+	+	+	+	+	++	+	
1451-1452	Н	H	\mathbb{H}	++	+	╁	H	+	+	+	+	+	Н	++	+	
1452-1453	Н	H	Н	++	H	╁┼	$^{+}$	++	+	+	+	+	+	++	+	DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely
1453-1454	H	H	H	+	H	+	H	H	+	+I	+	+-	+	+	+	crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly
1454-1455	┼ ╂	+	\parallel	+	H	++	+	+	+	+	+	+	+	++	+	cemented.
1455-1456	╟╂	H	\mathbb{H}	+	H	#	+	H	+	Н	+	+	+	H	+	CONTORNO.
1456-1457	Ш	H	H	#	H	$^{+}$	++	H	+	+	+	+	-++	H	+	
1457-1458	∐	H	H	++	╁	#	+	++	+	+1	+	+	++	+	+	
1458-1459	- -	H	\mathbb{H}	+	H	1	H	\mathbb{H}	\mathbb{H}	+	+	+	\mathbb{H}	H	+	
1459-1460	Щ	Н	Ц	4	4	H	#	H	+	4	+	+	4	H	+	
1460-1461	$ \downarrow $	\coprod	\parallel	\parallel	11	#	11	H	\mathbb{H}	#	+	+	44	+1	+	
1461-1462	Ш	\sqcup	4	1	4	11	#	H	+	+	+	+	\mathbb{H}	H	+	
1462-1463	┞╟	H	Ш	11	11	1	#	H	\parallel	+	+	4	+	H	+	DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely
1463-1464	Ш	Ц	\parallel	4	\sqcup	\coprod	11	11	44	+	+	4	+	+1	+	crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly
1464-1465	Ш	Ш	Ш	11	\coprod	11	11	11	\parallel	+	+	4	4	++	+	
1465-1466		Ш	Ш	$\perp \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \! \!$	∐.	Ш	11	Н	4	4	4	4	41	4	\perp	cemented.
1466-1467	Ш	Ц	Ц	Ш	Ш	Ш	Ц	\coprod	4	\perp	1	L	Ц	11	4	
1467-1468	Ш	Ц	Ш	11	Ц	Ц	11	Ц	41	\perp	1	1	41	#	4	
1468-1469	Ш	П	Ш	Щ	\coprod	Ш	11	\coprod	\parallel	\perp	1	4	41	41	\perp	
1469-1470		Ш		Ш	Ш	Ц	11		Ш	\perp	\perp	\perp	Ш	11	\perp	
1470-1471		П	П	П	Π	П	H	Ц	Ш	Ш	\perp	1	Ш	11	\downarrow	
1471-1472			\prod	П	Ц	Ш	П	Ш	Ш	\perp	\perp	1	Ш	4	\downarrow	
1472-1473		\prod			\coprod	Ш	Ш	Ц	Ш	Ш	_L	L		11	1	Each.
1473-1474		\prod	I	П	Ц	Ш	Ш	Ш	Ш	Ш	1	1	Ш	11	4	DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely
1474-1475		\prod	П	\prod	\prod	\prod	\coprod	П	П		\perp		Ш	11	Ш	crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly
1475-1476	П		П	\prod	\prod	П	П	П		\perp	1	1	Ш	П	\perp	cemented.
1476-1477			П	\prod	П	Π	П	П	П	Ш			Ш	Ц	\perp	
1477-1478		П	П	П		Π	П	П				Ш		H		•
1478-1479		Ti	П	П	П	П	П	П	H		ſ					
1479-1480		11	H	11	Ħ	Ħ	П	П	\mathbb{I}	Π	I					
1480-1481	Ħ	Ħ		П	T	П	П	П	П	T	Т				П	
1481-1482		H	††	1	tt	Ħ	Ħ	Ħ	11	П	1	Т	T		T	
1482-1483		11	11		Ħ	П	Ħ	Ħ	П	Ħ	1	1	11	П		
1483-1484		++	Ħ	11	Ħ	Ħ	Ħ	++	Ħ		T	-	T	11	П	DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely
1484-1485		1	t	H	††	H	††	H	++	1	+-	+	11	П	T	crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly
1485-1486	1	\forall	Η	++	\dagger	Ħ	H	Ħ	+	†		-	11		1-	cemented.
1486-1487		 		ļ- -	+	†÷	tt	++	††	+	+		- †-†	+	H	
1487-1488	╁╁	1	+ +	+	1	İt	††	††	ti	H	+		+1	1	+	
	H	H	1.1	-1-1-	+	H	++	H	14	+	. i	- :	- -	H	-:	
1488-1489	H	++	+	-1.1	+1		H	++	+	+	ij-	-i	-++	1.1	+	
1489-1490	H	++	÷	+	+	++	11	++	+	+	+	-	+	11	÷	
1490-1491	Ш	+	+	4	4	++	H	+	H		+	+	-++	++	+	
1491-1492	\sqcup	-		4	+-	H	ļ.,	H		4				++	-	
1492-1493	Ш	H	į.	11	+-	H	4-4	+	44	+	<u>-</u>	<u></u>	++	H	÷l	DOLOMITE WITH LITTLE LIMESTONE - Dolomite, 90%, medium light gray to pale yellowish brown, crystalline,
1493-1494	Li.	H	4.	+	-1	4	 - -	11	++	+	_ļ	\perp		+	+	moderately hard, vuggy; Limestone, 10%, very pale orange, fine grained, soft, poorly cemented.
1494-1495	H			1.	1		ļ.ļ.	1		4				4	+	moderately flard, vuggy; Efficience, 1076, very paic orange, fine grained, 3011, poorly centenced.
1495-1496	Ш			11	1		14	: 1		. :	ļ.,	_!_	41	1.		
1496-1497					1	Li.	Lį.	- 1			1		1		4	
1497-1498	LI		1.4	:	1	: :	; ; .i				. į.					
		1			: [ı.i.								4.		
1498-1499			'													



Depth Belov	~					F	'eı	nei	tra	tic	on	Ra	ite			-		Description
Pad Level									(m	in/	ft)							
(ft)	\perp	_	_	_			0			_	_	_2	20					
1500-1501	\perp	I	\prod	\prod	П	Ţ	П			П	П	Ц	П	П	П	П	\perp	
1501-1502	\perp	L	1	Ц	Ш	1	Ц	Ш		Ш			Ц			Ш	L	
1502-1503	\perp		1	Ц	П	\perp	Ц			Ц	Ш	Ц	Ц	П	Ш	Ш	Ш	<u>.</u>
1503-1504			1	Ц	Ц	1	Ц	Ш	Ш	Ц	Ш		Ц	Ш		Ш		LIMESTONE AND DOLOMITE - Limestone, 60%, yellowish gray, very fine grained, vuggy, partially dolomitic,
1504-1505	Ш			Ц	Ц	⊥	Ц	Ш		Ш	Ш		Ц	П	П		Ц	poorly to moderately cemented; Dolomite, 40%, moderately yellowish brown, microcrystalline, vuggy, moderately
1505-1506			\perp		П					Ш	Ш			Ш	Ш	Ш	Ш	cemented.
1506-1507	П	П	Ţ			I		П	I	П				П				
1507-1508		IJ						П		П				Ш	Ш	Ш		
1508-1509			Τ			L	\equiv			П		L		Ш	Ш		H	
1509-1510			L		П		-	П			Ш			Ш		Ш		4
1510-1511	П	П	Ţ				Π	П			Ш			П	П			
1511-1512	П		1		П						П			П	П	П	П]
1512-1513	П	П	Ι	1			П	П		П	П			Π	П	П	П	
1513-1514	П		Ī	T	П			П	П	П	П			П	П	П	П	DOLOMITE - Dolomite, 100%, pale yellowish brown to dark yellowish brown, microcrystalline, partially vuggy,
1514-1515	\prod		Ι	T		П		П	П		Π	\prod			П	Π	П	moderately well cemented.
1515-1516			Ι	Ι			1		\prod		\prod	\prod		П		П		
1516-1517	П	П	Γ	T		П	T	Π	\prod		Π	\prod	T		П	\prod	П	
1517-1518	\prod		Ι	Ι	T	\prod	J	П				П	I		\prod		П	
1518-1519				Ι	I		I	П	П	I	П	\prod	I	\prod	\prod	П	\square	
1519-1520	\prod		Π	T	J	\prod			П		\prod	\prod	Ţ		\prod		П	
1520-1521	T		П		T	П	T	П	П	T		П	T				Π	
1521-1522	П			١,	T	П	Τ		П	1	П	П	T	П	П	П	П	
1522-1523	П	I	П		T		Τ	Π	П	Ţ	П	П	T	П	П	П	П	
1523-1524	Ш				I		L	Ц	П		Ш		I		Ш	Ш	Ш	LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained,
1524-1525	Ш		П	Ш		Ц		Ц	П		Ш	Ц			Ш		Ш	dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown, microcrystalline, poorly to moderately cemented, slightly vuggy.
1525-1526					I		I		П			П				\perp	Ш	
1526-1527	Ш	Ш	Ш	Ш	L			Ш	Ш		Ш	Ц			Ш		Ш	
1527-1528	Ш					Ц	Ш	Ш		\perp	Ш	Ц	П				Ш	
1528-1529	Ш		Ш	П			Ш	Ц	Ш	L	Ш	\perp	Ш	\perp	L	1	Ш	
1529-1530	Ш	i	П	П	1	Ц			Ш		Ш	Ш	Ш					
1530-1531	Ш	Ц	П	Ш			П	\perp	П		Ш	П	Ш					
1531-1532	L		Ш				Ш	1	Ц	L		L	Ш	Ш			\perp	
1532-1533	Ш	LL.	Ш		1	1	П		Ц			Ш			Ш			
1533-1534	Ш	1	Ц	П		┸	Ш	Ĺ	Ш			Ц		Ш	Ш	Ц	1	LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained,
1534-1535	Ш	1	Ц	Ц	Ц	L	Ц	L	Ш	Ц			Ш	Ш	\perp	Ш	1	dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown,
1535-1536	Ш		L	L.	Ц	_	Ш	Ш	Ц	H			Ц	Ш	1	Ш	1	microcrystalline, poorly to moderately cemented, slightly vuggy.
1536-1537	Ш	14	4	Ц	Ш	_	Ш		Ц	П			Ш	\bot	11	Ш	1	
1537-1538	Ш	L		L	Ш	1	Ш			L	-1-1		П	Ш	11	11	Ш	
1538-1539	Ш	L	-1-	L	ļί	1.	Ш	4		Ц	-	L		Ц	Ш	11	1.	
1539-1540	ш	L	1	L	Ш	1		Ш	1		Цİ	\perp	Ш	Ш	1	Li		
1540-1541		L.	1	4	Ц	1	Ш	1	Ļ.	Ц	H	_ _	Ц	11	11	H	Ш	
1541-1542			_	j	11]	41	.1.	H	L.	1.	ļ.	H	11	11	4.	
1542-1543	4		Ļ.	-		1	ij.	44				- -	:	11	4	1.	.	
1543-1544	ij.	- -		4	Ц	1	ĻĻ	1,	- <u> </u> -	Ļļ	Ц	-	i	Ļİ.	ij.	4.4	\perp	LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained,
1544-1545	.	11	į	ŀ.	Ш	1	ļ. j.	14			14	1	ļ.L	H	11	11		dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown,
1545-1546	L		- -	ļ	1 4	<u> </u> _	i	44		L		-	÷	14	+-			microcrystalline, poorly to moderately cemented, slightly vuggy.
1546-1547		44	· 		Ŀļ.	1.	Ц.	;		.		1.			, İ.			
1547-1548		;		į.		1		44		<u>.</u>		-	i. į.	· ·	4			
1548-1549			- + -:	:.				ij		ì		1.	 			ı .i.	.	
1549-1550		<u>:</u>		1	_	H	_	ij	4	_	H	+		-		-	4	
1550-1551			. ŧ	. . .	1	1.	į.	11	1.	1	44	ļ	<u>.</u> .	i i	÷÷		:1	
1551-1552		4	: :	i.		١.	÷.	i ;_i.	- 1			1.						
1552-1553		4				ļ.,		<u>.</u>				ļ			. : :	<u></u>	-	
1553-1554		11	1:			1.		<u>.</u> ,	<u>.</u>	+	<u> </u>	1	;		i.,.		_	LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained,
1554-1555	1			.i		L	4	i.	1:		L	L.	_4		Ļ.	<u>.</u>		dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown,
1555-1556]			. į				11	Ĺ			1.					ŀ	microcrystalline, poorly to moderately cemented, slightly vuggy.
1556-1557		. :				ļ.,					1.							
1557-1558						L.												
						ľ						Ì Ĺ		- 1			1	
1558-1559	. 1					L						1					- 1	



Donth Balan	Penetration Rate	Description			
Depth Below Pad Level	(min/ft)	•			
(ft)	10 20				
1560-1561					
1561-1562	╶╏┋┋┋┋┋┋┋┋┋				
1562-1563	┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼				
1563-1564	┤╏┧┧╎╎╎┤╏ ╎┼┼┼┼┼┼┼	LIMESTONE AND SOME DOLOMITE - Limestone, 80%, very pale orange to pale yellowish brown, very fine			
1564-1565	┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	grained, fossiliferous, dolomitic, poorly to moderately cemented, slightly vuggy; Dolomite, 20%, medium light			
1565-1566		gray t medium dark gray, microcrystalline, fossiliferous, moderately cemented.			
1566-1567					
1567-1568					
1568-1569					
1569-1570					
1570-1571					
1571-1572					
1572-1573		TO COLOR (AND LIN (EGEO)) E. D. L. Witz. 759/ markets will awish brown micrographing hard well			
1573-1574		DOLOMITE AND LIMESTONE – Dolomite, 75%, moderate yellowish brown, microcrystalline, hard, well			
1574-1575		cemented; Limestone, 25%, very pale orange to yellowish gray, very fine grained, fossiliferous, dolomitic.			
1575-1576	<u>╶╎┤┤╏</u> ┤╂┼┼┼┼┼┼				
1576-1577	<u>╶╀╃╃╀┋┼┼╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼</u>				
1577-1578	<u>╶┼┼┼╎┼</u> ┋┼┼┇┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼				
1578-1579	╶ ┆╎╎┥╏╏╎╏╅┦┞┋╏╏╚				
1579-1580	┊┋╏┢┢╇╇┞┆┋╬┼┼╠╬┼╠╬┼╇				
1580-1581	┦╬┼ ╏┼ ╎┼┼╏╎┼┼╎╞ ┼┼ ╏╏ ┼┼┼┼┼				
1581-1582	┊╏╏ ╋┾┼┼┼╂┽┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼				
1582-1583 1583-1584	┊ ╏┼╂╏┼╎┼┼┧┼┼┼┼	DOLOMITE – Dolomite, 95%, pale yellowish brown to moderate yellowish brown, microcrystalline to very-fine			
1584-1585	┤┤ ┇╫ ┇╏╏╏╏ ┼┼┼┼┼┼	crystalline, well cemented, slightly vuggy; Limestone, 5%, very pale orange to yellowish gray, very fine grained,			
1585-1586	┤┤╏╏┼┊╎┼┞╏╏╏ ╗═┼┼┼┼┼┼┼┼┼	poorly cemented.			
1586-1587		· ·			
1587-1588					
1588-1589					
1589-1590					
1590-1591					
1591-1592					
1592-1593					
1593-1594		DOLOMITE AND LIMESTONE Dolomite, 80%, pale yellowish brown to dark yellowish brown and medium light			
1594-1595		gray to medium dark gray, microcrystalline to very-fine crystalline, slightly vuggy, well cemented; Limestone, 20%,			
1595-1596		very pale orange to yellowish gray, very fine grained, poorly cemented.			
1596-1597					
1597-1598	<u> </u>				
1598-1599	▗╏ ┇╏┼╏┼┼╏┼┼┆┤┼┊┦┼╏┼┟┼┼┼┼┼				
1599-1600					
1600-1601	<u>▗▕▗┆</u> ▗ ▗ 				
1601-1602	 <u></u> 				
1602-1603	<u>╶</u> ┇╒╃╫╫┸╃╃┪┪	DOLOMITE AND LIMESTONE Dolomite, 80%, pale yellowish brown to dark yellowish brown and medium light			
1603-1604	╶ ┇╒┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	gray to medium dark gray, microcrystalline to very-fine crystalline, slightly vuggy, well cemented; Limestone, 20%,			
1604-1605	╶ ┼┆╏┼┼┼┼┼╏┼┼┼┼┼┼┼	very pale orange to yellowish gray, very fine grained, poorly cemented.			
1605-1606	▗ ┆┆ <mark>╃╪╪┊┾╈</mark> ╬╏╏╬╠╫╩╬╬╟╟┼┼╪╬┞╽	very pair triange to yellowish gray, very line granted, poorly contented.			
1606-1607	<u> </u>				
1607-1608	┊ ┾┊╻┾╬╫┦╂┼╏╬┼╸┼╬╂┼╟┼┼┼┼┼┼				
1608-1609	╌╞ ╗╏╪┇╬┇╬╬╬╬╬╬				
1609-1610					
1610-1611	<u>╝</u>				
1611-1612					
1612-1613		DOLONGER AND LINESCOME. Delevite 909/ relevel because to deale collowich brown and medium light			
1613-1614		DOLOMITE AND LIMESTONE – Dolomite, 80%, pale yellowish brown to dark yellowish brown and medium light			
1614-1615		gray to medium dark gray, microcrystalline to very-fine crystalline, slightly vuggy, well cemented; Limestone, 20%,			
1615-1616		very pale orange to yellowish gray, very fine grained, poorly cemented.			
1616-1617					
1617-1618					
1618-1619					
1619-1620					



Depth Below	Pe	enetration Ra	te	Description
Pad Level		(min/ft)		
(ft)	10	0 2	0	
1620-1621		1		
1621-1622	<u>┤┤┤┤</u> ┇┤╽			
1622-1623				fine
1623-1624				DOLOMITE AND LIMESTONE - Dolomite, 70%, pale yellowish brown to moderate yellowish brown, very-fine
1624-1625				grained to fine grained, moderately-well cemented, vuggy; Limestone, 30%, very pale orange, very-fine grained,
1625-1626	 	++++++		poorly cemented.
1626-1627	┤┊ ┤┇┼┼┼┼┼			
1627-1628	╎╎╏ ┼┼┼┼	+++++		
1628-1629	┊┊┋ ┼┼┼	 		
1629-1630	┤┼ ╏┼┼┼┼	 		
1630-1631				
				
1631-1632	┤╎╏ ┼┼┼┼ ┢	┿┿┩┼┼┼		
1632-1633		////////// /		LIMESTONE AND DOLOMITIC LIMESTONE WITH VERY LITTLE DOLOMITE - Limestone, 75%, yellowish gray
1633-1634	 ∔▋┤┤┤┼┼	┤┤ ┤┼┼┤		to very pale orange, fine grained, fosiliferous, slightly vuggy, moderately soft to soft, moderately cemented;
1634-1635	┊ ┋┊┼┼┼┼┼	╅╏╏╏╏		Dolomitic limestone, 20%, very pale orange to pale yellowish brown, well cemented, moderately hard; Dolomite,
1635-1636	┆╏╎╎╎╎ ┼┼┼	┤╎┤ ┼╎ ╎╎ ┼	┝╬┧╏╬╬╏	5%, pale yellowish brown to moderate yellowish brown, microcrystalline to very-fine crystalline, slightly vuggy,
1636-1637	┼┇┼┼┼┼┼┼┼	╁┼┼┼┼┼	 	well cemented, moderately hard to hard.
1637-1638	┼ ╏┼ ╎┼╎╎ ┞	- - - - - - - - - - - - - - - - - - - 	┋┋┋┋	wen comented, medicated find to the comment
1638-1639	 - - - - - - - - - - - - - - - -		┤┤┤┤┤	
1639-1640	┊┋ ┼┼┼┼╀	++++++		
1640-1641	┼┨┼┼┼┼┼┼┼	- 	╏╏┩╏╏╏	
1641-1642	╌┇┼┤┼┼┼┼┼	- 	╒╎╎╎ ┼┼┼┼┼┼	
1642-1643	┊ ┇┊╎┼┼┼┼┼┼	╀┼┼┼┼	 	DOLOMITE AND SOME LIMESTONE - Dolomite, 80%, dark yellowish orange to moderate yellowish brown
1643-1644	▗ ┇ ╏┋ ╏┼┼┼┼┼	┩╿╃┦┦┟┿ ┼┼	╒┋┋┋	and some dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 20%,
1644-1845	╀╀┼┼┼┼┼		 	very pale orange to yellowish gray, fine grained, fossiliferous, slightly vuggy, moderately cemented.
1645-1646	╀	4114111	╒┩┋┋┋	very pare drange to Jenowich gray, and grammer, the same of the sa
1646-1647	 ╀┩┼┼┼┼┼	┼┼┼┼┼┼┼	╟╫╀╫┼	
1647-1648	╌╏ ┼┼┼┼┼┼┼		▎ ▍ ▍ ┋	
1648-1649	┵╂┼┼┼┼┼┼	- - - - - - - - - - - - - 	╒┋┋	
1649-1650	╀			
1650-1651		┷┪┼╎┼┼┼	╏╅╏╅┾┼┼┼┼┼	
1651-1652	_	┷┛┼┼┼┼┼		
1652-1653			<u> </u>	The state of the s
1653-1654				DOLOMITE AND LIMESTONE – Dolomite, 50%, pale yellowish brown to dark yellowish brown and some dark
1654-1655				gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 50%, very pale orange
1655-1656				to yellowish gray, fine grained, fossiliferous, slightly vuggy, moderately cemented.
1656-1657	╅╅┼┼┼┼			
1657-1658	- - 			
1658-1659	 			
1659-1660	┪			
1660-1661	7			
1661-1662				
1662-1663	:[:::::::			
1663-1664				LIMESTONE AND SOME DOLOMITIC LIMESTONE-Limestone, 70%, yellowish gray to very pale orange, fine
1664-1665				grained, fossiliferous, vuggy, moderately cemented, moderately soft; Dolomitic limestone, 30%, very light gray to
1665-1666				medium light gray, crystalline to fine crystalline, vuggy, well cemented, moderately hard to hard.
1666-1667				
1667-1668		+++++++		
1668-1669				
1669-1670				
1670-1671				
1671-1672	·····································			
1672-1673	┈		- - - - - - - - - - - - - - - - - - -	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to dark yellowish brow
1673-1674	│ ↓┃┤╺┝╌┼┞			and some medium light gray to dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to
1674-1675				hard; Limestone, 5%, very pale orange to yellowish gray, fine grained, fossiliferous, slightly vuggy, moderately
1675-1676				cemented.
1676-1677				ecinencu.
1677-1678				
1678-1679		1.		
1679-1680		Lead Control	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	



Depth Below	F	Penetration F	Rate	Description
Pad Level	[(min/ft)	20	
(ft)		10	20	
1680-1681			 	
1681-1682				
1682-1683				The second secon
1683-1684				DOLOMITE AND VERY LITTLE LIMESTONE - Dolomite, 95%, pale yellowish brown to dark yellowish brown
1684-1685				and some medium light gray to dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to
1685-1686				hard; Limestone, 5%, very pale orange to yellowish gray, fine grained, fossiliferous, slightly vuggy, moderately
1686-1687				cemented.
1687-1688				
1688-1689		T[[]]]		
1689-1690				
1690-1691				
1691-1692				
1692-1693				
1693-1694				DOLOMITE-Dolomite, 100%, light brownish gray to moderate yellowish brown, sucrosic to fine crystalline, vuggy
1694-1695				to compact, well cemented, moderately hard to hard; Limestone, trace, white to yellowish gray, fine grained, vuggy,
1695-1696				poorly cemented, soft.
1696-1697				
1697-1698				
1698-1699	┇┤ ┋┋ ┪┼┼┼┼			
1699-1700		▝▋▀▍▍▍▐▐▜▜	† 	
1700-1701		▜▐▕▕▐	╎┇╎╎╎╎ ┼┼┼┼┼	
	┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	┪┼┼┼┼┼┼	 	
1701-1702		┩┼┼┼┼┼┼┼┼	╎╏╎╎┼┼ ┼┼┼┼┼	
1702-1703	┇┋┋┋	╂┼┼┼┼┼┼	╎╏╎╏ ┼┼┼┼┼	DOLOMITE-Dolomite, 100%, light brownish gray to moderate yellowish brown, sucrosic to fine crystalline, vuggy
1703-1704	┞┤┢┿┩┤┤┼┼	┇ ┤┇┦┹╁┤┼┼	┊┋┋┋┋┋┋	DODOMITE-Dolomie, 100%, ign brownish gray to moderate yellowish brown, success to line with the land of the property of the pr
1704-1705		1 1 1 1 1 1 1 1 1 1	+-8-1-6-1-1-6-5-1-1-6-6	to compact, well cemented, moderately hard to hard; Limestone, trace, white to yellowish gray, fine grained, vuggy,
1705-1706			<u> </u>	poorly cemented, soft.
1706-1707				
1707-1708				
1708-1709		$oxed{1}$		
1709-1710				
1710-1711		7		
1711-1712	╏╎┢┼┩┼╎╽ ┆	1	† 	
1712-1713		Hilli	: 	
1713-1714	┞┼┋┼┼┼┼┼┼	 		DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, light brownish gray to moderate yellowish brown and
1714-1715	┞╀┯┿╅┼┼	 		some dark gray in the bottom of interval, sucrosic to fine crystalline, vuggy to compact, well cemented,
	╏╎╏┢┿╃ ╏┼┼	 	++++++++	moderately hard to hard; Limestone, 10%, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.
1715-1716	┊ ┼╂╂┼┼┼┼	╂┼┼┼┼┼┼	┊ ╏ ┊┊ ┼┼┼	moderately hard to make, Emissione, 1076, while to your many grown, 2007, 1076
1716-1717	- - - - - - -	1	 - - - - - - - - - - - - - - - - - - -	
1717-1718	┠╫┦ ┞┵┼┼┪ ╫	╂┼┼┼┼┼┼	 - - - - - - - - - - - - - - - - - - -	·
1718-1719	┃ ┆┢╇╇╬╃┩ ┞	1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +	 	
1719-1720				
1720-1721		1444444	<u> </u>	
1721-1722	 	 	<u> </u>	
1722-1723		1111111	+4++++++	DOLONGTO METELLITTED IN ACCTONIC Delemite 000/ light k-comish arous to moderate wellowish become and
1723-1724			111111111111	DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, light brownish gray to moderate yellowish brown and
1724-1725	1.11.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1	14444444	. [some dark gray in the bottom of interval, sucrosic to fine crystalline, vuggy to compact, well cemented,
1725-1726		144444	:1-11:11:11:11	moderately hard to hard; Limestone, 10%, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.
1726-1727		11-1-1-1-1-1-	. [
1727-1728	السلسل ا		البلبلباراة	
1728-1729			<u>. [] [] [] [] [] [] [] [] [] [</u>	
1729-1730				
1730-1731				
1731-1732	Hiti Milli	THITT		
1731-1732	▎ ▎ ▎		<u> </u>	
1732-1733	│ ┼┼┼ <mark>┃┼┼</mark> ┼┼	1+++++	1	DOLOMITE WITH VERY LITTLE LIMESTONE-Dolomite, 95%, 50% light brownish gray to moderate yellowish
1734-1735		111111		brown and 50% dark gray, fine crystalline, vuggy to compact, well cemented, moderately hard to hard; Limestone,
	 		+	5%, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.
1735-1736		1		And write to leave the Bush time Bushess (2001) Land a second of the sec
1736-1737	L			
1737-1738	 	<u> </u>		
1738-1739		14444		
1739-1740				



Depth Below		Penetr	atio nin/fl		te				Description		
Pad Level (ft)		10	ern V/I		20						
	1 1 1 1 1 1 1 1	TILL		111		11	ПТ	ī			
1740-1741	┊┋ ┋	+++	₩	+++	H		H +	$^{+}$			
1741-1742	╀	┪┼┼	₩	+++	Н	++	H	+			
1742-1743		╼┩┼┼┼	┼┼	₩	Hi	+	H +	╁	DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, moderate yellowish brown, sucrosic to fine crystalline,		
1743-1744	┦┦╏┼┼┼┼ ╌	+++	 	₩	Н	+		╁┼	vuggy, well cemented, hard; Limestone, 10%, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.		
1744-1745	╀╂┼┼┼			₩	Н	╁	++	╁	Va ₆₆), well contained, and a summer of the contained of		
1745-1746 1746-1747	╫╫┼┼┼	+++	++-	╁┼┼	Н	+	111	$\dagger \dagger$			
1747-1748	╫╫	+++	Ht	H	Ш	††		\dagger			
1748-1749	╫╫	+++	H	H		$\dagger \dagger$	Π	Ħ			
1749-1750	╁╂┼┼┼	+++		H	П	11		П			
1750-1751			Π	Ш		П		П			
1751-1752		HH		Ш				П			
1752-1753				Ш		Ш		\coprod	Total Control of the		
1753-1754				Ш	Ш	Щ	Ш	\coprod	LIMESTONE AND DOLOMITE-Limestone, 50%, very pale orange, fine grained, vuggy, moderately well comented,		
1754-1755		$\parallel \parallel \parallel \parallel$	Ш	##	Ш	4	-	1	moderately hard; Dolomite, 50%, dark yellowish orange, microcrystalline, vuggy, well cemented moderately hard		
1755-1756			Ш	111	Ш	4	H	#	to hard.		
1756-1757		\coprod	Ш	Ш	Ш	4	Ш	#			
1757-1758			Ш	Ш	Ш	41-	Ш	4			
1758-1759		_	Ш	Ш	Ш	4	-	$^{+}$			
1759-1760		444	Щ	Щ	Ш	4	Щ	+			
1760-1761	┊┋┋	1411	1-1-1	111	Ш		\mathbb{H}	H			
1761-1762		4		111	Ш	4	1	H			
1762-1763				111-	Ш	41	1	1	- or or other AND AMEDIA LITTLE LINGESTONE Delegate 1009/ 909/ light grow to dark grow 20% moderate		
1763-1764		1111	Ш	Ш	Ш	11-	11	11	DOLOMITE AND VERY LITTLE LIMESTONE-Dolomite, 100%, 80% light gray to dark gray, 20% moderate yellowish brown, microcrystalline, vuggy, well cemented, hard; Limestone, trace, very pale orange, fine grained,		
1764-1765		1111	Ш	Ш	Ш	4		1			
1765-1766	<u> </u>	-1-1-1	$\sqcup \sqcup$	111	Ш	#		#	fossiliferous, vuggy, moderately cemented, soft.		
1766-1767	╎╎ ┢┷┷┩╎┞╸		Ш.	144		- -		₽			
1767-1768	 ┷╃		111	111-	Ш	- -		╀			
1768-1769	 ∔┼╂┼┼		 	H	$\left \cdot \right $	+		╫			
1769-1770	┊ ┼┋┼┼┼┼		+++	₩	H	₩	++	H	·		
1770-1771	┼ ┞╏┟┼┼┼╌	+++	++	111	Н		H	H			
1771-1772 1772-1773	┼╂┼┼┼	-1-+-	+++	+	H	$^{+}$	1	H			
1773-1774	┽┼╂┼┼┼┼	-	H	†††	\Box	11		Ħ	DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, vuggy, well		
1774-1775	╫╫╫		H	111	Ш	11		Ħ	cemented, hard.		
1775-1776	╅┇┼┼┼			Π	П	1,1		П			
1776-1777	++ - 		Ш	Ш							
1777-1778			Ш	Ш	Ш	II	Ш	Ш			
1778-1779			Ш	Щ	Ш	11.	Щ	H			
1779-1780			Ш		Ш		Ш	ļi.			
1780-1781			ĻΠ	μĪ	Ш	ijĹ	14	ļĻ			
1781-1782		1111	H	111			.+.	H			
1782-1783			.	1-4-4			++	H	DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, vuggy, well		
1783-1784	4444+		+++	+++	+	++-	+++	H	cemented, hard.		
1784-1785	+		++	+++	1++	÷÷	+++	+	lecinetics, nare.		
1785-1786			++-	++	ļ.,.,			H			
1786-1787	1-1-11-1		1		ļ :		,	••			
1787-1788		12.1.1		•	1	- • - •		-			
1788-1789 1789-1790	1		+ + -			+	!-				
1789-1790				_	۳	-					
1790-1791		-	111		1	. :	· ·	4 - 4-			
1792-1793			11					:	in the state of th		
1793-1794			i- i i i		1		 L		DOLOMITE AND VERY LITTLE LIMESTONE-Dolomite, 95%, pale yellowish brown to moderate yellowish		
1794-1795			r i i						brown, microcrystalline, vuggy, well cemented, hard; Limestone, 5%, very pale orange, fine grained,		
1795-1796	—		111	1 - 1	T				fossiliferous, vuggy, moderately cemented, soft.		
1796-1797					1						
1797-1798					1						
1798-1799				•							



Depth Below		Penetration	Rate	Description				
Pad Level		(min/ft)						
(ft)		10	20					
1800-1801								
1801-1802	┆╎ ╎╎┆┆┋	 						
1802-1803	╎╎╎╏╏ ╏	╂┼┼┋┼┼╬┼	- 					
1803-1804		1	╅╂┼┼┼┼┼┼	DOLOMITE-Dolomite, 100%, 50% pale yellowish brown to moderate yellowish brown, 50% medium gray to dark				
1804-1805	┊┊┋┋ ┋		┤╏╏╎┼╏╏ ┼┼┼	gray, microcrystalline, vuggy, well cemented, hard; Limestone, trace, very pale orange, fine grained, fossiliferous,				
1805-1806				vuggy, moderately cemented, soft.				
	╎╎┋┊┤╎┊ ┼	╂╁╁┼┼┼	 					
1806-1807	╀╂╃┼┼┼┼	╂┼╁┼┼┼┼	┤╂╎╎┤┼╎ ┼┼┼┼					
1807-1808	┼╀╂┼┼┼┼┼	▋ ┼╎╎┼┼┼┤	- 					
1808-1809	╀	} 	╌╂┼┼┼┼┼┼┼					
1809-1810			- - - - - - - - - - - - - - - - - - -					
1810-1811		11444						
1811-1812								
1812-1813			<u>- </u>	The state of the s				
1813-1814		1111111	<u>╶╁╂┼┼┼┼┼┼</u>	DOLOMITE - Dolomite, 100%, 80% pale yellowish brown to dark yellowish brown, very-fine crystalline, vuggy,				
1814-1815		14444		well cemented, 20% medium gray to grayish black, very-fine crystalline, slightly vuggy, well cemented.				
1815-1816	<u> </u>		<u> </u>					
1816-1817		<u> </u>						
1817-1818								
1818-1819								
1819-1820								
1820-1821	11							
1821-1822	† 1 111111							
1822-1823	 							
1823-1824	 	┱┼┼┼┼┼		DOLOMITE - Dolomite, 85%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray				
1824-1825	 	▋ ┼╎╎┼┼┼	<u> </u>	to medium dark gray, very-fine crystalline, vuggy; Limestone, 15%, very pale orange to yellowish gray, very-fine				
1825-1826		┩ ╎┼┼┼┼┼┼	╅╻┼┼╅┼┼┼	grained, poorly cemented.				
1826-1827	▋┼┼┼┼┼┼	1+++++	<u>╂╏┾┼┼┼┼┼┼</u>					
1827-1828	▋╁╁┼╂┼┼	$\{ + + + + + + + + + + + + + + + + + + +$	╁ <u>┞┼┼┼┼</u> ┆					
1828-1829	┞╎┊ ┪┼┼┼	 	┼┠╎┼┼┼┼┼┼ ┤					
1829-1830	┼┼┼┼┋┼┼┼┼	╂┼┼┼┼┼┼┼	┼┠┼┼╎╎┼┼┼╎┞┫					
		HHHHH	-{ - - - - - - - - - - - - - - - - - -					
1830-1831	╎╎╎┞╬┪ ┼	$\{++++++++++++++++++++++++++++++++++++$	┼╏┼╎┼┼┼┼┼┼┦					
1831-1832	┆┢╧╪╧┩ ┞	1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 +	┼╏╎╎┊┤╎┊╞┤ ╏					
1832-1833	╎ ┇┼┼┼┼┼┼	$\{+,+,+,+,+,+,+,+,+,+,+,+,+,+,+,+,+,+,+,$	┊╏╎╎╡╏╏┋	DOLOMITE AND SOME LIMESTONE - Dolomite, 70%, pale yellowish brown to dark yellowish brown with trace				
1833-1834	┼┋ ┼┼┼┼┼┼┼	 	┊╏╞ ┼┼┼┼┼┼┼╂	amounts of medium gray to medium dark gray, very-fine crystalline, vuggy; Limestone, 30%, very pale orange to				
1834-1835	╀┇┼┼┼┼┼	H + H + H + H	┼╏┼╎╎╎ ┼┼┼					
1835-1836	H	1	┼╂┼┼┼┼┼┼┼	yellowish gray, very-fine grained, poorly cemented.				
1836-1837	 -	$\blacksquare \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box \Box$	<u>┼┠┼┞┼┼┼┼┞</u>					
1837-1838	╽ ╏╅┪┪┩	$\{1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,$						
1838-1839			<u> </u>					
1839-1840								
1840-1841								
1841-1842								
1842-1843								
1843-1844				DOLOMITE - Dolomite, 80%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray				
1844-1845		П		to medium dark gray, very-fine crystalline, vuggy; Limestone, 20%, very pale orange to yellowish gray, very-fine				
1845-1846		 		grained, slightly fossiliferous, poorly cemented.				
1846-1847								
		1 + - + - + - + - + - + - + - + - + - +						
1847-1848	<u>₿</u> ┼╎╌┼┼┼┼┼┼	<u> </u>						
1848-1849	خابا بهضا	1	+					
1849-1850								
1850-1851	أنني للن							
1851-1852								
1852-1853				DOLOMITIC LIMESTONE – Dolomitic Limestone, 95%, pale yellowish brown to medium light gray, microcrystalline, well cemented; Limestone, 5%, very pale orange to yellowish gray, very-fine grained, poorly cemented; Dolomite, trace, moderate yellowish brown, vuggy, very-fine crystalline.				
1853-1854								
1854-1855								
1855-1856		1						
1856-1857	1							
	1	· · · · · · · · · · · · · · · · · · ·						
1857-1858								
1857-1858 1858-1859								



Depth Below	v				Penetration Rate (min/ft)												Description				
Pad Level							^	(1	min	ı/ft)		20					·				
(ft)	4				1.7	1	0			1 1	7.7	20	7.7		,						
1860-1861 1861-1862	+	H	+	H	Н	+	4	H	₩	₩	#	Н	₩	H	+	4					
1862-1863	+		+	H	Н	+		Н	Н	H	H	Н	+	H	+	+					
1863-1864	+	+	+	Н	H	Н	+	+	\parallel	H	H	H	H	111	+	+	DOLOMITE – Dolomite, 85%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray				
1864-1865	†		+	H	H	H	†	+	H	H	††	H	+	†††	+	+	to medium dark gray, very-fine crystalline, vuggy; Limestone, 15%, very pale orange to yellowish gray, very-fine				
1865-1866	t		t	H	Ħ	Ħ			\parallel	\parallel	H	H	††	111	\parallel	+	grained, poorly cemented, partially dolomitic.				
1866-1867	T		1		П	Ħ	Т		IT	Ħ	\sqcap	Ħ	Π		T	T	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,				
1867-1868	Ι		I		П	П					П		П			L					
1868-1869	┰	Ш	Ĺ	1	Ц	Ц	Ш	Ш	Ш	Ш	Ш	Ш	Ш	Ш	Ш	Ш					
1869-1870	1		1	1	Ц	Ц	Ш	Ц		Ц	Ш	Ш	Ш	Ш	Ш	П					
1870-1871	╀		\perp	+	4	H	\mathbb{H}	Н	Щ	H	Н	${\mathbb H}$	1	11	\mathbb{H}	\parallel					
1871-1872 1872-1873	╀	-	+	+	+	H	+	+	+	+	1	H	\vdash	-	H	+					
1873-1874	+		+	ł	+	Н	+i	+	+	⊬	Н	+	+	+	H	\mathbb{H}	DOLOMITE AND LIMESTONE Delegate 650/ and college to the state of				
1874-1875	+		†	$^{+}$	+	H	H	H	Н	H	Н	+	\vdash	+	H	Н	DOLOMITE AND LIMESTONE – Dolomite, 65%, pale yellowish brown to moderate yellowish brown, very-fine crystalline, vuggy, moderately cemented; Limestone, 35%, very pale orange to yellowish gray, partially crystalline,				
1875-1876	1	1	П		+	Ħ	Ħ	Ħ	П		\top	t		††	#	Ħ	dolomitic, poorly to moderately cemented.				
1876-1877				Ī	Ţ	I	\prod	\prod	\prod			1		\prod	\prod	Ħ	·, , ···············				
1877-1878			П	П	T	\prod	П	П	\prod	\perp				\prod	П	\prod					
1878-1879	Ц		Ш	Ц	1	H	Ц	Ц	Ц	П	Ш	\perp	Ш	Ш	Ц	Ц					
1879-1880	Ц	Ц	Ц	Ц	+	Ц	Ш	4	\sqcup	4	Щ	Щ	Щ	#	11	Ц					
1880-1881	H	1	H	H	+	4	H	#	#	-	$\downarrow \downarrow$	+	\sqcup	#	#	\sqcup					
1881-1882 1882-1883	H	-	H	H	+	\mathbb{H}	-	+	++	\mathbb{H}	+	+	+	#	H	\mathbb{H}					
1883-1884	H	+	+	Н	+	Н	Н	Н	H	+	+	+	Н	+	╁	Η,	IMESTONE AND DOLOMITE. Limestone 50% commede comme to collection.				
1884-1885	H	H	H	H		H	H	H	H	\dagger	+	$\dagger \dagger$	+	++		Ħ,	LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange to yellowish gray, very-fine grained, partially very-fine crystalline, slightly dolomitic; Dolomite, 50%, pale yellowish brown to moderate yellowish brown,				
1885-1886	Ħ	1	П	П	t.	t	Ħ	Ħ	Ħ	П	$\dagger \dagger$	11	Ħ	†	H	Ħ,	very-fine to fine crystalline, vuggy, moderately-well cemented.				
1886-1887	П		П	Ħ	П	1	Π	\parallel	11	11	Π	Ħ	\prod	П	П	The state of the s					
1887-1888	П	П					П	П	П	П		11	Ti	T							
1888-1889		П	П				П	П	П	П	П	ΠĪ	П	П							
1889-1890	H		П		П				П						Ī						
1890-1891	П		П	Ц	П	T	Ш	Ш	П	П	П	П	П	Ш		П					
1891-1892	H	\downarrow	1	L	П	1	Щ	Ш	Н	Н	\coprod	4	4	Ш	- -						
1892-1893	H	\vdash	H	4	-		+	H	H	#	\bot	\mathbb{H}	H	Ш	-	Η,	THE CONTROLLE AND POLICE OF THE PARTY OF THE				
1893-1894 1894-1895	-	+	H	H	Н	╁		ŀŀ	⊬	H	╁	+	++		+	- 1	IMESTONE AND DOLOMITE – Limestone, 50%, very pale orange to yellowish gray, very-fine grained, partially				
1895-1896	+	H	H		Н	1		-	H	Н	††	H	H		+	-[`	ery-fine crystalline, slightly dolomitic; Dolomite, 50%, pale yellowish brown to moderate yellowish brown, ery-fine to fine crystalline, vuggy, moderately-well cemented.				
1896-1897	H	+	+	+	Ħ	1		H	H	Ħ	$\dagger \dagger$	H	H	Ш	+	- '	ery-fine to fine crystamine, vaggy, moderatery-wen cemented.				
1897-1898	I		1	1	† †			-	1	Ħ	11	Ħ	Ħ	Ш		1					
1898-1899	I		I		Π	L		Ι		П					H						
1899-1900	ľ	L		I	ij	L				Π	i	Ш	I			\perp					
1900-1901	4	Ш		Ţ	H	Į,	Į,	-		H	\prod	ļΤ	1-	Щ	П	Γ					
1901-1902	4		- -	Ļ	H	H	- -	Ц	4	나	H	H	4	Щ	44	-					
1902-1903 1903-1904	-	H				1			-	ļ.	-		+-	+	+		IMECTONE AND DOLOMITE Limited FOR				
1903-1904	-+		+	1	-	H	+-	.l.i		<u>.</u>	-	 - -	-	+	++	L.	IMESTONE AND DOLOMITE – Limestone, 50%, very pale orange to yellowish gray, very-fine grained, partially ery-fine crystalline, slightly dolomitic; Dolomite, 50%, pale yellowish brown to moderate yellowish brown,				
1905-1906	+	-	+	÷	+	-	+	++	+	H	+		 -	++	++		ery-fine crystainie, sugnity dolomitic; Dolomite, 50%, pale yellowish brown to moderate yellowish brown, ery-fine to fine crystalline, vuggy, moderately-well cemented.				
1906-1907	+1	Ш	†	-	+		++				1	† - †	 	11	Ħ	1	,				
1907-1908			*** ! !			ľ	7	1							11						
1908-1909				1																	
1909-1910				1		L					\perp										
1910-1911		4.	-	į.,	- <u>-</u> -	L			-		Γ,		Ξ.								
1911-1912	- ‡	14	÷÷	+		H	÷÷	<u>;</u> ;			1				; ;4.						
1912-1913	4.	14	4 -	1	-		<u>.</u>	÷ .			1		- -		DOLOMITE AND LIMESTONE Delevis 2007 1 11 111						
1913-1914							14								DOLOMITE AND LIMESTONE - Dolomite, 75%, pale yellowish brown to moderate yellowish brown, very-fine						
1914-1915			+-	+		-		÷÷	-1-1		1	- :		÷	crystalline, vuggy; Limestone, 25%, very pale orange to yellowish gray, very-fine grained, slightly fossiliferous, poorly cemented.						
1916-1917		+	+ -			٠	<u></u> -	+ :			1.		<u>}</u>								
1917-1918		1		•	÷	- +-	- +- -	·					-ii								
1918-1919	-			-	1						1										
1919-1920		1.	: :			•					1										
				-		_				_	ــــــــــــــــــــــــــــــــــــــ				-	٠.					



Davida Dalawa	Penetration Rate		Description	
Depth Below Pad Level	(min/ft)			
(ft)	10 20			
1920-1921				
1921-1922		$\coprod \uparrow$		
1922-1923		Ш		
1923-1924			DOLOMITE - Dolomite, 70%, pale yellowish brown to dark yellowish brown with trace amounts of medium dark	
1924-1925		Ш	gray to grayish black, very-fine crystalline, vuggy; Limestone, 30%, very pale orange to yellowish gray, very-fine	
1925-1926		Ш	grained, partially crystalline, poorly cemented.	
1926-1927		Ш		
1927-1928	<u>┖╌╎┧┇</u> ┇┇╌┼╏╌╬╬┼┼┼┼┼┼┼	Ш		
1928-1929	┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	Н		
1929-1930	▊ ▋▋▋▋▋			
1930-1931	╏╏┢┢┾╇╇╃ ┦╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼			
1931-1932	<u>┡╃╊╀╬╬╃╃╃╀╫┼┼┼┼┼┼┼┼┼┼┼</u>	Н		
1932-1933	▎ ▊▄▄▗ ▄▗▗▗▗▗▗▗▗▗	H	DOLOMITE – Dolomite, 70%, pale yellowish brown to dark yellowish brown with trace amounts of medium dark	
1933-1934 1934-1935	┠┼╂┼╂┼╏┼┼╏┼┼╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼	H	gray to grayish black, very-fine crystalline, vuggy; Limestone, 30%, very pale orange to yellowish gray, very-fine	
1934-1935	┠┼┋╎┢┿╃╎╎┟╏┆┆╏┼┆╎╎┆┆╏ ┼┼┼┼┼┼┼	#	grained, partially crystalline, poorly cemented.	
1936-1937	┠┼╁┼╂┼┼┼┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	H^{+}		
1937-1938	┠╁╁┼╏┼┼┼┼┼┼┼┼┼┼	1		
1938-1939	┠╫ ╒╒┩ ╫┼┼┼┼┠╫╫┼┼┼┼┼┼┼┼┼	Π		
1939-1940	<u>┠┼</u> ╟┼┼┼┼┼┼┼┼┟┟┼ <u>┤</u> ┼┼┼┼┼┼┼┼┼┼┼┼┼	Ш		
1940-1941				
1941-1942		Ш		
1942-1943		Ш	DOLONGER D. L	
1943-1944	┠┼ ╏╏╎╎╎╎╎╎╎ ╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	-	DOLOMITE – Dolomite, 70%, pale yellowish brown to dark yellowish brown with trace amounts of medium dark gray to grayish black, very-fine crystalline, vuggy; Limestone, 30%, very pale orange to yellowish gray, very-fine	
1944-1945	┠┼╏╀╎┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	gray to grayish black, very-fine crystalline, vulggy, Limestone, 30%, very pale blange to yenowish gray, very-fine grained, partially crystalline, poorly cemented.		
1945-1946	┠┼╂┾┼┼┼┼┼┼╂┼┼┼┼┼┼┼┼╂┾┼┼┼┼			
1946-1947 1947-1948	<u>┠</u> ┾ <u>╫╫┼┼┼┼┼┼</u> ┼┼╂ ┆╎╎┞ ┼┼┼┼┼┼┼┼┼			
1948-1949	▊ ▗ ▐▊▍ ▗ ▐▐▐▗▗▄▐▐▗▍▍ ▕ ▐▐			
1949-1950				
1950-1951		Ш		
1951-1952		Ш		
1952-1953	<u>┇╃┇┩┦┧┩╃╃┩</u>	- -	DOLOMITE – Dolomite, 70%, pale yellowish brown to dark yellowish brown with trace amounts of medium dark	
1953-1954	┇ ╪ <u>╫┼┼┼┼┼┼╂┾┼╎┼┼┼┼┼┼┼╂┼┼</u>	#	gray to grayish black, very-fine crystalline, vuggy; Limestone, 30%, very pale orange to yellowish gray, very-fine	
1954-1955	┠┼╏┼╎┼┼┼┼┼	+	gray to grayish black, very-line crystalline, vuggy, Ethiestonic, 30%, very paic orange to yellowish gray, very-line grained, partially crystalline, poorly cemented.	
1955-1956 1956-1957	┠┼┠┼┼┼┼┊┼┟┼┼┼┼┼┼┼┼┼┼┼┼┼	++	Brancas barrand a Joanning board assurement	
1956-1957	┠┼ <u>╏</u> ┼┼┼┼ ┆┊╏╏┼┼ ┼┼┼┼┼┼╂┼┼┼	111		
1958-1959	<u>▐</u> ▗╫ <u>▊</u> ▗▄▎▞░▗▗▗▐▍▞░▍▕ ▍ ▗▞░▋▗▐▗▍▜▐			
1959-1960				
1960-1961				
1961-1962		14		
1962-1963	<u>┇┋</u> ╏╁╬┇┼╬╏╬╏┼╫╬╬	44	DOLOMITE – Dolomite, 95%, moderate yellowish brown to dark yellowish brown, microcrystalline to very-fine	
1963-1964	┠╛┫┾┽┾┼┼┼┼┼┼	+	crystalline, porous, vuggy, moderately to well cemented; Limestone, 5%, very pale orange, very-fine grained,	
1964-1965	┠╬╏╫╫╫╫╫╫╫╫╫╫╫╫	HH		
1965-1966 1966-1967	┠╁╂┼┧╁┾┾┶┧╂╘┼┵╍┼┼┷╏┪┪╗┪╢╬╸		poorly cemented.	
1967-1968	┠╫╂╫╫┸╫╫	+++		
1968-1969				
1969-1970		II		
1970-1971				
1971-1972				
1972-1973			000/ 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	
1973-1974			DOLOMITIC LIMESTONE AND SOME DOLOMITE - Limestone, 90%, very pale orange to pale yellowish brown,	
1974-1975			very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%,	
1975-1976		moderate yellowish brown to dark yellowis	moderate yellowish brown to dark yellowish brown and little medium dark gray, very-fine crystalline, vuggy,	
1976-1977			unconsolidated, calcareous.	
1977-1978				
1978-1979		+		
1979-1980				



Depth Below	Penetration Rate (min/ft)		Description				
Pad Level	10 20						
(ft)							
1980-1981	┆╏╎╎╎┆╎┆╏╎┦╏╎╎╏╎╎╏ ┼┼┼┼┼┼┼┼┼┼┼	┼┼┼┼┼┼					
1981-1982	╎╏╎╎╎╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	╂┼┼┼┼┼					
1982-1983	┆╏┊╎╎╎┆┆┆ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	┼┼┼┼┼	DOLOMITIC LIMESTONE AND SOME DOLOMITE - Limestone, 90%, very pale orange to pale yellowish brown,				
1983-1984	┆┇╏╎┊┊┊┊┈ ╂┼┼┼┼┼┼┼┼┼┼	HHHH	very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%,				
1984-1985	╀	+++++	moderate yellowish brown to dark yellowish brown and little medium dark gray, very-fine crystalline, vuggy,				
1985-1986	<u>┆╫┾┦╎╀┧╎┾╂╎┾┼</u> ┼┼┼┼┼┼┼	+++++	unconsolidated, calcareous.				
1986-1987	┆╏┆┊╎╎╎┆┊╏┆╎ ┼┼┼┼┼┼┼┼	++++++	miconsolidated, calculosus.				
1987-1988	┆╏┊┊┆┆┊┊┆╏ ┼┼┼┼┼┼┼┼┼┼┼	┼┼┼┼┼					
1988-1989	┆╏┆╡┊┊┊┋ ┼┼┼┼┼┼┼┼┼	++++++					
1989-1990	┖ ┛┼┼┼┼┼┼┼┼┼┼						
1990-1991	┦┇┼┼┦┸┼┼┼┼┼┼┼┼┼┼┼┼┼	HHHH					
1991-1992	╎ <u>┇┊┤┤╃╏┆╃╃╏┼┼┼┼┼┼┼┼</u>	++++++					
1992-1993	┴▊┵┵┼┼┼┼┼┼┼┼┼┼┼┼┼┼	+++++	DOLOMITE - Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline to very-fine				
1993-1994	▗▐ ▗▗▗▗▗▗▗ ▗▐	HHHH	crystalline, porous, vuggy, moderately to well cemented; Limestone, trace, very pale orange, very-fine grained,				
1994-1995	╷ ┇╏╎┊╎┊┤┊╏┋┊ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	┼┼┼┼┼	poorly cemented.				
1995-1996	┊╏┊┊┊┊┊┊┊┋ ╀╫┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	 	poorty comonica.				
1996-1997	╎╏╎╎╎╎┊┆╎ ╏┼┼┼┼┼┼┼┼╂┼┼	┼┼┼┼┼					
1997-1998	╎ ╏┼ ┊╎╎╎╎┞╏╎╎┞╏╎╏╏╏	┼┼┼┼┼					
1998-1999	┊ ╏┼ ╎╏╏╏╏╏	╁┼┼┼┼┼					
1999-2000	┆ ╟┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼						
2000-2001	┼╂┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	 					
2001-2002	╎ ╏┼ ╎╎╎╎╎┊ ┠┼┞┼┼┼┼┼┼╂┼	╫╫╫					
2002-2003	┊ ╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	╫╫╫	DOLOMITE AND SOME DOLOMITIC LIMESTONE - Dolomite, 85%, moderate yellowish brown to dark				
2003-2004	┆ ┠┼╎┼┼╎┼┼┞┼┼	+++++	vellowish brown, very-fine to fine crystalline, yuggy, multiple limestone inclusions, moderately to well cemented;				
2004-2005	╷╏╎╎╎╏╎╎ ┼┺┽┼╄┽┾╪┼╂┿┼		Dolomitic Limestone, 15%, very pale orange to yellowish gray, very-fine to fine grained, partially crystalline,				
2005-2006	 ╀╫╫╫	+++++	slightly fossiliferous, poorly cemented, vuggy.				
2006-2007	╌ ┩ ┼┼┼┼┼┼┼╂╃┼┼┼┼┼┼┼┼┼┼┼┼┼	++++++					
2007-2008	╀╫╀┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	+++++					
2008-2009	┆ ╏┼ ╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	+++++					
2009-2010	▗ ▋ ▗┊ ╎┼┼┼┼						
2010-2011	╵╏╎┼┼╎ ╎┼┼┼┼┼┼┼┼┼┼┼┼┼	┼┼┼┼┼┼					
2011-2012	┇ ┋┋	++++++					
2012-2013	╌╏┼┼┼┼┼┼┼┼┼┼┼┼	+++++	DOLOMITIC LIMESTONE AND SOME DOLOMITE - Limestone, 90%, very pale orange to pale yellowish brown,				
2013-2014	╎╏┊┊┊┊┊╸╸ ┼┼┼┼┼┼┼┼┼┼┼┼	┼┼┼┼┼	very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%,				
2014-2015	╎ ┠ ╎┊╎┊╎┊╎╒╏	+++++	moderate yellowish brown to dark yellowish brown and little medium dark gray, very-fine crystalline, vuggy,				
2015-2016	╬ ╏╫╫╫╫╫		moderately hard.				
2016-2017	▗ ╎ ┡╧┪ ┼┼┼┼┼╏ ┊ ┼┞┽┼┼┼┼┼┼╏ ┋ ╏	++++	moderately limbs.				
2017-2018	┈┼╫┼┼┼┼┼	+					
2018-2019	╶╁╎┼╏╎┼╁╟┼╂╟┼╏╢┼┽┼╎┼┼┶┼╏┦┈┼┄	+++++					
2019-2020	▗ ▗▗▗▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗ ▗						
2020-2021	<u>╶</u> ╁┼┆ ║┼┼ ┼┞┼╏┼┼╟┼┼╟┼┼┼╂┸┼┤	+++++++					
2021-2022	▗ ┆ ╏╏╏╏╏	4					
2022-2023	▗ ┆┟╬ ┩┍╈╬╏┆╏ ┼┼┼┼┼┼┼┼┼	H-++++++	DOLOMITIC LIMESTONE, LIMESTONE AND SOME DOLOMITE- Dolomitic limestone, 50%, pale yellowish				
2023-2024	▗ ▗ ▗ ▗ ▗ ▗ ▗ 	+++++	brown, to medium dark gray, fine grained, dolomitic, fossiliferous, vuggy, well cemented, moderately hard;				
2024-2025	▗ ▗▗▗▗▄▄▋┆╏┈╎┆ ┊ ┆┼┆╏┼┆	1-1-1-1-1	Limestone, 40%, very pale orange, oolitic, slightly vuggy, moderately cemented, soft; Dolomite, 10%, moderate				
2025-2026			Limestone, 40%, very pate orange, counter, sugarty vaggy, moderately contented, 30tt, 2000mile, 1976, moderate				
2026-2027	<u>, a l'Olympian de l'al</u>		brown, microcrystalline, vuggy, well cemented, hard.				
2027-2028							
2028-2029							
2029-2030							
2030-2031							
2031-2032							
2032-2033		*					
2033-2034			LIMESTONE AND LITTLE DOLOMITE-Limestone, 95%, very pale orange, oolitic, slightly dolomitic, slightly				
2034-2035			vuggy, moderately well cemented, soft; Dolomite, 5%, moderate brown, microcrystalline, vuggy, well cemented,				
2035-2036		hard.					
2036-2037							
2037-2038	1						
2038-2039		na comunication of the company of th					



Depth Below	Penetration Rate	Description						
Pad Level	(min/ft)							
(ft)	10 20							
2040-2041								
2041-2042								
2042-2043								
2043-2044		LIMESTONE AND LITTLE DOLOMITE-Limestone, 95%, very pale orange, oolitic, slightly dolomitic, slightly						
2044-2045		vuggy, moderately well cemented, soft; Dolomite, 5%, moderate brown, microcrystalline, vuggy, well cemented,						
2045-2046		hard.						
2046-2047								
2047-2048								
2048-2049								
2049-2050								
2050-2051								
2051-2052								
2052-2053								
2053-2054		LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately						
2054-2055		cemented, soft.						
2055-2056	 							
2056-2057	╁ ┢╤┩ ┼┼┼┼┧╂┼┼┼┼┼┼┼┼┼╂┼┼┼┼┼┼							
2057-2058	╎┡┿┿┿┿ ┪╎╏╎┼╎┊┊┼┼╏┼╏┼┼┼┼┼┼							
2058-2059	╎╎╎╎╎╎	,						
	╎┢┾┾╬╇┩ ┼┇╢┼╢╫╫┼╂╂╂╂╫┼╂┼┼┼┼┼							
2059-2060 2060-2061	┆ ╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼							
2060-2061	┼ <u>╫┼┽┼┼┼┼┼╂┼┾┾┼┼┼┼┼╂</u> ╬┼┼┼┼┼┼							
2061-2062	┼ <u>┠╁┼┼┼┼┼┼┼╂┾╁┼┼┼┼┼┼┼</u> ┼╂╅┼┼┼┼┼┼							
2062-2063	┢┩╎┧╎┧┊┝ ┾╂╂╏┼ ┆ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately						
2064-2065	┨┼┼┊╎╎┾ ┼╏ ┼┼ ┼┼┼┼┼╏┿┼┼┞┼	cemented, soft.						
2065-2066	<u>▊</u> ┼╏ ╏╏╏╏╏╏╏╏╏ ╏┼┼┼┼┼┼┼┼┼┼┪┼┪┼┆┼┪┼	cemented, sort.						
2066-2067								
2067-2068								
2068-2069								
2069-2070								
2070-2071								
2071-2072								
2072-2073								
2073-2074		LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately						
2074-2075		cemented, soft.						
2075-2076								
2076-2077								
2077-2078	▊┊ ┵┼┼┼┷┼┼┩╪┾ [┋] ╕┼┼┼┼┨┼╀┼┼╬┼┼┼┤							
2078-2079	▊ ╪ ┆┆┆┋┊┆┆ ┇╬┼┼ ╏┆┆┆┆							
2079-2080	▊ ▍▗▘▍▘▍▗ ▍▋ ▍ ┆╏┼┼╏							
2080-2081	╉ ┦╒┇┩╏┋┋┋┋							
2081-2082	▊ ┾┼┾╀┼┼┼┼┼┼┼┼┼┼┼┼							
2082-2083	▋┼┼ ╁╁╁┼┼╂┼┼┼┼┼┼╂╂┼┼┼┼┼┼┼┼	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately						
2083-2084		cemented, soft.						
2084-2085 2085-2086	▊ ▐▗▗▗▗▗▗▗ ╒▊ ▗ ╌╏┼ ╏ ╏┼ ╏╏ ╏	ovinence, som						
2085-2086	▊▊▐▗ ▗▗▗ ▊▊▊▗▗▗ ▊██							
2087-2088								
2088-2089								
2089-2090	▊ ▎ ▗▘ ▕ ▗▘▎ ▘ ┆┆							
2090-2091								
2091-2092								
2092-2093								
2093-2094		LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately						
2094-2095		cemented, soft.						
2095-2096								
2096-2097								
2097-2098								
2098-2099								
2099-2100								

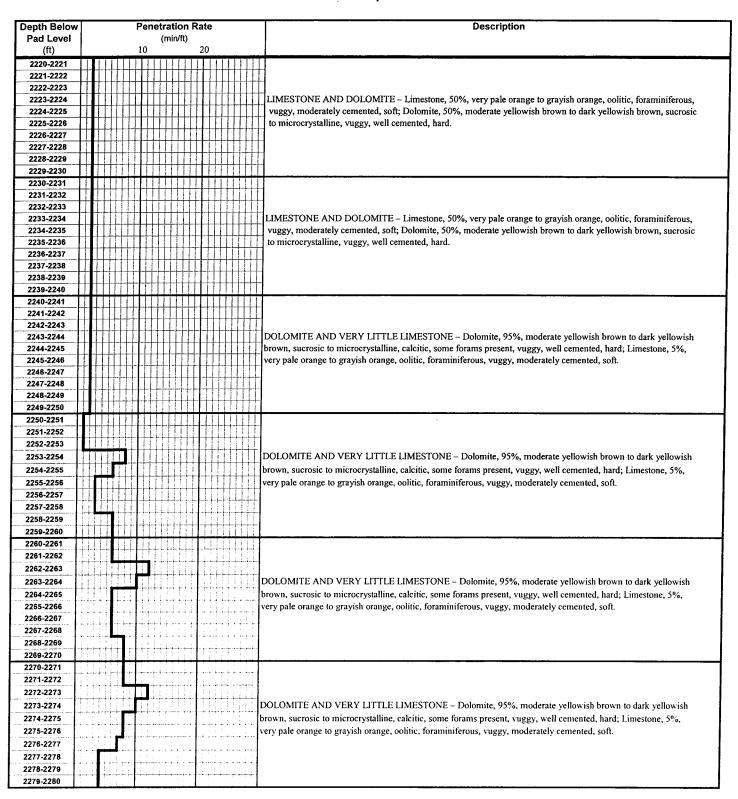


Depth Belov Pad Level	- 1					_	ļ	Рe	ne			on	R	ate	,					Description			
(ft)								10		(n	แก	/ft)		20									
2100-2101	┪	T	T			Ī	T	T	T	11	1		П	T	1		П	Τ	П				
2101-2102			I				I								T		П						
2102-2103	4		1	L	4	Ц	1	H	1	Ц	Į.	1	Ц	П	1	Ц	Ц	П	Ц				
2103-2104 2104-2105	+	H	+	L	+	Н	+	Н	+	Н	+	\perp	H	Н	+	Н	Н	\mathbb{H}	+	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately			
2105-2106	+	H	+	H	+	Н	+	H	+	H	Н	+	H	H	╁	H	H	+	+	cemented, soft.			
2106-2107	7	ı	t	h	t	H	+	H		H	Ħ	Ť	Ħ	П	t	+	H	H	+				
2107-2108	1	П		ı	T	П	Ť				Ħ	T	П	П		+	11	П	T				
2108-2109			Γ,			П	Ī				П	T		П	T	T		П	Ť.				
2109-2110	1	Ш																					
2110-2111	1	$\downarrow\downarrow$		-	1	Ц	1	Ц	\parallel	1	Ц	Ш	Ц	Ц		Ļ		Ц	Ш				
2111-2112 2112-2113	+	H	Н	-	╀	4	H	H	H	+	Н	\mathbb{H}	+	H	\mathbb{H}	-	4	H	+				
2113-2114	+	Н	Н	+	H	+	Н	+	H	+	Н	Н	+	Н	Н	+	+	H	+	POLOMITIC LIMESTONE AND DOLOMITE.			
2114-2115	+	H	H	1		+	H	+	H	t	H	Н	$^{+}$	+	Н	T	╁	H	$\dagger I$	DOLOMITIC LIMESTONE AND DOLOMITE - Limestone, 50%, very pale orange to pale yellowish brown, fine grained, dolomitic, fossiliferous, vuggy, well cemented, moderately hard; Dolomite, 50%, grayish brown to			
2115-2116	T	П	П	1		t	Ħ	1	Ħ	1	\parallel	$\dagger \dagger$	1	\dagger	Ħ	\parallel	1	1	$\dagger \mid$	medium dark gray, fine crystalline, vuggy, well cemented, moderately hard to hard.			
2116-2117	I							I		I			Ì	I					I				
2117-2118		Ц	I	Ī	П	1	Ц	1	Ц	\prod	Ц	П	\perp	Ţ	\prod	П		I	\prod				
2118-2119	+	4	4	1	Ц	1	H	1	$\!$	\coprod	\parallel		Н	+	\coprod	Ц	Ш	1	\coprod				
2119-2120 2120-2121	╀	+	+	+	Н	ļ	H	+	H	H	4	H	4	+	H	Н	+1	+	H				
2121-2122	+	-	+	1	H	$^{+}$	Н	+	\parallel	H	+	H	+I	+	H	H	Н	+	Н				
2122-2123	Ħ	1	1	t	H	t	H	t	T	\parallel	t	H	+	十	1	H	H	+	Н				
2123-2124		1	1	Ī		İ		L		П	Ī			İ		\prod	П		þ	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly dolomitic in the upper portion of interval,			
2124-2125	Ш		1	Ļ	1	L	1	Ц		Ц	I	П	П	I		П	П	T	1	foraminiferous, slightly vuggy, moderately cemented, soft; Dolomite, trace, moderate brown, microcrystalline,			
2125-2126 2126-2127	14	-	1	-	-	H	4	H	1	Н	+	H	\sqcup	\perp	+	$\!$	H	Ц	The state of the s				
2126-2127	Н	Н	+	H	+	H	+	+	+	H	+	+	H	\mathbb{H}	+	H	Н	\mathbb{H}					
2128-2129	1-	Н	t	1	+	H	+	Н	+	H	+	-	H	Н	+	+	H	H					
2129-2130	Ħ	H	T		Ť	П	T	П		H	Ħ	+	11	Ħ	t	\dagger	Ħ	††	1				
2130-2131	П	П	L		1		T					I		П				П	Ť				
2131-2132	1		1		1	Н	-	Ц		Ц	Ц		1	Ц				H					
2132-2133 2133-2134	H	H	╀	-	+	H	╀	H	+	+	Н	+	H	Н	+	į	H	H	- ,	IMPOTONE I			
2134-2135	+	Н	+	1	$^{+}$	H	t		\dagger	÷	+			H	+	+-	+	++	- L	IMESTONE-Limestone, 100%, very pale orange, oolitic, slightly dolomitic in the upper portion of interval, oraminiferous, slightly vuggy, moderately cemented, soft; Dolomite, trace, moderate brown, microcrystalline,			
2135-2136	11		T		t	П				+	H			Ħ		\dagger		H	1"	stammerous, sugardy vuggy, moderately centented, soft; Dolomite, trace, moderate brown, microcrystalline,			
2136-2137				1	L						П					1	Ī						
2137-2138	[.].	H		+	ļ.	4	L	1	Ц	-	1	H	┸	Ц.	П	1	L	Ц.	1				
2138-2139 2139-2140	\mathbb{H}	+	Н	ł	ŀ	-†-	-	+	+	+	i	44	- -		H	-	<u>.</u>	4	1				
2140-2141	-	Н		-	Н	+	H	-	Н	T	Н	Н	┿		H	+	+	+	╀				
2141-2142	+	-	H	-		†	H	t	H	H	+	H	\dagger	+		††	+	+					
2142-2143		Ļ		+		Ţ	L		I		Ħ		1		H	H	1	1					
2143-2144		Į.	_	ſ †	,]	Ţ,	-	1	ΙŢ	П]	Π		-	L	П	П	÷	L	MESTONE-Limestone, 100%, very pale orange, oolitic, slightly dolomitic in the upper portion of interval,			
2144-2145 2145-2146		+	-	-	H		H		H			Ĥ	L		1	-	+	+	fo	raminiferous, slightly vuggy, moderately cemented, soft; Dolomite, trace, moderate brown, microcrystalline,			
2145-2146	+-		•	į	. !	Ė.		4	÷	-		-	+		+	ļ	<u>.</u>						
2147-2148	i	1	. 4.			-				H	- •		1				•	+					
2148-2149						-• -1		• ;		L						. [i			j			
2149-2150		Ĺ	-								-		L										
2150-2151	-	1	- į -	-		4			-				L	-									
2151-2152 2152-2153	-]		-	-		-		4	- •	+-						: 	LIMESTONE-Limestone, 100% very pale grange, golitic, slightly dolomitie in the upper portion of instance.						
2153-2154		÷	÷	-		+-	÷			-	4		-	- :									
2154-2155	1	- + + i			Ť			÷-÷		1						LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly dolomitic in the upper portion of interval, foraminiferous, slightly vuggy, moderately cemented, soft; Dolomite, trace, moderate brown, microcrystalline,							
2155-2156			-				i	T-f		1	++				polanimiterous, siigntiy vuggy, moderately cemented, soft; Dolomite, trace, moderate brown, microcrystallin		5. 5. 7. 1-865; moderately contented, 30tt, Dolointic, trace, moderate orown, microcrystalline,						
2156-2157	[.	4						"	•		- +-							
2157-2158								: 	••••								. :	.					
2158-2159 2159-2160	.					.												.					
138-2100		٠	_	_	-	1	i	_	_				<u> </u>					_					



Depth Below	_			_	_	Pe	ne	tra	itic	n i	Raf	e	_		_	Description					
Pad Level						•			nin/1												
(ft)						10)				2)_									
2160-2161	T	П	H	1		П	П	П			П	\prod		\prod	Ш						
2161-2162	T	T	T	1			П	Π	П		\prod	\prod	П	\prod							
2162-2163	Ħ	П	П	T	П		П	\mathbb{L}	Ш		Ш	Ш	Ш	Ш	Щ	- Italia Comministrato					
2163-2164	Ī				Ш		П	П	Ш	Ш	Ш	Ц	Ш	11	Щ	LIMESTONE AND DOLOMITE-Limestone, 60%, very pale orange to grayish orange, oolitic, foraminiferous,					
2164-2165							Ц	Ш	Ш		Ш	\perp	Ш	Щ	Ш	vuggy, moderately cemented, soft; Dolomite, 40%, grayish orange to pale yellowish brown some medium gray,					
2165-2166	П			Ī		Ц	Ц	Ш		Ш	11	11	11	11	Щ	sucrosic to microcrystalline, vuggy, calcitic, well cemented, moderately hard to hard.					
2166-2167	Ц		Ш			Ц	Ц	Ш	\perp	Ц	11	4	11	11	1	<u>↓</u>					
2167-2168	Ц	Ц	Ц	1	Ш	Ц	Ц	Ш	11	Ц	Ш	Ш	11	Ш		<u> </u>					
2168-2169	Ц	Ц	Ц	1	Ц.	Ц	Ц	Н	41	Н	4	\mathbb{H}	11	Н	-	 					
2169-2170	Ц	Ц	Ц	-	Щ	Ц	Ц	Ш	44	Щ	4	Ц	4	11	Н.						
2170-2171	Ц	Ц	Ц	1	Ц.	4	Н	$^{\parallel}$	11	4	+	\mathbb{H}	++	H	-	+					
2171-2172	Ц	Ц	Ш		4	Ц	Н	11	4	\mathbb{H}	11	\mathbb{H}	╀	\mathbb{H}	}-						
2172-2173	Н	\downarrow	Н	+	4	Н	H	+	+	$^{+}$	++	\mathbb{H}	++	$^{+}$	╁┼	LIMESTONE -Limestone, 100%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately					
2173-2174	H	4	Н	+	4	H	H	$^{+}$	+	+	++	+	₩	₩	1	cemented, soft; Dolomite, trace, moderate brown to dark gray, microcrystalline, hard.					
2174-2175	\vdash	${\mathbb H}$	Н	+	+	H	H	+	++	++	╫	+	H	+	+	Comonica, sori, Soromino, davo, moderate oromino de la la la la la la la la la la la la la					
2175-2176	\vdash	+	H	+	+	╟	H	+	+	+	+	+	$^{+}$	+	+	+					
2176-2177 2177-2178	$^{+}$	+	H	+	+	+	H	+	+	+	+	$\dagger \dagger$	††	+	+	<u>†</u>					
2177-2178	+	+	H	+	+	+-	H	†	+	H	+	H	$\dagger\dagger$	†	H						
2179-2179	$^{+}$	$^{+}$	H	+	+	H	H	\dagger	Ħ	††	$\dagger \dagger$	#	††	#	1						
2180-2181	+	H	Н	t	$^{+}$	+	H	$\dagger\dagger$	Ħ	$\dagger\dagger$	Ħ	H	Ħ	††							
2181-2182	1	+	Н	$^{+}$	╫	+	H	$\dagger\dagger$	$\dagger\dagger$	Ħ	11	Ħ	11	Ħ		\Box					
2182-2183	H	H	H	t	\dagger	H	П	$\dagger\dagger$	Ħ	††		П	Ħ	11							
2183-2184	H	H	Ħ	T	T	\dagger	П	Ħ	П	П	1	П	Ti	П		DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline,					
2184-2185	\dagger	Ħ	П	T	\dagger		П	$\dagger \dagger$	Ħ	П	11	П	П	\prod		vuggy, well cemented, hard.					
2185-2186	П		П	T	T		П	П	H	П		П	П	П							
2186-2187	П	T		T				П					П	Ш	Ш						
2187-2188	IT			T				\prod	\prod	Π		П		Ш							
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2189-2190				l.		Ш	Ш	Ш	Ш	Ш	Ш	Ц	Ш	Ц	Ш						
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2191-2192	Ц	1	Ш	ļ.,		1	Ц	11	44	4	4	11	44	11		4					
2192-2193	Ш	4	П	1	4	4	H	44	\mathbb{H}	4	+	#	\mathbb{H}	+	Н	DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline,					
2193-2194	4	4	Ļ	1	4	-	H	$^{+}$	4	++	+	\mathbb{H}	H	++							
2194-2195	H	4	Н	+	-	+	H	$^{++}$	+	\mathbb{H}	+	\mathbb{H}	+	╫	-	vuggy, well cemented, hard.					
2195-2196	H	1		+-	+	+	H	H	+	╁	++	+	+	┼┼	Н	+1					
2196-2197	H	-	Н	4	H		H	++	H	++	+	++	+	╁		+1					
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2202-2203	+	H	+	+	+	-	Ħ	Ħ	H	Ħ	†	11	11	H							
2203-2204	H	1		t	-	1	1	Ti	1	11	11		11	Ħ		DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline,					
2204-2205		1		Ť	T	1		H	П	It			Π	H		vuggy, well cemented, hard.					
2205-2206	1	ľ		İ	- -			H		I	П		П	П							
2206-2207	П			Ī				П					П	H							
2207-2208				-			Π	П				Į.	Ц	11	Ш						
2208-2209				Ĺ			Lĺ	Ц	J.	44		1.1	11	1							
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2212-2213		l.,	Ì.	1			Ė	44		<u> </u>		44		LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange to grayish orange, oolitic, foraminiferous vuggy, moderately cemented, soft; Dolomite, 50%, moderate yellowish brown to dark yellowish brown, sucros to microcrystalline, vuggy, well cemented, hard.							
2213-2214		l	li		1		H	4	++	++		+∔	H								
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Depth Below	Penetration Rate	Description					
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(ft)	10 20						
2280-2281							
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2283-2284	▋▗▗▗▊ ┼ ▗▕▗▊ ┼ 	microcrystalline, vuggy, well cemented, hard; Limestone, 25%, very pale orange to yellowish gray, very-fine					
2284-2285	┇╏╒╏┫╒ ┼┼┼┼ ┇╏╘╏ ┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	grained, partially dolomitic, poorly cemented.					
2285-2286	┋┊╎┊╏╎┊╎┆╎╏╏╎╎╎╎╎╎ ┼┼┼┼┼┼┼┼┼┼┼┼┼	grained, partially deformate, poorly conference.					
2286-2287	┖ ┤╀┼╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	1					
2287-2288	▊▃▗▗▐▗▗▗▗ ▗▗▗▗▗▗▗ ▗	4					
2288-2289	┇ ┼┼╫╫╫╫	-					
2289-2290							
2290-2291	▋▍▞ ▗▊ ▞▗▗▞ ░▋ ▐▗	4					
2291-2292	┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	4					
2292-2293	 ┇┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋┋	DOLOMITE AND SOME LIMESTONE – Dolomite, 75%, moderate yellowish brown to dark yellowish brown,					
2293-2294	┠╎╎╎╟╎┼╎╎┼╏┆╎╎╎╎╎╏ ┼╂┼┼┼┼┼┼┼┼┼┼┼┼	microcrystalline, vuggy, well cemented, hard; Limestone, 25%, very pale orange to yellowish gray, very-fine					
2294-2295	┇╎╎╎┡╪╪┿ ┪╎╏┼┼┼┼┼┼┼┼╏┞┼┼┼┼┼┼┼┼						
2295-2296	▋▎▍▍▄▙▄ ▋╏▋ <u>╎┦┞</u> ┊┦╎┞╂╀┼┼┼┼┼┼┼	grained, partially dolomitic, poorly cemented.					
2296-2297							
2297-2298							
2298-2299							
2299-2300							
2300-2301							
2301-2302							
2302-2303							
2303-2304		DOLOMITE - Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, slightly					
2304-2305	┠ ┢┼┼ ╤┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	vuggy, well cemented, hard; Limestone, trace, very pale orange to yellowish gray, very-fine grained, partially					
2305-2306	┠┋┼┼┼┼┼┼┼┼┠┼┼┟┼┼┼┼┼┼┼┼┼	dolomitic, poorly cemented.					
2306-2307	┠╏┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼						
2307-2308	┠╻┼┼┼┼┼┼┼┼┼						
2308-2309	<u>┠</u> ╫╫╫╫╫╫						
2309-2310	┠╻┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼						
2310-2311	┠ ╫╫╫╫╫╫						
2311-2312	┠┫┼┼┾┼┼┼┼┼╂╂┼┼┼┼┼┼┼┼┼┼╂						
2317-2312	<u>┞</u> ╟┼╀┊┼┼┼┼┼╁┼┼┼┼┼┼┼┼┼╂┼┼┼┼┼┼┼						
2312-2313	┠╏┼┼╎┼┼┼┼┼┠╏┼┼┼┼┼┼┼╏┼┼╏┼┼┼┼	DOLOMITE - Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, slightly					
2314-2315	┠╋╁┼╁┾┾┼┼╂╂┼┼┼┼┼┼┼┼┼┼╂┼┼┼┼┼┼┼┼┼┼	vuggy, well cemented, hard; Limestone, trace, very pale orange to yellowish gray, very-fine grained, partially					
2315-2316	┠╻╫┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼	dolomitic, poorly cemented.					
2316-2317	┠╫╟┼┼┼┼┼┼┼╂┼┼┼┼┼┼┼┼┼╂	, F ,					
2317-2318	┠ <u>╏╫╫╫╫╫</u>	<u>'</u>					
2317-2316	┠ ╏┊╒╒╒┋╒╒┋╒╒┋╒╒						
2319-2320	┠┫╁┡╫┼┼┧┼┼╟╬┼┼┼┼╚╬╣╗╏						
2319-2320	┠ ╗┋┊┊┊┊┋┋┋┋						
2320-2321	┠ ╏ ┇ ┊╒╒┋╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒╒						
2321-2322	┠ <u>┫</u> ┼┼┼┼╀┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼┼						
2322-2324	┞╉┼┾╁┾╬┾┺┼┨┼┼┼┼┼┼┼┼╂╁┼┼┼┼┼┼	DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, medium gray and moderate yellowish brown to dark					
	┠ ╏ ┺╌ ╏╘ ┾╄╃┋╤╃╏╞╂┈┼╏╬╌┾┾┼╂╏╃┼┾┾╀┼┼	yellowish brown, microcrystalline, well cemented, hard; Limestone, 30%, very pale orange to yellowish gray,					
2324-2325	┠ ╏ ┸╃╀┸╫┾╁╬┼╂┾╫┾┾┿┿╅┷╃╏┾┿┼╃╡ ^{╬╏╬} ╬┼	very-fine grained, partially dolomitic, poorly cemented.					
2325-2326	╏ ┡╩╞╒ ┪┼╼┾┼┠╬╬╧┼┼╄┇┍╀╏╬╀┞╂╣╬╬┼┞	rery time granted, partially denomine, poorly commence.					
2326-2327	 ┞ ┸ ╡╅┼ ╏ ┼┼┼┼┣┿╾┼┵┼┼┼┞╂┼┆┽┞┞┼┼┆						
2327-2328	┡╃ ╒╌┼╏╏ ╪╘ ╞┼╏╡╧┊ ╒╬ ┞┼┋ ┡┼ ┋						
2328-2329	╒┋┍╒┋ ╻┋╒ ╒╒┋╏ ┩╬╬╬╬╫╫						
2329-2330							
2330-2331							
2331-2332							
2332-2333							
2333-2334		DOLOMITE AND SOME LIMESTONE - Dolomite, 85%, pale yellowish brown to dark yellowish brown a					
2334-2335		medium light gray, microcrystalline to very-fine crystalline, moderately to well cemented; Limestone, 15%,					
2335-2336		very pale orange to yellowish gray, very-fine grained, partially crystalline, slightly fossiliferous, partially dolomit poorly to moderately cemented.					
2336-2337							
2337-2338	trani a il a relabilita di la ciù la						
2338-2339	<u> 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4</u>						
2339-2340							



Depth Below Pad Level (ft)							Ī	Ре				io≀ √ft	-	₹a :	_						Description
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2341-2342							\dagger		H	\dagger		t	İ		l				1		
2343-2344	\perp		1	П	1	ļ	4		H	Ŧ	H	1	+	\prod	ŀ	\parallel	Ц	\downarrow	4	н	DOLOMITE AND LITTLE LIMESTONE— Dolomite, 90%, moderate yellowish brown to dusky yellowish brown, nicrocrystalline, slightly vuggy, well cemented, hard; Limestone, 10%, very pale orange to yellowish gray,
2344-2345 2345-2346	H		+	H	t	i	+	Н	+	+	\parallel	+	+	\parallel	t	\parallel	H	\parallel		н	very-fine grained, partially dolomitic, poorly cemented.
2346-2347			Ţ	П	L		I		1	I		П	1	П		Ţ	Ц	П	\prod		
2347-2348 2348-2349	H	+	ł	H	+		+	H	+	H	+	\parallel	+	\parallel	1		H	H	+	H	
2349-2350		1	T				I							П							

ADVANCED CORE ANALYSIS STUDY

Youngquist Brothers, Inc.
PF001153.003/Westport 1W1
Port St. Lucie, Florida

FINAL REPORT

Submitted to:

Youngquist Brothers, Inc.

July 10, 2003

Performed by:

Core Laboratories, Inc.
Advanced Technology Center
6316 Windfern
Houston, Texas 77040



Core Laboratories 6316 Windfern Road Houston, Texas 77040 USA Tel: 713-328-2673

Fax: 713-328-2170 www.corelab.com

July 10, 2003

Youngquist Brothers, Inc. 15465 Pine Ridge Road Ft. Myers, FL 33980

Attention: Mr. Mike Waldron

RE:

PF001153.003/Westport 1W1

Port St. Lucie, Florida File: HOU-030446

Dear Mr. Waldron:

Presented in this report are the final results of the Advanced Rock Properties measurements performed on six (6) core samples from the subject well. The submitted core samples were selected from the Core 1 interval and previously had Permeability & Porosity data provided by our Routine Properties Laboratory under the same File Number HOU-030446.

The Advanced Rock Properties Laboratory received the samples in a clean and dry condition and remeasured Permeability to Air and Porosity at a net confining stress of 800 psi prior to the Petrophysical and Geomechanical Properties tests.

A discussion of the test procedures precedes the tabular and graphical presentations.

It has been a pleasure performing this study on behalf of Youngquist Brothers, Inc. If you require any additional information, please do not hesitate to contact us.

Sincerely,

Craig C. Whitney
Project Coordinator
Core Laboratories

Advanced Technology Center

Houston, Texas (713) 328-2426

TEST SCHEDULE SUMMARY

TEST SCHEDULE SUMMARY

Youngquist Brothers, Inc. PF001153.003/Westport 1W1 Port St. Lucie, Florida

File: HOU-030446

Sample Number	Depth feet		Formation Resistivity Factor	Triaxial Compressive Test
1H	1854.3-55.0	Х	Х	
1V	1854.3-55.0	Х		Х
2H	1855.4-56.9	Х	Х	
2V	1855.4-56.9	Х		X
3H	1857.7-58.8	Х	Х	
3V	1857.7-58.8	Х		Х

PETROPHYSICAL PROPERTIES

Formation Resistivity Factor

LABORATORY PROCEDURES

Formation Resistivity Factor

- 1. Synthetic formation brine with a concentration of approximately 27,700 ppm was prepared in the laboratory based on a brine analysis provided by Youngquist Brothers, using reagent-grade chemicals and deionized water. The resistivity (R_w) of the synthetic formation brine was measured.
- 2. The selected core plug samples were vacuum saturated with the brine.
- 3. The brine-saturated samples were individually mounted into 2-electrode high-pressure resistivity cells with conductive plates and silver screens at each end face. The samples were stressed to 800 psi confining pressure using oil as the hydraulic fluid.
- 4. The synthetic formation brine was briefly flowed through each sample with 300-psi backpressure, to displace any trapped gas from the sample and system.
- 5. The core sample resistivities (R_o) were measured until constant values were attained (+/-1%) with phase angles less than 2 degrees. The measurements were made at a frequency of 1000 Hz.
- 6. The core sample resistivities (R_o), brine resistivity (R_w) and porosities were used to calculate the formation factors (F) and cementation exponents (m) of each sample according to the following equations:

$$F = R_0 / R_w$$

m = log F / log Porosity

7. A plot of formation factor versus porosity was used to determine the composite 'm' value. An average line was fit through the data points and unity (1,1) using a least squares linear regression, where 'm' is the slope of the line.

FORMATION RESISTIVITY FACTOR

1000 Hertz

Company: Youngquist Brothers, Inc.

Project:

PF001153.003/Westport IW1

Location: Port St. Lucie, Florida

File:

HOU-030446

Saturant, ppm:

27,700

Confining Stress, psi:

800

Brine Resistivity, ohm-m @25°C:

0.2273

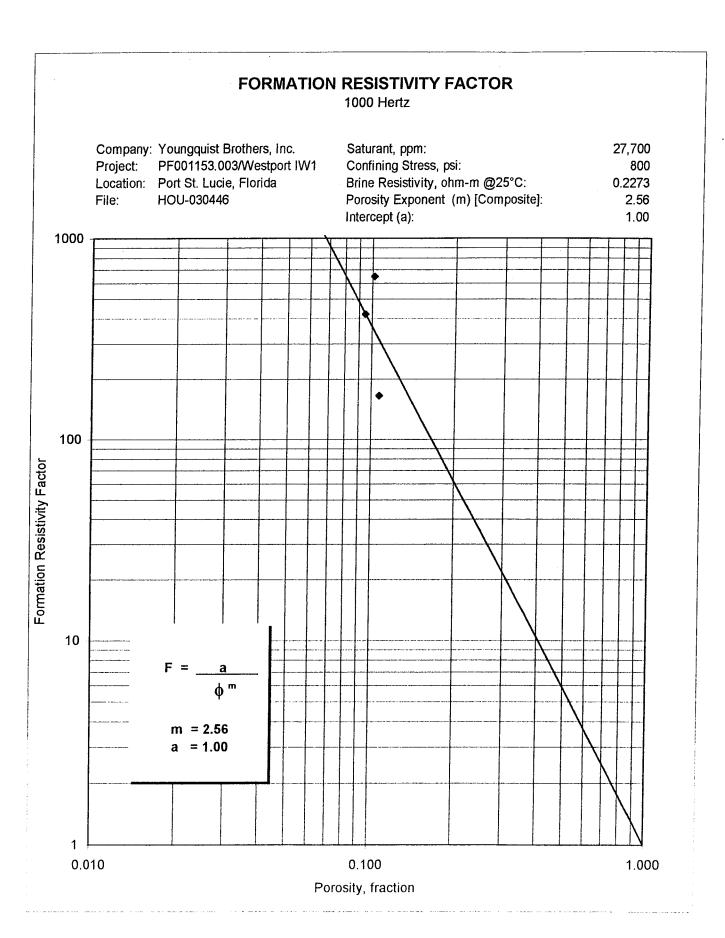
Porosity Exponent (m) [Composite]:

2.56

Intercept (a):

1.00

Sample	Depth,	Grain Density	Klinkenberg Permeability	Porosity,	For	mation Factor, (Appare	ent)
Number	feet	gm/cc	md	fraction	Fa	Ro, ohm-m	m
1H	1854.3-55.0	2.83	147.	0.107	\ 165.29	37.57	2.29
2H	1855.4-56.9	2.83	.035	0.095	421.65	95.84	2.56
3H	1857.7-58.8	2.83	.029	0.102	647.59	147.20	2.83



GEOMECHANICAL PROPERTIES

Triaxial Compressive Test

Triaxial Compressive Tests

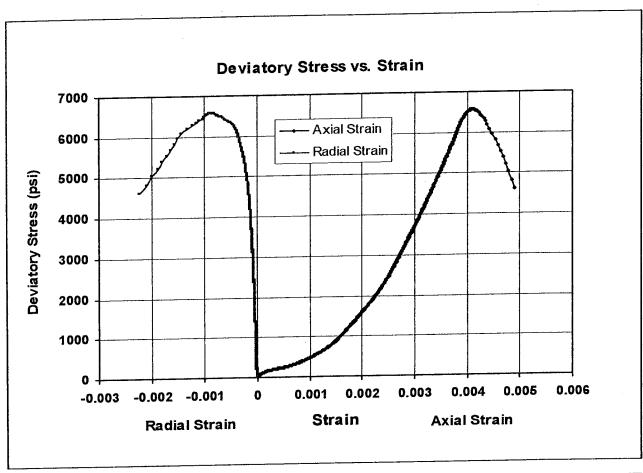
This report reviews the result of the triaxial compressive tests performed on limestone core plugs from PF001153.0003/Westport IW1, GHI Field of Port St. Lucie, Florida for Youngquist Brothers, Inc.

The triaxial compressive tests were conducted on 3 samples of 1-inch diameter under fully saturated condition, using simulated formation brine as the saturant. All samples were deformed at a confining pressure of 1,000-psi.

The test result indicated that the compressive strengths ranged from 7567-psi to 14,033-psi. Static Young's moduli ranged from 2.38x10⁶ psi to 3.71x10⁶ psi with static Poisson's ratios ranging from 0.11 to 0.14. The results of the triaxial compressive tests, which include compressive strength, static Young's modulus, and static Poisson's ratio are summarized in **Table 1**. Stress-strain curves for each test are shown in **Figures 1** through **3**, together with the sample dimensions and experimental conditions.

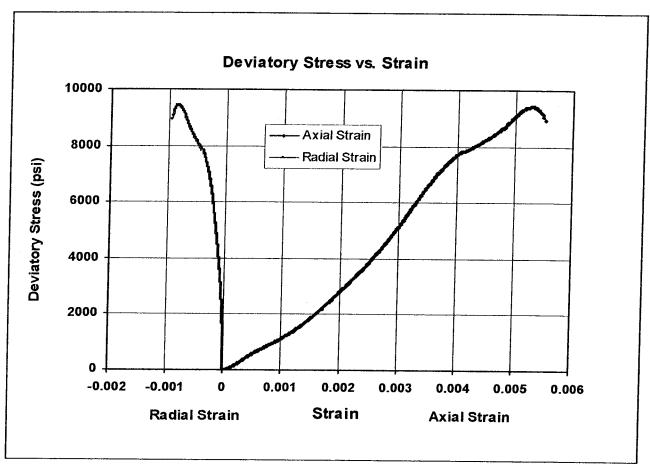
Table 1. Results of triaxial compressive tests, static Young's modulus, and static Poisson's ratio measured for samples from PF001153.0003/Westport IW1.

Sample	Depth	Confining Pressure	Bulk Density	Compressive Strength	Young's Modulus	Poisson's
Number	(ft)	(psi)	(gm/cm ³)	(psi)	(10 ⁶ psi)	Ratio
1V	1854.3-1855.0	1000	2.65	7567	2.49	0.11
2V	1855.4-1856.9	1000	2.61	9083	2.38	0.12
3V	1857.7-1858.8	1000	2.60	14033	3.71	0.14



Sample Core/Depth (ft) Diameter (in) Length (in)	1V 1854.3-1855.0 0.9995 2.0682	
Mass (g) Saturation Fluid Sample Density (g/cc) Confining Pressure (psi) Pore Pressure (psi) Static Young's Modulus (X10 ⁶ psi)	70.56 Formation Brine 2.65 1000 0 2.49 0.11	
Static Poisson's Ratio Compressive Strength (psi)	7567	

Figure 1. Stress-strain curves measured for sample No. 1V from PF001153.0003/ Westport IW1.



Sample	2V	
Core/Depth (ft)	1855.4-1856.9	j
Diameter (in)	0.9964	1
Length (in)	2.1068	İ
Mass (g)	70.36	ľ
Saturation Fluid	Formation Brine	
Sample Density (g/cc)	2.61	
Confining Pressure (psi)	1000	1
Pore Pressure (psi)	0	
Static Young's Modulus (X10 ⁶ psi)	2.38	
Static Poisson's Ratio	0.12	i
Compressive Strength (psi)	9083	

Figure 2. Stress-strain curves measured for sample No. 2V from PF001153.0003/ Westport IW1.

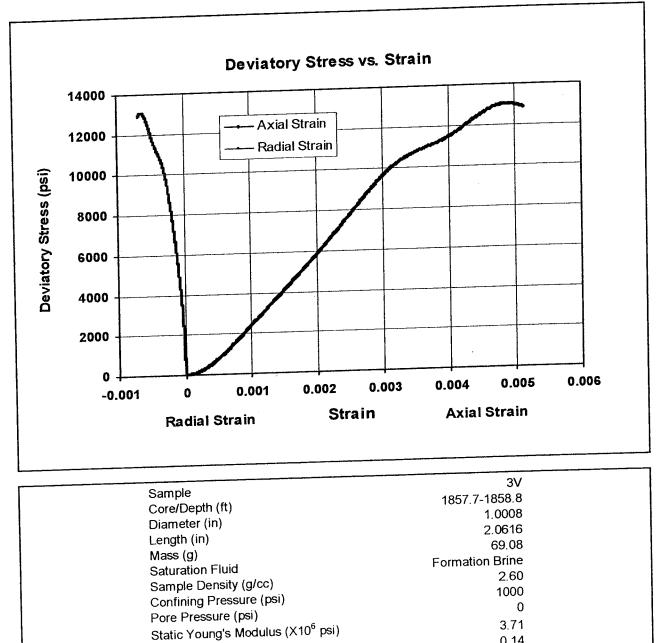


Figure 3. Stress-strain curves measured for sample No. 3V from PF001153.0003/ Westport IW1.



6316 Windfern

Houston, TX 77040 USA Tel: 713-328-2565 Fax: 713-328-2567

Youngquist Brothers, Inc.

Project No. PF001153.0003/Westport IW1
Port St. Lucie, Florida

CONVENTIONAL CORE ANALYSIS
CL File No.: HOU-030446

June 24, 2003



6316 Windfern Houston, TX 77040 USA Tel: 713-328-2565 Fax: 713-328-2567

June 24, 2003

Arcadis 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 Attn: Mr. Mike Waldron

> Final Core Analysis Report Project: PF001153.0003/Westport IW-1 Port St. Lucie, Florida CL File No. HOU-030446

Dear Mr. Waldron,

Core samples from the subject project were delivered to Core Laboratories' Windfern Road facility in Houston, Texas. Analysis was performed as directed by Youngquist Brothers representatives.

The following documentation includes procedures for sample preparation and petrophysical measurements, and the resultant data reported in tabular format.

We appreciate this opportunity to be of service. If we can be of further assistance, please do not hesitate to contact us.

Sincerely,

CORE LABORATORIES LP

minas & Kong

Michael R. Long

Laboratory Supervisor

SAMPLE PREPARATION & PETROPHYSICAL MEASUREMENTS

PLUG DRILLING and TRIMMING: A pair of 1.0-inch diameter horizontal and vertical plugs was taken from each sample submitted for analysis. The plugs were drilled and clipped using fresh tap water as the drilling and trimming lubricant. The plugs were faced with a diamond facing tool to provide right circular cylinders. Trimmed ends were catalogued and stored.

SAMPLE DRYING: All samples were dried in a convection oven at 240 degrees F. for 24 hours.

GRAIN VOLUME: Direct grain volume measurements were made using an automated porosimeter. This instrument utilizes the principle of gas expansion as described by Boyle's law. Helium was used as the test gas. The instrument was calibrated daily and test standards were run to verify instrument accuracy.

GRAIN DENSITY: Calculated grain densities were obtained utilizing grain volume measurements and sample weights. Grain densities were checked against lithology standards.

PLUG DIMENSIONS: Sample lengths and diameters were measured using digital metric calipers.

POROSITY: Pore volumes were determined at a net confining stress (NCS) of 800 psi in a hydrostatic core holder using the Boyle's Law double-cell technique (API RP-40, Sec 5.3.2.2). Porosity was calculated by the following equation:

Porosity = Pore Volume / (Pore Volume + Grain Volume) X 100

PERMEABILITY: Air permeability values were measured using the steady state method at 800 psi in a hydrostatic core holder (API RP-40, Sec 6.3.1.1). The sample permeability was calculated by the following equation:

Kair =
$$\frac{Q \times \mu \times L \times Pa}{\Delta P \times Pm \times A}$$

where:

Q = Gas Flow Rate (cc/sec)

= Gas Viscosity (centipoise)

= Sample Length (cm)

ΔP = differential pressure across sample (atms)

Pm = mean pressure (atms)

A = Sample cross-sectional area (cc)

Pa = atmospheric pressure (atms)

Hydraulic conductivities were derived by multiplying the air permeabilities times a factor of 0,000000858.

Youngquist Brothers, Inc. Project No. PF001153.0003/Westport IW1 Port St. Lucie, Florida



CL File No.: HOU-030446 Date: June 9, 2003 Analyst(s): ML-LA-JH

CONVENTIONAL PLUG ANALYSIS

Sample	Sample	Depth	Porosity	Permeability	Hydraulic	Bulk	Grain	
Number	· ID			Kair	Conductivity		Density	Description
		ft	%	mD	cm/sec	g/cm3	g/cm3	
								<u> </u>
			но	RIZONTAL S	AMPLES			
1H	Core 1	1854.3 - 1855.0	10.71	152	1.46E-04	2.539	2.826	Dol it tan vf xin simy foss vu
2H	Core 1	1855.4 - 1856.9	9.46	.050	4.79E-08	2.602	2.827	Dol It tan vf xin simy ross vu
3H	Core 1	1857.7 - 1858.5	10.18	.042	4.04E-08	2.561	2.834	Dol it tan vf xin simy vug
4H	Core 2	2273.5 - 2274.7	1.86	.001	7.88E-10	2.694	2.711	Dol brn vf xin vug
5H	Core 2	2276.8 - 2277.7	8.75	.311	2.99E-07	2.585	2.805	Dol brn vf xin vug
6H	Core 2	2282.5 - 2283.2	17.14	36.5	3.51E-05	2.301	2.782	Dol lt brn vf xin vug
7H	Core 3	2343.2 - 2343.7	24.15	99.2	9.53E-05	2.148	2.807	
8H	Core 3	2346.4 - 2347.0	18.43	75.6	7.26E-05	2.317	2.815	Dol tan vf xln pp vug
9H	Core 3	2348.0 - 2349.6	10.32	.484	4.66E-07	2.557	2.818	Dol tan vf xln vug
10H	Core 4A	2529.9 - 2530.8	19.69	1.72	1.66E-06	2.230	2.751	Dol tan vf xln vug Chk bu vf xln
11H	Core 4B	2542.9 - 2543.5	18.00	1.01	9.67E-07	2.263	2.735	Chk bu vf xin
12H	Core 4B	2544.4 - 2545.0	22.85	1.92	1.85E-06	2.126	2.733	
13H	Core 5	2604.8 - 2605.6	24.30	5.51	5.30E-06	2.050	2.686	Chk bu vf xln
14H	Core 5	2609.0 - 2609.5	25.02	7.78	7.47E-06	2.038	2.690	Chk wh vf xln vfoss
15H	Core 5	2612.9 - 2613.6	19.20	.401	3.85E-07	2.028	2.693	Chk wh vf xln vfoss
16H	Core 6	2681.7 - 2682.2	13.80	23.9	2.30E-05	2.197		Chk bu vf xln
17H	Core 6	2685.2 - 2685.4	24.81	1177	1.13E-03	2.349 1.988	2.698	Chk wh vf xln vfoss vug
18H	Core 6	2687.9 - 2688.7	18.69	149	1.43E-04		2.695	Chk wh vf xln vfoss vug
19H	Core 7	2765.5 - 2765.8	18.62	1.11	1.43E-04 1.07E-06	2.209	2.707	Chk wh vf xln vfoss vug
20H	Core 7	2766.4 - 2766.8	25.91	757	7.27E-04	2.214	2.702	Chk wh vf xln vfoss vug
21H	Core 7	2766.8 - 2767.2	23.84	47.0	4.52E-05	1.997	2.701	Chk wh vf xln vfoss vug
22H	Core 8	2892.7 - 2893.2	14.70	.301	4.52E-05 2.89E-07	2.056	2.704	Chk wh vf xin vfoss vug
23H	Core 8	2894.1 - 2894.4	20.52	1.11		2.334	2.709	Chk wh vf xln vfoss vug
24H	Core 8	2896.2 - 2896.7	14.52	36.0	1.07E-06	2.181	2.714	Chk wh vf xin vfoss vug
	00.00	2000.2 - 2000.7	14.52	30.0	3.46E-05	2.329	2.704	Chk wh vf xln vfoss vug

Youngquist Brothers, Inc.
Project No. PF001153.0003/Westport IW1
Port St. Lucie, Florida



CL File No.: HOU-030446 Date: June 9, 2003 Analyst(s): ML-LA-JH

CONVENTIONAL PLUG ANALYSIS

Sample Number	Sample ID	Depth	Porosity	Permeability Kair	Hydraulic Conductivity	Bulk Density	Grain Density	Description
		ft	%	mD	cm/sec	g/cm3	g/cm3	Description
							3	
			\	/ERTICAL SA	MPLES			
1∨	Core 1	1854.3 - 1855.0	9.67	1.85	1.78E-06	2.588	2.835	Dol It tan vf xln slmy foss vu
2V	Core 1	1855.4 - 1856.9	10.74	22.6	2.17E-05	2.528	2.817	Dol it tan vf xin simy vug
3V	Core 1	1857.7 - 1858.5	11.16	.030	2.91E-08	2.540	2.831	Dol It tan vf xin simy vug
4V	Core 2	2273.5 - 2274.7	0.22	< .001		2.714	2.720	Dol brn vf xin vug
5V	Core 2	2276.8 - 2277.7	0.32	< .001		2.714	2.723	Dol brn vf xin vug
6V	Core 2	2282.5 - 2283.2	13.89	.575	5.53E-07	2.408	2.773	Dol it brn vf xin vug
7V	Core 3	2343.2 - 2343.7	24.10	81.6	7.84E-05	2.146	2.806	Dol tan vf xin pp vug
V8	Core 3	2346.4 - 2347.0	23.24	108	1.04E-04	2.182	2.813	Dol tan vf xin yug
9V	Core 3	2348.0 - 2349.6	9.43	.081	7.75E-08	2.583	2.823	Dol tan vf xln vug
10V	Core 4A	2529.9 - 2530.8	21.05	2.86	2.75E-06	2.201	2.769	Chk bu vf xln
11V	Core 4B	2542.9 - 2543.5	18.06	.968	9.30E-07	2.263	2.736	Chk bu vf xin
12V	Core 4B	2544.4 - 2545.0	21.27	1.72	1.65E-06	2.163	2.720	Chk bu vf xln
13V	Core 5	2604.8 - 2605.6	25.77	6.05	5.81E-06	2.008	2.688	Chk wh vf xin vfoss
14V	Core 5	2609.0 - 2609.5	25.37	10.7	1.02E-05	2.030	2.694	Chk wh vf xln vfoss
15V	Core 5	2612.9 - 2613.6	19.11	.278	2.68E-07	2.207	2.698	Chk bu vf xln
16V	Core 6	2681.7 - 2682.2	13.26	1.99	1.91E-06	2.372	2.701	
17V	Core 6	2685.2 - 2685.4	18.44	35.3	3.39E-05	2.228	2.701	Chk wh vf xln vfoss vug
18∨	Core 6	2687.9 - 2688.7	18.39	25.2	2.42E-05	2.229	2.707	Chk wh vf xin vfoss vug
19V	Core 7	2765.5 - 2765.8	22.24	7.16	6.88E-06	2.116	2.707	Chk wh vf xln vfoss vug
20V	Core 7	2766.4 - 2766.8	20.33	24.4	2.35E-05	2.171		Chk wh vf xln vfoss vug
21V	Core 7	2766.8 - 2767.2	19.57	3.60	3.46E-06	2.171	2.702 2.705	Chk wh vf xin vfoss vug
22V	Core 8	2892.7 - 2893.2	16.31	.260	2.50E-07	2.193	2.705 2.712	Chk wh vf xln vfoss vug
23V	Core 8	2894.1 - 2894.4	18.71	.610	5.86E-07	2.234		Chk wh vf xln vfoss vug
24V	Core 8	2896.2 - 2896.7	13.88	.156	1.50E-07	2.234	2.708 2.700	Chk wh vf xln vfoss vug Chk wh vf xln vfoss vug

Note: Hydraulic conductivity is a calculated value.



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 1

Total Length Drilled (feet): Core Barrel Length (feet): Core Barrel Diameter ID (inches): Drilling Fluid Used: 13.5 34.6 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 3/15/2003 1846.5-1860 8

De	pth	Length Recovered	RPM	WOB	Core Description
fee	et bpl				
From	То	feet		pounds	
1850.0	1853.2	3.2	20	7	Dolomitic limestone, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4), fine crystalline, vuggy, few fossils, hard.
1853.2	1855.2	2.0			Dolomite, medium light gray (N6) to medium dark gray (N4), microcrystalline, numerous vugs, partly filled with calcite, very well cemented, very hard.
1855.2	1858.4	3.2	24	8	Dolomite, pale yellowish gray (10YR 6/2), some medium gray (N5) and medium dark gray (N4), microcrystalline, very few vugs (mostly in top section), solid, massive, extremly hard.
1858.4	1860.0	1.6	40	8	Dolomite, moderate yellowish brown (10YR 5/4), little dark yellowish brown (10YR 4/2), fine crystalline, some sucrosic with numerous vugs partially filled with calcareous material, very hard.

bpl denotes below pad level

RPM denotes rate per minute of coring barrel

WOB denotes weight on coring barrel in 1000 pounds



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 1

Total Length Drilled (feet):
Core Barrel Length (feet):
Core Barrel Diameter ID (inches):
Drilling Fluid Used:

13.5 34.6 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 3/15/2003 1846.5-1860 8

	Depth Length RPM WOB Recovered		WOB	Core Description	
fee	t bpl				
From	То	feet		pounds	
1850.0	1850.4	0.4			Dolomitic limestone, solid, vuggy.
1850.4	1851.4	1.0			Dolomitic limestone, fragmented, 1-3-inch pieces.
1851.4	1851.9	0.5			Dolomitic limestone with diagonal fracture across 1/2 of diameter.
1851.9	1852.5	0.6			Dolomitic limestone split in half by vertical fracture.
1852.5	1853.5	0.5			Dolomitic limestone, fragmented, 1-4-inch pieces.
1853.5	1854.3	0.8			Dolomite, solid- two 4-inch long pieces.
1854.3	1855.0	0.7			Dolomite, solid, vuggy.
1855.0	1855.4	0.4			Dolomite, half core.
1855.4	1856.9	1.5			Dolomite, solid, few vugs.
1856.9	1857.7	0.8			Dolomite, solid, vuggy.
1857.7	1858.5	0.8			Dolomite, solid, small vugs.
1858.5	1859.3	0.8			Three dolomite fragments 1-4-inches long, numerous vugs.
1859.3	1860.0	0.7			Dolomite, solid, numerous, small vugs.

bpl denotes below pad level

RPM denotes rate per minute of coring barrel WOB denotes weight on coring barrel in 1000 pounds



Sample/ Core Log Form

Well	IW 1		Project/No.	Reese, Macon 8	& Assoc. / PF	F001153.0003				Page	1 o	f	1
Site			-			Drilling		_	Drilling		,	_	
Location	Port St. Luc	ieWestport Ir	njection Well S	System		Started	4/5/2003		Completed	4/5/2003			
								_			_		
								Type of Sam	nple/				
Total Depth	Drilled	13.5	Feet	Hole Diameter	8	inches		Coring Device	се	coring barre	<u> </u>		
	.												
Length and [05.04 (4 i I D	0.5 in th. 0.D					0	4	404C E	4000 0	
of Coring De	vice	35.24 feet 10	ng, 4-inch I.D.,	8.5-Inch O.D.					Sampling Int	tervai	1846.5-	1860.0	
Land-Surface	e Flev		feet	Surveyed	Г	Estimated		Datum					
Lana Ganao	, Liev.			Curveyeu	<u> </u>	Latimated		Datam		_			
Drilling Fluid	Used	water							Drilling Meth	nod	reverse a	air	
21	0002		-										
Drilling													
Contractor	Youngquist B	3ros.,Inc.						Driller	P. Shand				
			-								_		
								Hammer		Hammer			
		_						Weight	N/A	Drop	N/A		
Sample/Core			Time/Hydraulio	C									
(feet below la	and surface)	Core	Pressure or				Sample/Core	Description					
		Recovery	Blows per 6										
From	То	(feet)	Inches										
1850.0	1850.4	0.4	<u> </u>	Dolomitic limestone, so									
1850.4	1851.4	1.0	 	Dolomitic limestone, fr									
1851.4	1851.9	0.5	 	Dolomitic limestone wi			of diameter.						
1851.9	1852.5	0.6	 	Dolomitic limestone sp									
1852.5	1853.5	0.5	 	Dolomitic limestone, fr		•							
1853.5	1854.3	0.8	 	Dolomite, solid- two 4-		:ces.							
1854.3	1855.0	0.7	 	Dolomite, solid, vuggy	<i>'</i> .								
1855.0	1855.4	0.4	 	Dolomite, half core.									
1855.4 1856.9	1856.9	1.5 0.8	 	Dolomite, solid, few vu									
1857.7	1857.7 1858.5	0.8	 	Dolomite, solid, vuo Dolomite, solid, sm	007								
1858.5	1859.3	0.8	 	Three dolomite frag		inches long r	umoroue vuic						
1859.3	1860.0	0.8	 	Dolomite, solid, nu			umerous vug	15.					
1009.0	1000.0	0.7	 	Dolomite, solia, mai	illelous, sil	naii vugs.							

Red font- sections of the core suitable for lab analysis.



Sample/ Core Log Form

vveii	144 1		Project/No.	Reese, Macc	on & Assoc. / Pru	01153.0003				Page	1 01 1	
Site			-	_		Drilling		_	Drilling			
Location	Port St. Luc	cieWestport II	njection Well S	3ystem_		Started	3/14/2003	_	Completed	3/15/2003	_	
								Type of Com	-l-/			
								Type of Samp	•			
Total Depth	Drilled	13.5	_Feet	Hole Diameter	8	inches		Coring Device	е	coring barre	<u> </u>	
Length and	Diameter											
of Coring De		34.6 feet lon	ng, 4-inch I.D.						Sampling Int	erval	1846.5-1860.0	
-			<u></u>	-								
Land-Surfac	e Elev.		feet	Surveyed		Estimated		Datum		_		
Drilling Fluid	Used	water	_						Drilling Meth	od	reverse air	
Drilling												
Drilling Contractor	Youngquist E	Bros Inc						Driller	P. Shand			
Oomingote.	Tourigquiot	5103.,1110.	=					Dimoi	1 . Oriana		_	
								Hammer		Hammer		
		_						Weight	N/A	Drop	N/A	
Sample/Cor	o Donth		Time/Hydrauli									
· ·	•	0000					Comple/Cor	- Dagarintian				
(feet below i	land surface)	Core	Pressure or Blows per 6				Sample/Core	e Description				
From	То	Recovery (feet)	Inches									
1850.0	1853.2	3.2	WOB=7K	Dolomitic limestone	e. pale yellowish b	rown (10YR 6/2)	to gravish ora	nge (10YR 7/4). fine crystal	line, vuggy, f	ew	
		+	RPM=20	fossils, hard.	o, pare j	,	vo 8-1-7-1-1	<u>8</u> (),	,,	<u> </u>	
1853.2	1855.2	2.0	1	Dolomite, medium l	light gray (N6) to r	medium dark gra	y (N4), microc	rystalline, num	nerous vugs, p	artly filled wi	ith	
				calcite, very well ce	emented, very hard							
1855.2	1858.4	3.2	WOB=8K	Dolomite, pale yello	owish gray (10YR	6/2), some medii	ım gray (N5) a	ınd medium da	rk gray (N4),	kryptocrustal	line,	
			RPM=24	very few vugs (most								
1858.4	1860.0	1.6	WOB=8K	Dolomite, moderate	yellowish brown ((10YR 5/4), little	dark yellowis	h brown (10YF	$\overline{(4/2)}$, fine cry	ystalline, som	ie	
			RPM=40	sucrosic with numer	crosic with numerous vugs partially filled with calcareous material, very hard.							



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 2

Total Length Drilled (feet):

Core Barrel Length (feet):

Core Barrel Diameter ID (inches):

Drilling Fluid Used:

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/6/2003 2272.0-2285.0 8.5

	epth et bpl	Length Recovered	RPM	WOB	Core Description
From	То	feet		pounds	
2272.0	2285.0	13.0	15-32	8000	Dolomite, pale yellowish brown (10 YR 6/2), slightly calcitic, micritic to sucrosic, few vugs, hard to very hard. Diagonal to vertical fractures at 2275 and 2281 feet.

bpl denotes below pad level

RPM denotes rate per minute of coring barrel

WOB denotes weight on coring barrel in 1000 pounds

Core Recovery: 95%

RQD: 70% (denotes the ratio of total length of individual cores with length at least two times the core diameter over total drilled interval).

13

13.6

4

water



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 2

Total Length Drilled (feet):13.0Core Barrel Length (feet):13.6Core Barrel Diameter ID (inches):4Drilling Fluid Used:water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/6/2003 2272 - 2285 8.5

De	Depth Length RPM WOB Recovered		WOB	Core Description	
fee	t bpl				
From	То	feet		pounds	
2272.0	2272.5	0.5	32	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2272.5	2274.7	2.2	32	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2274.7	2275.3	0.6	28	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2275.3	2276.8	1.5	32	8	Dolomite, slightly calcitic, compact, few scattered vugs, vertical fracture at 1/3 top of the core.
2276.8	2278.4	1.6	32	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2278.4	2280.0	1.6	32	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2280.0	2281.1	1.1	15	8	Dolomite, slightly calcitic, compact, few scattered vugs, vertical fracture at 1/3 bottom of the core.
2281.1	2281.7	0.6	15	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2281.7	2282.5	0.8	15	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2282.5	2283.6	1.1	15	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
2283.6	2285.0	0.7	15	8	Dolomite, slightly calcitic, compact, few scattered vugs, hard.
		RQD=70%			

bpl denotes below pad level

RPM denotes rate per minute of coring barrel

WOB denotes weight on coring barrel in 1000 pounds

RQD denotes the ratio of total length of individual cores with length at least two times the core diameter over total drilled interval.



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 3

Total Length Drilled (feet): Core Barrel Length (feet): Core Barrel Diameter ID (inches): Drilling Fluid Used:

13.5 13.6 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/7/2003 2341.5-2355.0 8.5

De	epth	Length Recovered	RPM	WOB	Core Description
fee	et bpl	Recovered			
From	То	feet		pounds	
2341.5	2341.7	0.2	17	8000	Dolomite, dark yellowish orange (10YR 6/6), sucrosic, porous with vugs, soft to moderately hard.
2341.7	2344.6	2.9	17	8000	Dolomite, pale yellowish brown (10YR 6/2), microcrystalline to sucrosic, few vugs, solid, very hard.
2344.6	2345.7	1.1	17	8000	Dolomite, dark yellowish orange (10YR 6/6), sucrosic, porous with vugs, soft to moderately hard.
2345.7	2350.1	1.6	17	8000	Dolomite, pale yellowish brown (10YR 6/2), microcrystalline to sucrosic, few vugs, solid, very hard.
2350.1	2350.8	0.7	18	X(1(1()	Dolomite, dark yellowish orange (10YR 6/6), sucrosic, porous with vugs, soft to moderately hard, bottom of the interval is harder and pale yellowish brown.
2350.8	2351.3	0.5	16	8000	Dolomite, pale yellowish brown (10YR 6/2), microcrystalline to sucrosic, vuggy, solid, very hard.

bpl denotes below pad level

RPM denotes rate per minute of coring barrel

WOB denotes weight on coring barrel in 1000 pounds



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 3

Total Length Drilled (feet): Core Barrel Length (feet): Core Barrel Diameter ID (inches): Drilling Fluid Used:

13.5	
13.6	
4	
water	
'	

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches):

	4/7/2003
(feet bpl):	2341.5-2355.0
hes):	8.5

De	epth	Length Recovered	RPM WOB	Core Description
fee	et bpl	Noovorou		
From	То	feet	pounds	
2341.5	2341.7	0.2		Dolomite, very vuggy, porous, soft to moderately hard.
2341.7	2342.8	1.1		Dolomite, solid, slightly vuggy, moderately hard.
2342.8	2343.7	0.9		Dolomite, solid, slightly vuggy, moderately hard.
2343.7	2344.6	0.9		Dolomite, solid, slightly vuggy, moderately hard.
2344.6	2345.7	1.1		Dolomite, solid, slightly vuggy, moderately hard.
2345.7	2346.0	0.3		Dolomite, solid, slightly vuggy, moderately hard.
2346.0	2346.4	0.4		Dolomite, solid, slightly vuggy, hard.
2346.4	2347.0	0.6		Dolomite, solid, slightly vuggy, hard.
2347.0	2347.8	0.8		Dolomite, solid, slightly vuggy, hard.
2347.8	2348.5	0.7		Dolomite, solid, slightly vuggy, hard.
2348.5	2349.5	1.0		Dolomite, solid, slightly vuggy, hard.
2349.5	2350.4	0.9		Top 2/3 of section is dolomite - solid, slightly vuggy, hard; bottom 1/3 - dolomite, very vuggy, soft to moderately hard.
2350.4	2350.8	0.4		Dolomite, very vuggy, porous, soft to moderately hard.
2350.8	2351.3	0.5		Dolomite, solid, slightly vuggy, hard.

bpl denotes below pad level

RPM denotes rate per minute of coring barrel

WOB denotes weight on coring barrel in 1000 pounds

Core Recovery: 72%

RQD: 28%



Injection Well No. 1 Core Sample No. 4 A

Total Length Drilled (feet): 6.6

Core Barrel Length (feet): 36.5

Core Barrel Diameter ID (inches): 4

Drilling Fluid Used: water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/9/2003- 4/10/2003 2529.0-2535.6 8.5

Depth (feet bpl)		Length Recovered	RPM	WOB	Core Description
From	То	(feet)			
2529.0	2529.4	0.4	18	8K	Limestone, solid, slightly dolomitic.
2529.4	2529.9	0.5	18	8K	Limestone, solid, slightly dolomitic.
2529.9	2530.8	0.9	26	8K	Limestone, solid, slightly dolomitic.
2530.8	2530.9	0.1	26	8K	Limestone, slightly dolomitic, few cavities, uneven, small fragment.
2530.9	2530.3	0.4	26	8K	Limestone, solid, few shallow cavities, slightly dolomitic.

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds

Core Recovery: 29%



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 4 A

Total Length Drilled (feet): 6.6 Core Barrel Length (feet): 36.5 Core Barrel Diameter ID (inches): **Drilling Fluid Used:**

water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches):

4/9/2003-4/10/2003 2529.0-2535.6 8.5

(fee	epth t bpl)	Length Recovered	RPM	WOB	Core Description
2529.0	To 2535.6	(feet) 2.3	18- 26	8- 9K	LIMESTONE- Limestone, 100%, yellowish gray (5Y 7/2) to pale olive (10Y 6/2), partly with smudges of darker material, slightly dolomitic, fine crystalline, massive, hard, with few cavities to 2-inches wide, 1-inch deep, traces of fossills (forams), with rounded areas of secondary sedimentation 1-2- inches in diameter.

bpl denotes below pad level RPM denotes revolutions per minute WOB denotes weight on coring bit in 1000 pounds Core Recovery: 29%



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 4 B

Total Length Drilled (feet): 13.7

Core Barrel Length (feet): 36.5

Core Barrel Diameter ID (inches): 4

Drilling Fluid Used: water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/11/2003 2536.5- 2550.2 8.5

Depth (feet bpl)		Length Recovered	RPM	WOB	Core Description
From	То	(feet)			
2536.5	2536.8	0.3	16	8	Dolomite, olive gray with irregular black spots, porous, very hard. 2- inch chert fragment at the bottom.
2536.8	2537.3	0.5	16	8	Limestone, yellowish gray, 1-3- inch fragments.
2537.3	2537.9	0.6	16	8	Limestone, yellowish gray (5Y 8/1), solid, moderately well cemented, moderately hard.
2537.9	2538.2	0.3	16	8	Limestone, yellowish gray (5Y 8/1), solid, moderately well cemented, moderately hard.
2538.2	2538.4	0.2	16	8	Limestone, yellowish gray (5Y 8/1), solid, moderately well cemented, moderately hard.
2538.4	2539.6	1.2	16	8	Limestone, yellowish gray (5Y 8/1), fragmented into 1-4 inch pieces.
2539.6	2540.2	0.6	16	8	Chert, medium gray, with cavities filled with calcareous material, partly fractured, very hard.
2540.2	2540.8	0.6	16	8	Limestone, yellowish gray (5Y 7/2), shade darker than above, slightly dolomitic, solid, hard.
2540.8	2541.3	0.5	16	8	Limestone, yellowish gray (5Y 7/2), slightly dolomitic, solid, hard.
2541.3	2543.8	2.5	16	8	Limestone, yellowish gray (5Y 7/2), slightly dolomitic, solid single piece, hard.
2543.8	2544.4	0.6	16	8	Chert, medium gray, with small cavities filled with calcareous material, solid, very hard.
2544.4	2545.0	0.6	16	8	Limestone, yellowish gray (5Y 7/2), slightly dolomitic, solid, hard.
2545.0	2545.7	0.7	16	8	Limestone, yellowish gray (5Y 7/2), slightly dolomitic, multiple small fragments, two 2- 4- inch pieces.
2545.7	2546.1	0.4	16	8	Limestone, yellowish gray (5Y 7/2), slightly dolomitic, solid, hard.

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds

Core Recovery: 70%



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 4 B

Total Length Drilled (feet): Core Barrel Length (feet): Core Barrel Diameter ID (inches):

36.5 **Drilling Fluid Used:** water

13.7

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches):

4/11/2003 2536.5- 2550.2 8.5

Depth (feet bpl)		Length Recovered	RPM	WOB	Core Description
From	То	(feet)			
2536.5	2536.7	0.2	16	8	DOLOMITE- Dark yellowish brown (10YR 4/2) with irregular black spots, porous, very hard.
2536.7	2536.8	0.1	16	8	CHERT-Pale yellowish brown (10YR 6/2) and medium light gray (N6),microcrystalline silica,very hard.
2536.8	2539.6	2.8	16	8	LIMESTONE-yellowish gray (5Y 8/1), fine crystalline, moderately well cemented, moderately hard, trace of fossils.
2539.6	2540.2	0.6	16	8	CHERT-medium gray (N5) to light gray (N7) and light olive gray (5Y 6/1), microcrystalline silica, few fractures and cavities, cavities filled with calcareous sand, very hard.
2540.2	2543.8	3.6	16	8	LIMESTONE-yellowish gray (5Y 7/2), fine crystalline, well cemented, slightly dolomitic, hard.
2543.8	2544.4	0.6	16	8	CHERT-medium gray (N5) to light gray (N7), microcrystalline silica, few fractures and cavities, cavities filled with calcareous sand, very hard.
2544.4	2546.1	1.7	16	8	LIMESTONE-yellowish gray (5Y 7/2), fine crystalline, well cemented, slightly dolomitic, hard.

bpl denotes below pad level RPM denotes revolutions per minute WOB denotes weight on coring bit in 1000 pounds Core Recovery: 70%



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 5

Total Length Drilled (feet): Core Barrel Length (feet): Core Barrel Diameter ID (inches): Drilling Fluid Used: 16 36.5 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/12/2003 2602.0-2618.0 8.5

	epth et bpl)	Length Recovered	RPM	WOB	Core Description
From	То	(feet)			
2602.0	2612.0	10.0	22	8	LIMESTONE-yellowish gray (5Y 8/1) and some greenish gray (5GY 6/1) with black (N1) specs, fine grained, moderately well cemented, moderately soft, fossiliferous.
2612.0	2612.7	0.7	22	8	LIMESTONE-very pale orange (10YR 8/2), fine grained, chalky, well cemented, soft, trace of fossils.
2612.7	2614.5	1.8	22	8	LIMESTONE-yellowish gray (5Y 8/1) and bands of light olive gray (5Y 6/1), fine crystalline, slightly dolomitic, well cemented, moderately hard, trace of fossils.

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 5

Total Length Drilled (feet): 16
Core Barrel Length (feet): 36.5
Core Barrel Diameter ID (inches): 4
Drilling Fluid Used: water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/12/2003 2602.0- 2618.0 8.5

De	epth	Length	RPM	WOB	Core Description	
(fee	et bpl)	Recovered				
From	То	(feet)				
2602.0	2603.9	1.9	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, broken into 1-2-inch long fragments.	
2603.9	2604.5	0.6	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2604.5	2604.8	0.3	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2604.8	2605.9	1.1	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2605.9	2606.3	0.4	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2606.3	2606.9	0.6	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2606.9	2607.9	1.0	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2607.9	2609.0	1.1	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2609.0	2610.2	1.2	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2610.2	2610.6	0.4	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, 1-2 inch fragment with 2 chert pieces	
2610.6	2611.1	0.5	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2611.1	2611.6	0.5	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid.	
2611.6	2612.1	0.5	22	8	LIMESTONE- Limestone, 100%, yellowish gray, fine grained, solid, 2- 3-inch fragments.	
2612.1	2612.4	0.3	22	8	LIMESTONE- Limestone, 100%, very pale orange, very fine grained, chalky, solid.	
2612.4	2613.6	1.2	22	13	LIMESTONE- Limestone, 100%, very pale orange, very fine grained, chalky, solid, to 2612.7; yellowish gray, very	
		11.6	22	8	fine crystalline, slightly dolomitic below.	
2613.6	2614.0	0.4	22	8	LIMESTONE- Limestone, 100%, yellowish gray, very fine crystalline, slightly dolomitic, fractured vertically.	
2514.0	2614.5	0.5	22	8	LIMESTONE- Limestone, 100%, yellowish gray, very fine crystalline, slightly dolomitic, solid.	

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds





Injection Well No. 1 Core Sample No. 6

Total Length Drilled (feet):
Core Barrel Length (feet):
Core Barrel Diameter ID (inches):
Drilling Fluid Used:

13.7
36.5
4
water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches):

4/13/2003
2681.0-2694.8
8.5

	epth et bpl)	Length Recovered (feet)	RPM	WOB	Core Description
2681.0	2694.7	13.7	14-25	8	LIMESTONE- very pale orange (10YR 8/2), yellowish gray (5Y 8/1) and some grayish orange (10YR 7/4) with black (N1) specs, fine grained, poorly to moderately well cemented, slightly dolomitic, soft to moderately hard, frequent irregular fractures, vuggy, fossiliferous with forams; Chert, trace, olive black(5Y 2/1), very hard.

bpl denotes below pad level RPM denotes revolutions per minute WOB denotes weight on coring bit in 1000 pounds



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 6

Total Length Drilled (feet):
Core Barrel Length (feet):
Core Barrel Diameter ID (inches):
Drilling Fluid Used:

13.7 36.5 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/13/2003 2681.0- 2694.8 8.5

	pth	Length	RPM	WOB	Core Description
(fee	t bpl)	Recovered			
From	То	(feet)			
2681.0	2681.7	0.7	14	8	LIMESTONE AND CHERT- 1-4 -inch long fragments.
2681.7	2682.2	0.5	14	8	LIMESTONE- solid.
2682.2	2682.7	0.5	14	8	LIMESTONE- 2- 4- inch fragments with uneven cut.
2682.7	2683.6	0.9	14	8	LIMESTONE- fractures, fragile, ready to break.
2683.6	2684.0	0.4	14	8	LIMESTONE- fragments 1-3-inch.
2684.0	2685.2	1.2	14	8	LIMESTONE- 3 sections, 4-5- inches long.
2685.2	2685.7	0.5	14	8	LIMESTONE- solid, vuggy.
2685.7	2685.9	0.2	14	8	LIMESTONE- 1-inch fragments .
2685.9	2687.0	1.1	14	8	LIMESTONE- solid, with fractures from 2686.7 ft bpl, and diagonal cut, slightly vuggy.
2687.0	2687.1	0.1	14	8	LIMESTONE- 1-inch fragments .
2687.1	2687.9	0.8	14	8	LIMESTONE- fractures, fragile, very vuggy, ready to break.
2687.9	2688.7	0.8	14	8	LIMESTONE- solid.
2688.7	2689.0	0.3	14	8	LIMESTONE- 1-inch fragments .
2689.0	2689.7	0.7	22	8	LIMESTONE- 2- 3-inch fragments .

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds



CORE LOG SUMMARY

Injection Well No. 1 Core Sample No. 7

Total Length Drilled (feet):
Core Barrel Length (feet):
Core Barrel Diameter ID (inches):
Drilling Fluid Used:

11 36.5 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/14/2003 2758-2769 8.5

	epth et bpl)	Length Recovered	RPM	WOB	Core Description
2764.2	2769.0	(feet) 4.8	14		LIMESTONE-Limestone, 100%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), fine grained, slightly dolomitic, moderately well cemented, soft.

bpl denotes below pad level RPM denotes revolutions per minute WOB denotes weight on coring bit in 1000 pounds



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 7

Total Length Drilled (feet):11Date Completed:4/14/2003Core Barrel Length (feet):36.5Sampling Interval (feet bpl):2758-2769Core Barrel Diameter ID (inches):4Hole Diameter (inches):8.5Drilling Fluid Used:water

	epth et bpl)	Length Recovered	RPM	WOB	Core Description
From	То	(feet)			
2764.2	2765.4	1.2	14	5	LIMESTONE- Fragments of 1 inch to 2 inches.
2765.4	2765.8	0.4	14	5	LIMESTONE-Solid .
2765.8	2766.4	0.6	14	5	LIMESTONE- Fragments from 1 to 3 inches.
2766.4	2767.3	0.9	14	5	LIMESTONE-Two sections of 5 inches each.
2767.3	2769.0	1.7	14	5	LIMESTONE- Fragments from 1 to 3 inches.

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds

Core Recovery: 43%



Injection Well No. 1 Core Sample No. 8

Total Length Drilled (feet): Core Barrel Length (feet): Core Barrel Diameter ID (inches): Drilling Fluid Used:

13
36.5
4
water

Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches):

4/19/2003
2890-2903
8.5

	epth et bpl)	Length Recovered	RPM	WOB	Core Description		
From	То	(feet)					
2890.0	2891.6	1.6	15	8	LIMESTONE -Limestone, 100%, very pale orange (10YR 8/2) to grayish orange (10YR 7/4), fine grained, slightly dolomitic, with spherical and horizontal smudges of darker material. moderately well cemented, hard, few vugs.		
2891.6	2895.5	3.9	15	8	LIMESTONE -Limestone, 100%, very pale orange (10YR 8/2), fine crystalline, dolomitic, with numerous vugs and solution cavities to 3- 4 inches wide, fosiliferous (shell fragments), well cemented, hard.		
2895.5	2896.2	0.7	15	8	DOLOMITE- Dolomite, 100%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2), micritic to sucrosic, calcareous, moderately well cemented, moderately hard to hard.		
2896.2	2897.7	1.5	15	8	LIMESTONE-Limestone, 100%, very pale orange (10YR 8/2), fine grained, vuggy, porous, poorly cemented, soft, slightly fossiliferous; Marl, trace, white (N9) to bluish white (5B 9/1), soft.		



CORE LOG INVENTORY

Injection Well No. 1 Core Sample No. 8

Total Length Drilled (feet):
Core Barrel Length (feet):
Core Barrel Diameter ID (inches):
Drilling Fluid Used:

13 36.5 4 water Date Completed: Sampling Interval (feet bpl): Hole Diameter (inches): 4/19/2003 2890-2903 8.5

Depth (feet bpl)		Length Recovered	RPM	WOB	Core Description
From	То	(feet)			
2890.0	2891.6	1.6	15	8	LIMESTONE- Limestone, slightly dolomitic, 1-3 inch fragments, becoming more dolomitic in the base and top.
2891.6	2892.1	0.5	15	8	LIMESTONE-Dolomitic Limestone, solid but cut at 1/3 diagonally.
2892.1	2892.3	0.2	15	8	LIMESTONE-Dolomitic Limestone, solid, irregular cut.
2892.3	2892.7	0.4	15	8	LIMESTONE-Dolomitic Limestone, fragments of 2-3 inch.
2892.7	2893.2	0.5	15	8	LIMESTONE-Dolomitic Limestone, solid, vuggy (vugs to 1- inch) hard, fosiliferous.
2893.2	2893.5	0.3	15	8	LIMESTONE-Dolomitic Limestone, solid, with 4-ich, 1-inch deep cavity.
2893.5	2893.8	0.3	15	8	LIMESTONE-Dolomitic Limestone, solid, vuggy.
2893.8	2894.1	0.3	15	8	LIMESTONE-Dolomitic Limestone, solid, vuggy, irregular cut.
2894.1	2894.5	0.4	15	8	LIMESTONE-Dolomitic Limestone, solid, vuggy, diagonal fracture.
2894.5	2895.5	1.0	15	8	LIMESTONE-Dolomitic Limestone, fragments of 2-4 inch.
2895.5	2896.2	0.7	15	8	DOLOMITE- Dolomite, calcareous, very hard, 2-3 fragments.
2896.2	2896.7	0.5	15	8	LIMESTONE-Limestone, porous, solid, moderately hard.
2896.7	2897.3	0.6	15	8	LIMESTONE-Limestone, 2 fragments of 3 inch.
2897.3	2897.7	0.4	15	8	LIMESTONE- Limestone, irregular fragments 1- 3 inch.

bpl denotes below pad level

RPM denotes revolutions per minute

WOB denotes weight on coring bit in 1000 pounds

Core Recovery: 59%

ARCADIS

Appendix E

Injection Well System Sampling and Monitoring Plan

Plugging and Abandonment Plan

Injection Well System Sampling and Monitoring

During operational testing, permit conditions applicable to monitoring the physical and chemical characteristics of injected fluids and deep monitor well monitor zone fluids, as well as monitoring of the operational performance of the injection well, must be satisfied to provide information to submit an operating permit application for the test-injection well system. The data monitoring requirements may include the information described below, but the actual operational testing requirements may vary. The requirements and information presented here are for reference purposes.

Injection-Fluid Analysis

A wastestream analysis (24 hour composite sample) for primary and secondary drinking water standards (62-550 F.A.C.) and (municipal) minimum-criteria parameters must be collected within 30 days of start up and submitted within 150 days after the start of operational testing and annually (sampled in February and submitted in April). Biological and volatile organic compounds must be collected as 'grab' samples.

Initially, routine sampling and analysis of the wastestream will be performed weekly for the first 180 days of operation, and then monthly for the duration of injection.

Sampling of the following chemical characteristics of the total wastestream will be required:

```
chloride (mg/L)
fecal coliform (# of colonies/100 ml)
iron (mg/L)
nitrogen, ammonia, total as N (mg/L)
nitrogen, total Kjeldahl nitrogen as N (TKN, mg/L)
nitrogen, nitrate, total as N (mg/L)
pH (standard units)
phosphorous, total as P (mg/L)
residue, total filterable (TDS, mg/L)
sodium (mg/L)
specific conductance (temperature compensated, umhos/cm)
sulfate, total as S04 (mg/L)
temperature (°C)
total suspended solids (TSS, mg/L)
```

During operational testing, sampling of the following chemical characteristics of the total wastestream will be required on a monthly basis:

```
gross alpha (pCi/L)
radium-226 (<sup>226</sup>Ra, pCi/L)
radium-228 (<sup>228</sup>Ra, pCi/L)
fluoride (mg/L)
```

Injection-Well Performance

Flow Rates and Pressures

The wellhead pressure, injection rate, and cumulative volume injected will be monitored continuously to ensure that the maximum pressure at the wellhead of IW1 does not exceed 100.1 pounds per square inch, gauge (psig), a pressure equal to 66.6 percent of the 150.3 psig pressure rating for the injection tubing, and the velocity down the well does not exceed the injection well's rated velocity of 9.6 feet per second (fps).

The annulus wellhead pressure will be monitored continuously to ensure that the annulus pressure at the wellhead exceeds the injection pressure by a minimum of 33 percent at all times. Because the maximum sustained wellhead pressure is not expected to exceed 45 psig, the annulus pressure at the IW1 wellhead will be maintained at approximately 60 psig. It is anticipated that this annular pressure (60 psig) will be more than 1.5 times the normal-operating (sustained-maximum) wellhead injection pressure for IW1.

The maximum daily flow rate, in millions of gallons per day (mgd), total daily flow rate (mgd), and average daily flow rate will be recorded on a daily basis and submitted monthly to the Florida Department of Environmental Protection (FDEP). The maximum injection pressure (in pounds per square inch-gauge [psig]), and the average injection pressure (psig) also will be reported to the FDEP. Monthly averages for the daily maximum flow (mgd), daily maximum injection pressure (psig), and daily average injection pressure (psig) will be calculated for monthly reporting to the FDEP.

Measurement of the injection pressure and flow rate will be made at the same time and recorded so that correlations between these two values can be made. It is essential that performance data be collected from the start to establish baseline information for satisfying regulatory requirements and to serve as a benchmark for future data comparison and analysis of performance. FDEP forms for recording and reporting these data are included as Appendix A of the Operation and Maintenance (O&M) Manual.

Injection wellhead pressure monitoring/reporting will include the following in psig:

- 1) injection pressure, daily average (psig)
- 2) sustained (15 minutes) injection pressure, daily maximum (max.) in psig
- 3) sustained (15 minutes) injection pressure, daily minimum (min.) in psig
- 4) injection pressure, monthly average (psig)
- 5) sustained (15 minutes) injection pressure, monthly max. (psig)
- 6) sustained (15 minutes) injection pressure, monthly min. (psig)
- 7) monthly wellhead pressure with no flow (shut in) (psig)
- 8) specific injectivity test results (gpm/change in psi)

Injection volume monitoring/reporting will include the following in millions of gallons (MG):

- 1) total daily flow volumes to injection well (MG)
- 2) monthly average of the daily flow volumes (MG)
- 3) monthly maximum of the daily flow volumes (MG)
- 4) monthly minimum of the daily flow volumes (MG)

Injection rate monitoring/recording will include the following in mg per day (MGD):

- 1) average daily flow rate to injection well (MGD)
- 2) maximum daily sustained (15 min.) flow rate to injection well (MGD)
- 3) minimum daily sustained (15 min.) flow rate to injection well (MGD)
- 4) monthly average daily flow rate to injection well (MGD)
- 5) monthly maximum (peak hour) flow rate to injection well (MGD)
- 6) monthly minimum daily sustained flow rate to injection well (MGD)

Annulus pressure monitoring/reporting will include the following in pounds per square inch-gauge (psig):

- 1) annulus pressure, daily average (psig)
- 2) sustained (15 minutes) annulus pressure, daily max. (psig)
- 3) sustained (15 minutes) annulus pressure, daily min. (psig)
- 4) annulus pressure, monthly average (psig)
- 5) sustained (15 minutes) annulus pressure, monthly max. (psig)
- 6) sustained (15 minutes) annulus pressure, monthly min. (psig)

Specific Injectivity Testing

A well injectivity is a function of (1) friction loss in the casing, (2) the bottom-hole driving pressure, and (3) the density differential between the injected wastestream and the formation water in the injection zone. The latter is a constant as long as the temperature and density of the injection fluid remain constant. Friction loss in the casing and bottom-hole driving pressure can vary as a result of changes in the flow rate, the condition of the injection zone, and the physical condition of the pipe. Some loss in well efficiency occurs normally due to increased friction loss as the roughness factor of the injection casing increases over time. This potential for a loss of efficiency should be eliminated by the glass-flake epoxy coating on the internal wall of the IW1 injection tubing.

Similarly, plugging of an injection zone can cause a gradual pressure buildup over time; this is not expected at the Westport Injection Well IW1 because of the cavernous and highly fractured nature of the injection zone.

Periodic determination of a well's injectivity can be used as a measure of a well's efficiency, and it is recommended as a management tool for the Westport Injection Well as required by Chapter 62528, F.A.C. The test involves injecting fluid into a well at the routine maximum operating rate and recording the injection well well-head pressure for that rate. The injectivity is calculated by dividing the injection rate by the change in the injection pressure (well-head pressure minus the static or non-pumping pressure). Quarterly specific injectivity testing will be conducted at the same injection rate so that future comparisons can be made. During the injectivity testing, well-head pressure readings will be collected only after the selected injection rate has stabilized for 5 minutes. Deep Monitor Well monitor zone pressures should be recorded before, during, and after injectivity testing. The injection well will be "shut-in" following the completion of the injectivity test in order to monitor and record a valid observation of the pressure fall-off at the well head. Well-head pressure readings will be collected at 10-minute intervals for at least 30 minutes or until the well-head pressure returns to the pre-test static pressure value. The procedure should be easily repeatable so that injectivities can be computed for the same injection rate.

Testing should be conducted monthly during operational testing, and then quarterly for the life of the well.

FDEP sample forms for the collection of injection well and monitoring zone data are included as an appendix to the O&M Manual.

Monitor-Zone Water Sampling and Analysis

The monitoring/reporting will include the physical characteristics of the Deep Monitor Well MW1 monitor zone water, including the upper and lower monitor-zone potentiometric surface height relative to NGVD (feet of head) or pressure (psig) referenced to NGVD:

```
daily maximum pressure (ft. NGVD or psig)
daily minimum pressure (ft. NGVD or psig)
daily average pressure (ft. NGVD or psig)
monthly maximum pressure (ft. NGVD or psig)
monthly minimum pressure (ft. NGVD or psig)
monthly average pressure (ft. NGVD or psig)
```

The monitoring/reporting will include the weekly sampling and analysis of the chemical characteristics of the upper and lower monitor zone water; including the following parameters which will require weekly analysis for a minimum of 180 days (and monthly analysis after operational testing is completed):

```
chloride (mg/L)
fecal coliform (# of colonies/100 ml)
iron (mg/L)
nitrogen, ammonia, total as N (mg/L)
nitrogen, total Kjeldahl nitrogen as N (TKN, mg/L)
nitrogen, nitrate, total as N (mg/L)
pH (standard units)
phosphorous, total as P (mg/L)
residue, total filterable (TDS, mg/L)
sodium (mg/L)
specific conductance (temperature compensated, umhos/cm)
sulfate, total as S04 (mg/L)
```

During operational testing, monitoring/reporting will include monthly sampling and analysis of the following chemical characteristics of the upper and lower monitor zones:

```
gross alpha (pCi/L)
radium-226 (<sup>226</sup>Ra, pCi/L)
radium-228 (<sup>228</sup>Ra, pCi/L)
fluoride (mg/L)
```

A minimum of 3 well volumes of fluid shall be evacuated from the monitor system prior to sampling for the chemical parameters listed above. The specific volumes are referenced in Subsection 4.3 for the O&M Manual:

```
MW1 Upper Monitor Zone: 39,250 gallons MW1 Lower Monitor Zone: 8,500 gallons
```

All samples shall be analyzed by a state-certified laboratory. Sufficient purging shall have occurred when either of the following have occurred: 1) pH, specific conductivity and temperature when sampled, upon purging the third or subsequent well volume, each vary less than 5% from that sampled upon purging the previous well volume; or upon purging the fifth well volume.

Surficial Aquifer Data Collection

There are four shallow monitoring wells in the immediate vicinity of the combined injection well/monitor well pad which must be sampled monthly (during operational testing) and quarterly thereafter. The purpose of this data collection is to detect any changes in the surficial aquifer water quality due to spills on the injection well (containment) pad. The parameters established for routine analyses are:

chloride conductivity and temperature or specific conductance temperature total dissolved solids water level.

The results should be summarized in the monthly operating report (see Appendix A of the O&M Manual for the form) and submitted to FDEP with the injectivity test results. After operational testing is complete, sample collection will be required at least quarterly and should be reported every quarter in the applicable month's operating report. The pad monitoring wells must also be sampled 48 hours prior to any maintenance, well testing or repairs to the system which may result in a discharge to the surficial aquifer.

The existing, containment-pad monitor wells, utilized during construction, will be used for the water-table monitoring. Existing pad monitor wells will be flush-mounted and the top of casings will be re-surveyed to North American Vertical Datum (NAVD) 1988. When that work is complete, the new monitor well construction logs will be forwarded to the FDEP.

General Class I Submittal Requirements

All injection well data submissions, including Monthly Operating Reports (MORs), will be clearly identified on each page with facility name, I. D. Number, permit number, operator's name, license number, day-time phone number, date of sampling/recording and type of data. Monitor zones shall be identified by well and depth of the producing interval. The lead plant operator or higher official shall sign and date each submittal. A summary sheet from the FDEP Southeast District Underground Injection Control (UIC) Section must be attached.

The monthly reports shall be submitted to the FDEP, UIC Section, 400 North Congress Avenue, West Palm Beach, FL 33416 and the Tallahassee FDEP office (UIC Section FDEP Twin Towers Building, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400) by the last day of the month following the month of record. These reports will consist of the forms contained in the back of the O&M Manual.

Operational Testing Period Submittals

During operational testing, permit conditions applicable to monitoring the physical and chemical characteristics of injected fluids and deep monitor well monitor zone fluids, as well as monitoring of the operational performance of the injection well, must be satisfied to provide information to submit an operating permit application for the test-injection well system. The data monitoring requirements will include most if not all of the information described above.

After 3-months of injection well system operational and groundwater monitoring data have been collected, a quarterly report of operational testing results will be submitted to the FDEP and UIC Technical Advisory Committee (TAC) members, at least 2 weeks prior to a scheduled UIC-TAC meeting. After 6-months of operational and groundwater monitoring data have been collected, a second quarterly report of operational testing results will be submitted to the FDEP and UIC Technical Advisory Committee (TAC) members, at least 2 weeks prior to a second, scheduled UIC-TAC meeting. Operational testing will extend for at least 6 months and may be reviewed during scheduled UIC-TAC meetings. The conditions for operational testing may be modified by the FDEP at each of these UIC-TAC review intervals.

Mechanical Integrity Testing

An injection well has mechanical integrity if there is no leak in the injection casing, injection tubing or packer and no fluid movement into any underground source of drinking water through channel(s) adjacent to the injection casing or the injection well bore. In accordance with Rule 62-528.425(1)(d), F.A.C., the mechanical integrity of the injection well must be demonstrated every 5 years, with the period beginning on July 8, 2003. A down-hole video survey is required of both the injection casing and the injection zone. To demonstrate mechanical integrity, the injection tubing's annular space must be pressure tested (or tested by another approved method), at a hydrostatic pressure equal to (at least) the pressure of the most recent hydrostatic-pressure test completed for demonstration of mechanical integrity (150.3 psig). The pressure test will be performed for a minimum of one hour with no more than a 5-percent pressure change over the duration of the test.

A temperature or noise log and a Radioactive Tracer Survey (RTS) will be conducted to demonstrate the absence of fluid movement into any underground source of drinking water through channel(s) adjacent to the injection casing or the injection well bore.

The first 5-year mechanical integrity test must be completed no later than **July 9, 2008**. Subsequent tests are due at five years intervals.

PRIMARY & SECONDARY DRINKING WATER STANDARDS & MINIMUM CRITERIA

Updated May 6, 2002 Page 1 of 3

PRIMARY DRINKING WATER STANDARDS

PARAMETER

Alachlor (Polychlorinated Biphenyl or PCB)

Aldicarb

Aldicarb sulfoxide

Aldicarb sulfone

Aroclors (Polychlorinated Biphenyls or PCBs)

Alpha, Gross

Antimony

Arsenic

Atrazine

Barium

Benzene

Benzo(a)pyrene

Beryllium

Bis(2-ethylhexyl) adipate (Di(2-ethylhexyl) adipate)

Bis(2-ethylhexyl) phthalate (Di(2-ethylhexyl) phthalate)

Cadmium

Carbofuran

Carbon Tetrachloride (Tetrachloromethane)

Chlordane

Chlorobenzene (Monochlorobenzene)

Chloroethylene (Vinyl Chloride)

Chromium

Coliforms, Total

Cyanide

2,4-D (2,4-Dichlorophenoxyacetic acid)

Dalapon (2,2-Dichloropropionic acid)

Dibromochloropropane (DBCP)

1,2-Dibromoethane (EDB, Ethylene Dibromide)

1,2-Dichlorobenzene (o-Dichlorobenzene)

1,4-Dichlorobenzene (p-Dichlorobenzene or Para Dichlorobenzene)

1,2-Dichloroethane (Ethylene dichloride)

1,1-Dichloroethylene (Vinylidene chloride)

1,2-Dichlorethylene (cis-1,2-Dichloroethylene or trans-1,2-Dichloroethylene) cis-1,2-Dichloroethylene (1,2-Dichlorethylene)

trans-1,2-Dichloroethylene (1,2-Dichlorethylene)

Dichloromethane (Methylene chloride)

1.2-Dichloropropane

Di(2-ethylhexyl) adipate (Bis(2-ethylhexyl) adipate)

Di(2-ethylhexyl) phthalate (Bis(2-ethylhexyl) phthalate)

Dinoseb

Diquat

EDB (Ethylene dibromide, 1,2-Dibromoethane)

Endothall

Endrin

Ethylbenzene

Ethylene dichloride (1,2-Dichloroethane)

Fluoride

Glyphosate (Roundup)

Gross Alpha

Heptachlor

Heptachlor Epoxide

Hexachlorobenzene (HCB)

gamma-Hexachlorocyclohexane (Lindane)

Hexachlorocyclopentadiene

Lead

PRIMARY DRINKING WATER STANDARDS, CONT'D

Page 2 of 3

PARAMETER

Lindane (gamma-Hexachlorocyclohexane)

Mercury

Methoxychlor

Methylene chloride (Dichloromethane)

Monochlorobenzene (Chlorobenzene)

Nickel

Nitrate (as N)

Nitrite (as N)

Total Nitrate + Nitrite (as N)

Oxamyl

p-Dichlorobenzene or Para Dichlorobenzene (1,4-Dichlorobenzene)

Pentachlorophenol

Perchloroethylene (Tetrachloroethylene)

Picloram

Polychlorinated biphenyl (PCB or Aroclors)

Radium

Roundup (Glyphosate)

Selenium

Silver

Silvex (2,4,5-TP)

Simazine

Sodium

Styrene (Vinyl benzene)

Tetrachloroethylene (Perchloroethylene)

Tetrachloromethane (Carbon Tetrachloride)

Thallium

Toluene

Toxaphene

2,4,5-TP (Silvex)

1,2,4-Trichlorobenzene

1,1,1-Trichloroethane

1,1,2-Trichloroethane

Trichloroethylene (Trichloroethene, TCE)

Trihalomethanes, Total

Vinyl Chloride (Chloroethylene)

Xylenes (total)

SECONDARY DRINKING WATER STANDARDS

PARAMETER

Aluminum

Chloride

Color

Copper

Ethylbenzene

Fluoride

Foaming Agents (MBAS)

Iron

Manganese

Odor

pH

Silver

Sulfate

Toluene

Total Dissolved Solids (TDS)

Xylenes

Zinc

MUNICIPAL WASTEWATER MINIMUM CRITERIA GROUND WATER MONITORING PARAMETERS

Page 3 of 3

INORGANICS

Ammonia Nitrogen (organic) Total Kjeldahl Nitrogen Total Phosphorus (phosphate)

VOLATILE ORGANICS

Chloroethane
Chloroform
para-Dichlorobenzene (1,4 Dichlorobenzene)
1,2-Dichloroethylene (cis-1,2-Dichloroethylene or trans-1,2-Dichloroethylene)

BASE/NEUTRAL ORGANICS

Anthracene Butylbenzylphthalate Dimethylphthalate Naphalene Phenanthrene

PESTICIDES AND PCBs

Aldrin Dieldrin

ACID EXTRACTABLES

2-chlorophenol Phenol 2,4,6-trichlorophenol

OTHER

Conductivity Biological Oxygen Demand Chemical Oxygen Demand Temperature

PROPOSED PLUGGING AND ABANDONMENT PLAN WESTPORT WASTEWATER TREATMENT PLANT INJECTION WELL SYSTEM PORT ST. LUCIE, FLORIDA

Chapter 62-528 Florida Administrative Code (FAC) states that "an applicant for an Underground Injection Control permit shall be required to submit a plan for plugging and abandonment which may include post-closure monitoring of the injection operation." The FDEP can order the plugging of an injection well when it has been abandoned or has been "determined to be a threat to the waters of the State." Additionally, a Plugging and Abandonment Plan (P&A) should be included in the Operation and Maintenance Manual for the treatment facility so that the plan can be implemented promptly in the event it is needed. The objective of the P&A is to effectively plug or seal the borehole and well casings, thereby preventing the upward migration of injected fluids or the circulation of groundwaters of different qualities.

The P&A program will require the services of a qualified contractor and equipment capable of installing drill pipe to a depth of approximately 3,350 feet, mixing and pumping drilling fluid to suppress flow and providing some form of blow-out prevention equipment, emplacing crushed rock and pumping neat cement. Before any plugging and abandonment construction activities proceed, a complete MIT will be performed on the each injection well to be abandoned.

In the event the Westport Injection Well (IW1) has to be abandoned, a P&A permit application, which specifies the procedures to fulfill the requirements of Section 62-528.435 FAC, must be filed with the FDEP at least 180 days prior to commencement of P&A activities. Before any construction activities proceed, a complete MIT must be performed on the injection well to be abandoned. In order to effectively plug the well, it will be necessary to mobilize a drill rig, "kill" the well by filling the casing with a salt slurry, and remove the valve from the well head.

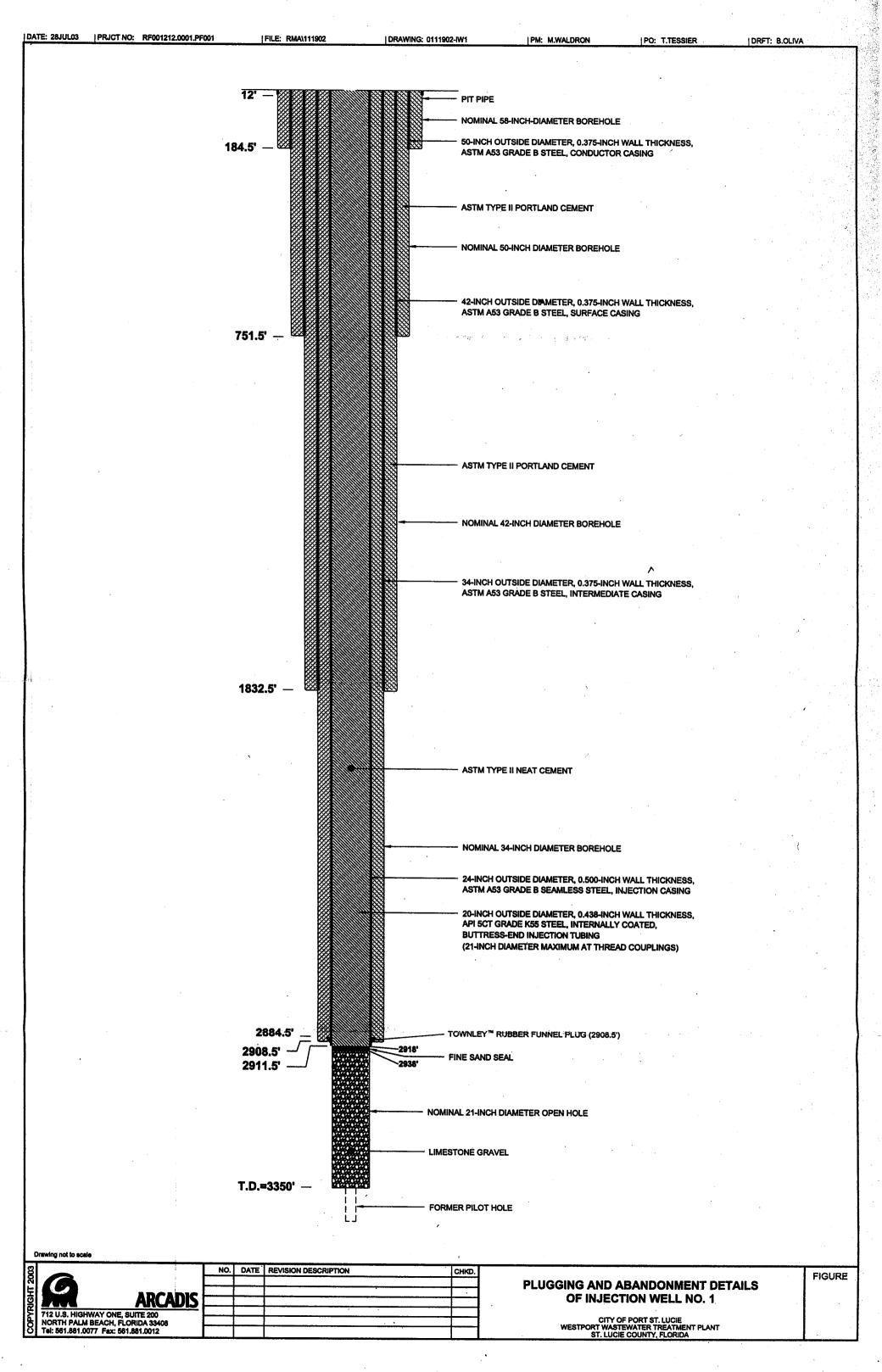
The Contractor first will pull the injection tubing from the final casing. The rig will be equipped with a calibrated weight indicator, certified as calibrated within the previous 3-month period, to be used to monitor the pulling weight on the tubing. A copy of the calibration certificate will be provided to the Engineer prior to initiation of the work and copies shall be available at the job site at all times during the procedures. The rig support equipment will be capable of handling the maximum

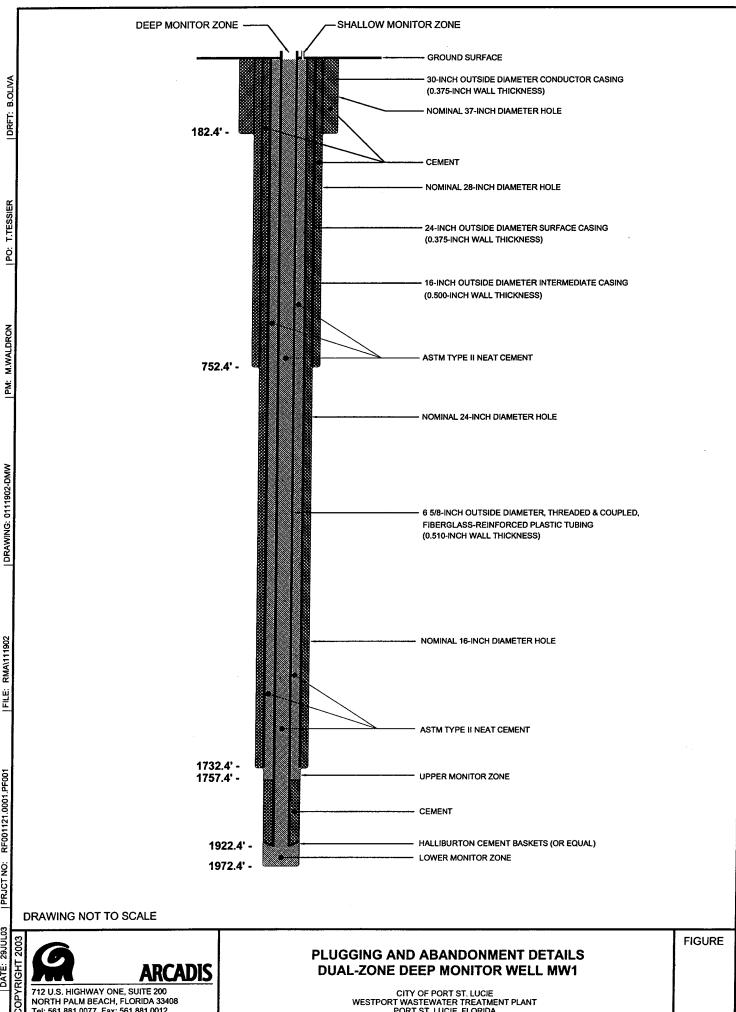
load anticipated for the work. Once the injection tubing is cut from the header, the tubing will be lifted slowly, cut into nominal 60 to 90-foot-long sections, or unscrewed in nominal 41-foot long sections, and removed.

The majority of the open-hole portion of the injection well then will be filled with crushed limestone gravel. This will fill the open hole up to a depth of approximately 2,934 feet, or about 30 feet below the base of the injection casing. A fine grained sand plug (35/65 grade) then will be poured into the well, to fill approximately 20 linear feet of the open hole up to within 10 feet of the base of the injection casing. The fine sand fill-up will be confirmed by "tagging" the top of the fill with a wireline tool.

A mixture of neat cement will be pumped into the hole through 2-inch diameter, threaded steel tremie pipe in two successive small stages of no more than 100 feet (linear-theoretical fill) of cement. Each stage of the cement will be allowed to set for 24 hours, and then "tagged" with a wire line to determine if fill-up has been achieved. The remainder of the casing then will be filled with neat cement (a total of approximately 8,450 cubic feet).

In the event the injection well is abandoned and not replaced, the Deep Monitor Well will be plugged. However, the FDEP may require sampling of the monitor zones for some period of time after the plugging and abandonment of the injection well for post-closure monitoring of the system. The lower monitor-zone tubing must be cemented first to ensure proper cement fill is obtained during the upper monitor-zone plugging and abandonment. The 5.43-inch inside-diameter tubing for the lower monitor zone can be plugged from the surface by pumping enough ASTM Type I cement (in several, successive cementing events) to displace the fluid in the inner casing and open-hole section. The upper zone will require the installation of a 1-inch diameter, annular tremie line, between the inner tubing and the 16-inch (outside) diameter casing, to fill the hole and casing from the base of the upper monitor zone to the surface. Cementing of this zone should require two or three cement stages.





712 U.S. HIGHWAY ONE, SUITE 200 NORTH PALM BEACH, FLORIDA 33408 Tel: 561 881 0077 Fax: 561 881 0012

DUAL-ZONE DEEP MONITOR WELL MW1

CITY OF PORT ST. LUCIE
WESTPORT WASTEWATER TREATMENT PLANT
PORT ST. LUCIE, FLORIDA

Table 1. Plugging and Abandonment Plan Cost Estimate for Proposed Injection Well IW1 and Deep Monitor Well MW1 City of Port St. Lucie Westport WWTP Injection Well System. Port St. Lucie, Florida.

Injection Well IW1 Tasks	Number of Units	Unit	Unit Price	Coot	
	Transpor or ornits	Offic	Offit Frice	Cost	
Mobilization	1		\$50,000	\$50,000	
Remove Tubing	1		\$175,000	\$50,000 \$475,000	
MIT Program	<u>i</u>		\$50,000	\$175,000 \$50,000	
* Fill Open Hole	41	cubic yards	\$50,000 \$75	\$50,000 \$2,075	
** Fill Casing	8,450	cubic feet		\$3,075	
Demobilization	0,430	cubic leet	\$16	\$135,200	
Demobilization	•		\$10,000	\$10,000	
Contingency				\$50.440	
Contangonoy				\$50,412	
INJECTION WELL TOTAL:				\$473,687	
eep Monitor Well MW1 Tasks	Number of Units	**Units	Deit Deies		
Taoko	Transci of Office	Offics	Unit Price	Cost	
Mobilization	1		\$15,000	£15 000	
Lower Monitor Zone	•	cubic feet	· ·	\$15,000 \$5,020	
	370	cubic feet	\$16	\$15,000 \$5,920	
Upper Monitor Zone	370		\$16	\$5,920	
	370 65	cubic feet	\$16 \$100	\$5,920 \$6,500	
Upper Monitor Zone * *Cement Open Hole	370		\$16 \$100 \$16	\$5,920 \$6,500 \$45,920	
Upper Monitor Zone * *Cement Open Hole **Cement Annulus	370 65	cubic feet	\$16 \$100	\$5,920 \$6,500	
Upper Monitor Zone * *Cement Open Hole **Cement Annulus Demobilization	370 65	cubic feet	\$16 \$100 \$16	\$5,920 \$6,500 \$45,920 \$7,500	
Upper Monitor Zone * *Cement Open Hole **Cement Annulus Demobilization Contingency	370 65	cubic feet	\$16 \$100 \$16	\$5,920 \$6,500 \$45,920	
Upper Monitor Zone * *Cement Open Hole **Cement Annulus Demobilization	370 65	cubic feet	\$16 \$100 \$16	\$5,920 \$6,500 \$45,920 \$7,500	

^{*} Denotes filling the open hole with limestone gravel and capping with fine sand

^{**} Denotes neat cement emplaced using tremie pipe, bottom to top
Contingency amounts above (\$35,031.50) are equal to one-half of a 20% contingency on the plugging and abandonment cost estimate for the entire injection well system

ARCADIS

Appendix F

Packer-Pumping Test Transducer Readings and Plots Of The Drawdown And Recovery Data



City of Port St. Lucie Westport Injection Well System Port St. Lucie, Florida

PACKER TEST WATER QUALITY SUMMARY

Injection Well No. 1 Straddle Packer Test No. 6

4/25/2003 18:55:53 Start day/ time: End day/time: 4/26/2003 7:20

51220 Flowmeter Total-Start (gal): 55470 Flowmeter Total- End (gal): Average Test Pumping Rate (gpm): 8.8 **Development Duration (min):** 699

Open Hole Total Depth (feet bpl) : 3450 Packer Depth Interval (feet bpl): 2880.0-2897.7 Pump Setting Depth (feet bpl): 240 Transducer Depth (feet bpl): 220

Static DTW Before Test (feet bmp): 18.84

Date	Time	Elapsed	Pump	Total	Depth to	Temp.	Conductivity	Chlorides	pH	Comments
		Time	Rate	Volume	Water		!			
		(min)	(gpm)	(gal) ·	(feet bmp)	(°C)	(umhos/cm)	(mg/L)		İ
Devel	pment		10, ,			· · · · · · · · · · · · · · · · · · ·	- `			
4/25/03	0.00	0	10	0	10.2	22.2	45300	17500	6.87	begin airlift development
4/25/03	1:00	60	10	600	na	24.9	48100	16500	7.27	
4/25/03	2:00	120	10	1200	na	26.5	44700	16000	7.46	
4/25/03	4:00	240	10	2400	na	24.1	46400	16000	7.73	*
4/25/03	6:00	360	10	3600	na	26.3	50400	17500	8.03	Packers pressure 405 psi.
4/25/03	7:15	435	10	4350	па	25.9	52000	17500	па	
4/25/03	7:30	450	10.0	4500	na	na	na	na	na	Stop air development.
4/25/03	9:20	450	19.0	5100	na	na	na	na	na	Start development w/ a pump.
4/25/03	9:47	477	8.2	na	210	na	na	na	na	Pumping rate stabilized.
4/25/03	10:40	530	8.3	5305	210	27.3	50600	16000	na	Packers pressure 395 psi.
4/25/03	11:40	590	8.5	5815	208	27.4	50600	16000	6.75	
4/25/03	12:10	620	8.5	6070	207	27.2	50700	17000	na	
4/25/03	12:40	650	8.5	6325	206	27.3	50800	17000	na	Packers pressure 410 psi.
4/25/03	13:10	680	8.5	6955	205	27.4	50800	17000	6.72	1
4/25/03	13:29	699	8.5	7115	205	na	na	na	na	Begin post- development recovery.
umpii	ng Test			·						
1/25/03	18:55:51	0	20	0	na	na	na	na	na	Pump-on, start test.
1/25/03	19:40	45	8.7	392	na	26.1	50800	17500	7.09	
1/25/03	20:00	65	8.7	566	na	26.2	50800	17000	7.2	Flowmeter: 51986
1/25/03	20:30	95	8.6	824	na	26.5	51000	17000	7.27	Flowmeter: 52200
1/25/03	21:00	125	8.5	1079	na	26.0	50500	17000	7.24	Flowmeter: 52500
1/25/03	22:00	185	8.4	1583	189.2	25.8	49600	17000	7.29	Hermit Reading: 189.4 ft bpf
/25/03	23:00	245	8.5	2093	189.17	24.8	49800	16500	7.36	Hermit: 189.38 ft bpl, Packer: 403 psi
/26 03	0:00	305	8.4	2597	na	25.2	48800	17000	7.2	
26 03	1:30	395	8.5	3362	na	25.3	49700	17000	7.4	
26 03	2:05	430	8.5	3659	188.97	25.9	50100	16500	7.43	Packer: 400 psi
26 03	2:30	455	8.5	3990	189.01	25.2	49500	16500	7.44	Collect lab. lample.
26 03	3:00:30	485	na	4250	na	na	na	na	na	Pump- off, begin recovery.

Approximately 4,330 gallons in one pipe and packer zone volume

"na" denotes data not available Static depth to water (DTW) is measured just prior to pumping test startup

[&]quot;gal" denotes gallons

[&]quot;gpm" denotes gallons per minute

[&]quot;min" denotes minutes

[&]quot;feet bpi" denotes feet below pad level

[&]quot;feet bmp" denotes feet below measuring point (pipe flange), 7-1 feet above the pad

C* denotes degrees celcius

[&]quot;umhos cm" denotes micromhos per centimeter

[&]quot;mg L" denotes milligrams per liter

[&]quot;psi" denotes pressure in pounds per square inch

Straddle-Packer Test No. 6 - Drawdown City of Port St. Lucie, Westport Injection Well System Injection Well No.1

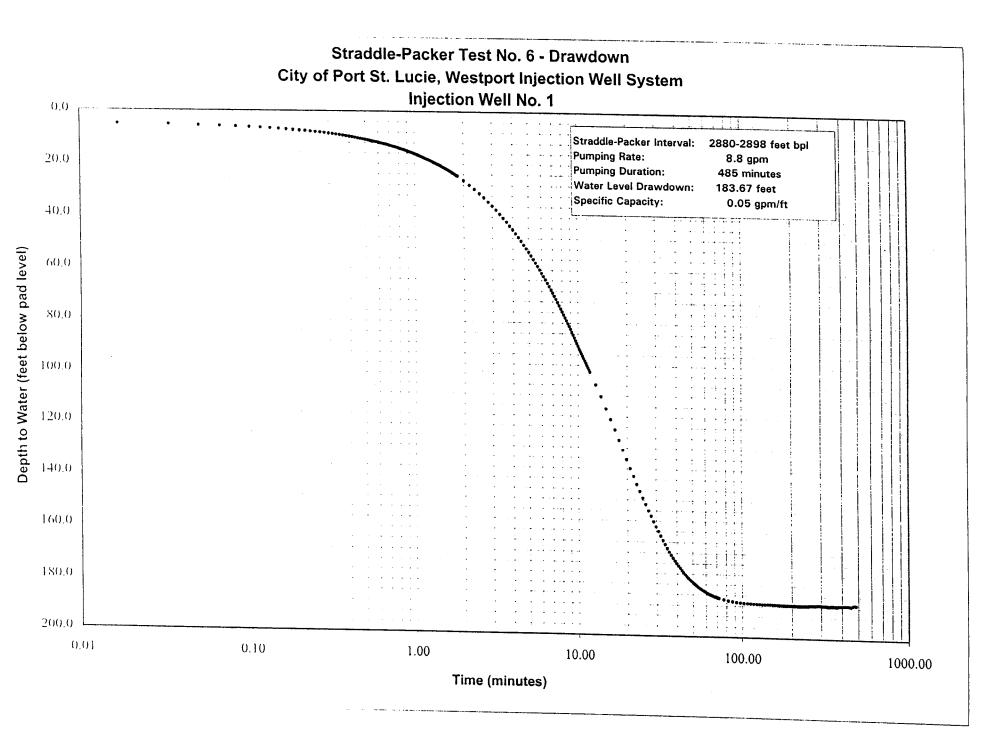
Packer Depth Interval:	2880-2898 feet bpl	Static Water Level:	3.65 feet below pad level
Start of Logging:	4/25/2003 18:55	Start of Pumping:	18:55:51
End of Logging:	4/26/2003 2:57	End of Pumping:	3:02:48
Pumping Rate:	8.8 gpm	Pumping Duration:	483 minutes

Data Collected Using Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\WESTPORT\PT6DD.DAT

Note: Bold number indicates assumed stabilized depth to water at the end of pumping (187.32 feet bpl)

Date	Time	Minutes	Water Level	Depth to Water	Drawdown	
		(start of pump)	(feet above transducer)	(feet bpl)	(ft below static)	
04/25/03	18:55:45		208.77	4.23	0.58	
04/25/03	18:55:46		208.76	4.24	0.59	
04/25/03	18:55:47		208.76	4.24	0.59	
04/25/03	18:55:49		208.76	4.24	0.59	
04/25/03	18:55:50		208.76	4.24	0.59	
04/25/03	18:55:51		208.77	4.23	0.58	
04/25/03	18:55:51		210.05	2.95		
04/25/03	18:55:52	** ** * * * * * * * * * * * * * * * * *	209.80	3.20		
04/25/03	18:55:53		209.02	3.98	0.33	
04/25/03	18:55:55	0.00	207.49	5.51	1.86	
04/25/03	18:55:56	0.02	207.63	5.37	1.72	
04/25/03	18:55:57	0.03	207.50	5.50	1.85	
04/25/03	18:55:58	0.05	207.19	5.81	2.16	
04/25/03	18:55:58	0.07	207.00	6.00	2.35	
04/25/03	18:55:59	0.08	206.84	6.16	2.51	
04/25/03	18:56:00	0.10	206.65	6.35	2.70	
04/25/03	18:56:02	0.12	206.46	6.54	2.89	
04/25/03	18:56:03	0.13	206.26	6.74	3.09	
04/25/03	18:56:04	0.15	206.06	6.94	3.29	
04/25/03	18:56:04	0.17	205.90	7.10	3.45	
04/25/03	18:56:05	0.18	205.70	7.30	3.65	
04/25/03	18:56:06	0.20	205.52	7.48	3.83	
04/25/03	18:56:08	0.22	205.35	7.65	4.00	
04/25/03	18:56:09	0.23	205.14	7.86	4.21	
04/25/03	18:56:10	0.25	204.96	8.04	4.39	
04/25/03	18:56:10	0.27	204.80	8.20	4.55	
04/25/03	18:56:11	0.28	204.60	8.40	4.75	
04 25 03	18:56:12	0.30	204.38	8.62	4.97	
04 25 03	18:56:14	0.32	204.23	8.77	5.12	
04 25 03	18:56:15	0.33	204.04	8.96	5.31	
04 25 03	18:56:16	0.35	203.86	9.14	5.49	
04 25 03	18:56:17	0.37	203 65	9.35	5.70	
04 25 03	18 56 17	0.38	203.47	9.53	5.88	
04 25 03	18 56 18	0.40	203 29	ןר פ	6.06	
04 25 03	18 56 19	0.42	203 11	989	6.24	
04 25 03	18 56 21	0.43	202 95	10.05	6.40	
04 25 03	18/56/22	0.45	202.75	10.25	6.60	
04 25 03	18 56 23	0.47	202.57	10.43	0.78	



STRADDLE PACKER TEST 6 OF INJECTION WELL, PACKER INTERVAL 2880-2897.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA APRIL 26, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963)

Drawdown Data

ENTER		
	0.05	specific capacity of pumped well, gpm/ft
	1 :	ratio of screen length to full aquifer thickness (decimal)
	0.25	radius of pumped well, feet
0	.099	outer radius of pump column, feet (if unknown or insignificant compared to well radius, enter 0)
·	17.7	thickness of aquifer, feet thickness of aquifer, feet

0.050000108 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

- Specific capacity of well penetrating full aquifer thickness, gpm/ft-dd
2000 = multiplier factor (may range from 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
leaky aquifers [Sheahan, 1970]}
100 0003164
100.0002161 # effective transmissivity of fully panetrating well-appliff
Note: If you don't have a pretty good idea of the

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

5.649729722 = hydraulic conductivity, gpd/sq ii

168.2996363 = time until the effect	io Graing storage discipates, minutes (Papadopulos Gooper 1967)
364.2547009 = time until the effect	Concessing storage dissipates minutes (Schafer 1976 in Dissoil-1986)
	Salada go Anisa Hares a minures a Schale 1849 (Sin Driscoll 1986)

Determining Transmissivity by Papadopulos-Cooper (1967) Method for Low-Yield, Large Diameter Wells

Port St. Lucie, Westport Injection Well System, Packer Test 6 Drawdown Test Interval: 2880-2897.7 feet bpl, April 26, 2003

ENTER DATA

8.8	= pumping rate, gpm
0.63	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

	= F(u, B)			
1000000	= 1/u			
12.2	= s, feet			
9.2	= t, time, minutes			
0.00001				

11.04886237	11	Transmissivity, sq ft/day	
82.6454905	=	Transmissivity, gpd/ft	

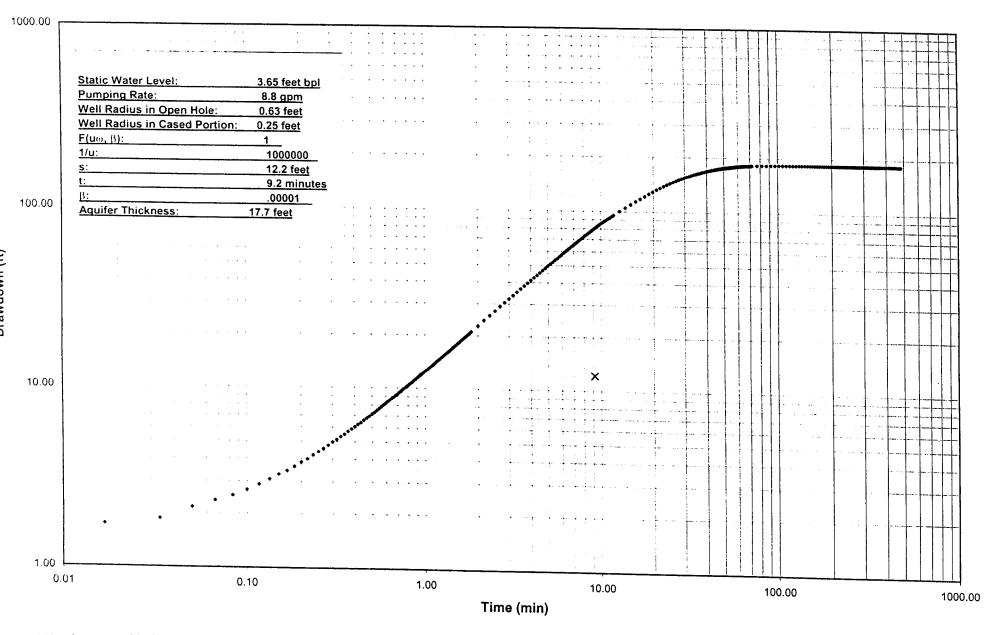
7 11/135 07	- Cto 0
7.11413E-07	= Storage Coefficient from 1/u value, dimensionless
1.5747E-06	= Storage Coefficient from B value, dimensionless
11 / 0	value, dimensionless

Note: Since the form of the type curve differs only very slightly when B differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

If the effective thickness of the aquifer (thickness of the zone influenced by pumping) is known or assumed, an estimate of K (Permeability) can be made.

	erricability) carribe made.
17.7	effective aquifer thickness, feet
0.624229512	= permeability or hydraulic conductivity, ft/day
4.669236751	= permeability or hydraulic conductivity, ibday
0.000220214	permeability of rhydraulic conductivity, gpd/sq ft
0.000220214	= permeability or hydraulic conductivity, gpu/sq it

Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 6 - Drawdown



Straddle-Packer Test No. 6 - Recovery City of Port St. Lucie, Westport Injection Well System Injection Well No. 1

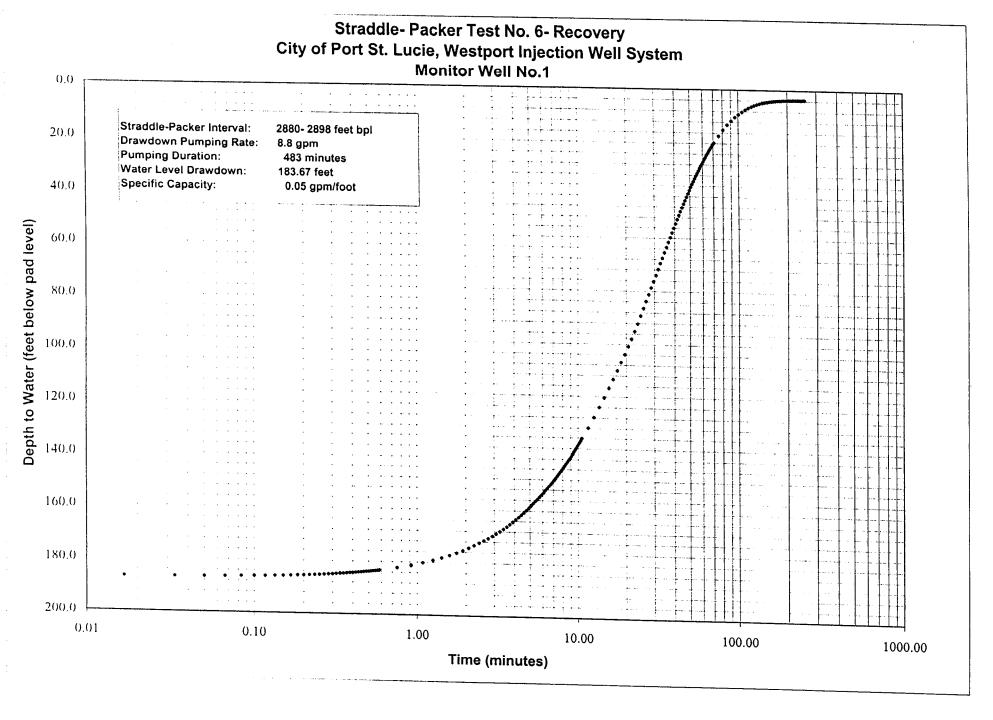
Packer Depth Interval:	2880-2898 feet bpl	Assumed Stabilized DTW:	187.32 feet bpl
Start of Logging:	4/26/03 3:01:00	Start of Pumping:	4/25/03 18:55:55
End of Logging:	4/26/03 7:18:00	Pumping Duration:	483 minutes
Pumping Rate:	8.8 gpm	Total Test Time:	737 minutes

Data collected with Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\PT6REC.DAT

Note: Double line indicates end of pumping

Date	Time	Minutes	Water Level	Depth to Water	Calculated
		(end of pump)	(feet above transducer)	(feet bpl)	Recovery (ft)
4/26/03	3:01:25		26.08	186.92	0.40
4/26/03	3:01:26		26.10	186.90	0.42
4/26/03	3:01:27		26.10	186.90	0.42
4/26/03	3:01:28		26.09	186.91	0.41
4/26/03	3:01:29		26.08	186.92	0.40
4/26/03	3:01:30		26.08	186.92	0.40
4/26/03	3:01:31		26.08	186.92	0.40
4/26/03	3:01:32		26.10	186.90	0.42
4/26/03	3:01:33		26.08	186.92	0.40
4/26/03	3:01:34		26.06	186.94	0.38
4/26/03	3:01:35		26.08	186.92	0.40
4/26/03	3:01:36		26.08	186.92	0.40
4/26/03	3:01:37		26.10	186.90	0.42
4/26/03	3:01:38		26.08	186.92	0.40
4/26/03	3:01:39		26.09	186.91	0.41
4/26/03	3:01:40		26.10	186.90	0.42
4/26/03	3:01:41		26.08	186.92	0.40
4/26/03	3:01:42		26.09	186.91	0.41
4/26/03	3:01:43		26.09	186.91	0.41
4/26/03	3:01:44		26.09	186.91	0.41
4/26/03	3:01:45		25.92	187.08	0.24
4/26/03	3:01:46		26.36	186.64	0.68
4/26/03	3:01:47		26.25	186.75	0.57
4/26/03	3:01:48		26.09	186.91	0.41
4/26/03	3:01:49		26.13	186.87	0.45
4/26/03	3:01:50		26.08	186.92	0.40
4/26/03	3:01:51		26.16	186.84	0.48
4/26/03	3:01:52		26.13	186.87	0.45
4 26 03	3:01:53		26.13	186.87	0.45
4 26 03	3:01:54		26.10	186.90	0.42
4 26 03	3:01-55		26.12	186 88	0.44
4 26 03	3:01.56		26.10	186.90	0.42
4 26 03	3:01:57		26.10	186 90	0.42
4 26 03	3 01 58		26.13	186 87	0.45
4 26 03	3 01 59		26.11	186 89	0.43
4 26 03	3 02 00		26 13	186.87	0.45
4 26 03	3 02 01		26.11	186 89	0.43
4 26 03	3 02 02		26 10	186.90	0.42



STRADDLE PACKER TEST 6 OF INJECTION WELL, PACKER INTERVAL 2880-2897.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA APRIL 26, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963)

Recovery Data

ENTER		
0.05	= specific capacity of pumped well, gp	om/ft
1	= ratio of screen length to full aquifer	thickness (decimal)
	= radius of pumped well, feet	
17.7	= thickness of aquifer, feet	

0.05 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

2000 = multiplier factor (may range from 1	1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
leaky aquifers [Sheahan, 1970]}	
100.0002 = effective transmissivity ovially dep	persion values of the

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

5.64973 = hydraulic conductivity gpd/sq i

Port St. Lucie, Westport Injection Well System, Packer Test 6 Recovery Test Interval: 2880-2897.7 feet bpl, April 26, 2003

ENTER DATA

	= pumping rate, gpm
0.63	= well radius in open portion of hole, feet
	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

	= F(u, B)
1000000	= 1/u
120	= s, feet
12.7	= t, time, minutes
0.00001	= B

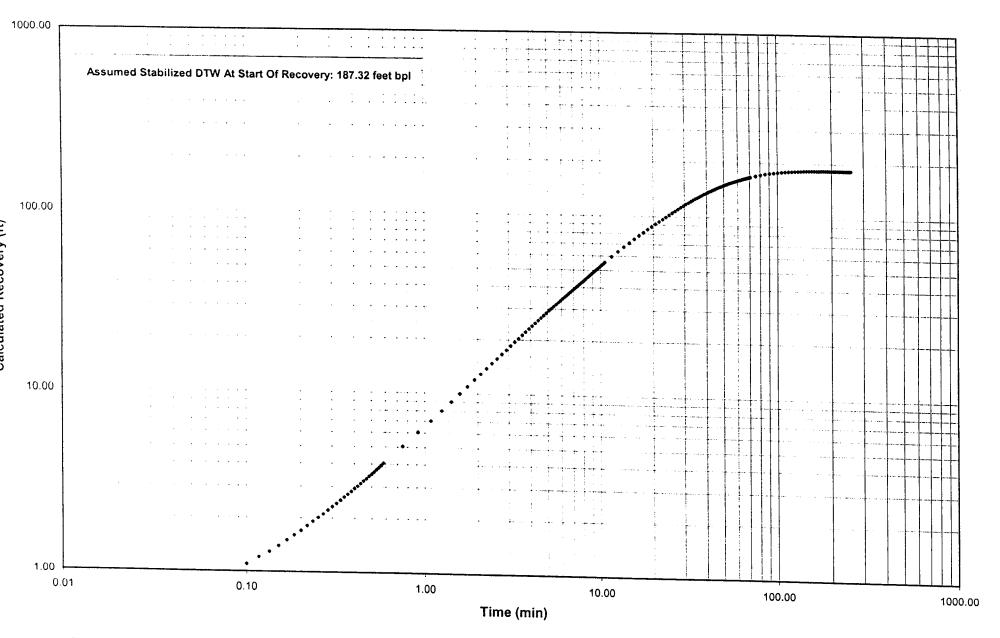
11.23301007	= Transmissivity, sq ft/day	
84.02291534	= Transmissivity, gpd/ft	

9.98427E-07	= Storage Coefficient from 1/u value, dimensionless
1.5747E-06	= Storage Coefficient from B value, dimensionless

Note: Since the form of the type curve differs only very slightly when B differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

17.7	= effective aquifer thickness, feet	
0.634633337	= permeability or hydraulic conduc	tivity, ft/day
4.747057364	= permeability or hydraulic conduction	tivity, apd/sa ft
0.000223885	= permeability or hydraulic conduc	ctivity, cm/sec

Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 6 - Recovery





PACKER TEST WATER QUALITY SUMMARY

Injection Well No. 1 Straddle Packer Test No. 7

Start day/ time:

5/3/2003

6:18:47

End day/time:

5/3/2003

14:23:47

Flowmeter Total-Start (gal): lowmeter Total- End (gal):

778136 794190

Packer Depth Interval (feet bpl): Pump Setting Depth (feet bpl):

Open Hole Total Depth (feet bpl):

3450 2830.0-2880.7 240

. verage Test Pumping Rate (gpm) : **Development Duration (min):**

33.1 389 min

220 Transducer Depth (feet bpl):

tatic DTW Before Test (feet bmp):

20.40

Date	Time	Elapsed	Pump	Total	Depth to	Temp.	Conductivity	Chlorides	pН	Comments
Date		Time	Rate	Volume	Water			i i	i	
		(min)	(gpm)	(gal)	(feet bmp)	(°C)	(umhos/cm)	(mg/L)		
Davelo	pment	<u> </u>								
5/2/03	20:30	0	19.5	0	18.79	na	na	na	na	Pump on. Start devel. Packr.press.: 410psi
5/2/03	21:01	31	10.0	340	74.48	24.9	43800	17000	6.62	Water Vol. from Totalizer - gauge readings.
	21:53	82	30.0	1900	81.22	25.1	45000	17500	6.67	Pkr. Press.: 410 psi
5/2/03	22:32	122	34.0	3226	98.40	24.9	48000	18500	6.86	Gauge changed 1st reading: 7693174
5/2/03	23:05	155	32.0	4282	98.74	25.0	49300	19000	6.96	Pckr.press.: 422psi (Annulus Transd.: 20.181)
5/2/03	23:36		28.0	5150	99.24	25.1	49200	19000	6.92	•
5/2/03		186 230	32.0	6558	99.63	25.0	49100	19500	6.96	
5/3/03	0:20	262	32.0	7582	99.88	25.0	49500	19000	7.01	Pkr. Press.: 425 psi (Annulus Transd.: 20.181)
5/3/03	0:52	305	32.0	8958	100.01	25.0	50000	19000	7.00	Pkr. Press.: 425 psi (Annulus Transd.: 20.183)
5/3/03	1:35	325	32.0	9598	100.02	25.1	49900	19500	7.03	i
5/3/03	1:55		32.0	10494	100.08	25.2	50100	19500	7.04	Pkr.Press.: 420 psi
5/3/03	2:23	353 389	32.0	11646	99.94	25.1	50000	19500	7.09	Pump off. Start Recovery
5/3/03	2:59	389	32.0	1.0.0						
	ng Test	0	36	0	20.40	na	na	na	na	Pump on, 8-hr test begin. Pckr.Press.: 410 psi
5/3/02	6:17:30		33.0	1060	na .	24.9	49400	18500	na	Packers pressure: 405 psi.
5/3/02	6:50	32	33.0	5074	na .	25.6	50600	18500	7.08	•
5/3/02	8:18	120	33.0	9024	119	27.0	51200	18500	6.9	Packers pressure: 403 psi.
5/3/02	10:18	240 .		24650	na .	27.2	51400	19000	na	•
5/3/02	12:18	240	33.0	27100	na .	27.3	51200	19000		Collect lab, water sample.
5/3/02	14:05	467	33.0	. 27100 . 27700 .	na 120	27.3 na	na .	na .	na	Pump- off, begin recovery.
5/3/02	14:23	485	33.0	27700	120	114	110			

oproximately 4890 gallons in one pipe and packer zone volume

[&]quot;gal" denotes gallons

[&]quot;gpm" denotes gallons per minute

nin" denotes minutes

eet bp/" denotes feet below pad level

set bmp" denotes feet below measuring point (pipe flange), 8.2 feet above the pad

C" denotes degrees celcius

[&]quot;umhos/cm" denotes micromhos per centimeter

ng/L" denotes milligrams per liter

isi" denotes pressure in pounds per square inch

[.]ia" denotes data not available

Static depth to water (DTW) is measured just prior to pumping test startup

Straddle-Packer Test No. 7 - Drawdown City of Port St. Lucie, Westport Injection Well System

Injection Well No.1

Packer Depth Interval:	2830-2880 feet bpl	Static Water Level:	13.12 feet below pad level
Start of Logging:	5/3/2003 6:17	Start of Pumping:	5/3/2003 6:17
End of Logging:	5/3/2003 14:19	End of Pumping:	14:23:47
Pumping Rate:	33.1 gpm	Pumping Duration:	486.00

Data Collected Using Aquastar Data Logger (ARCADIS)

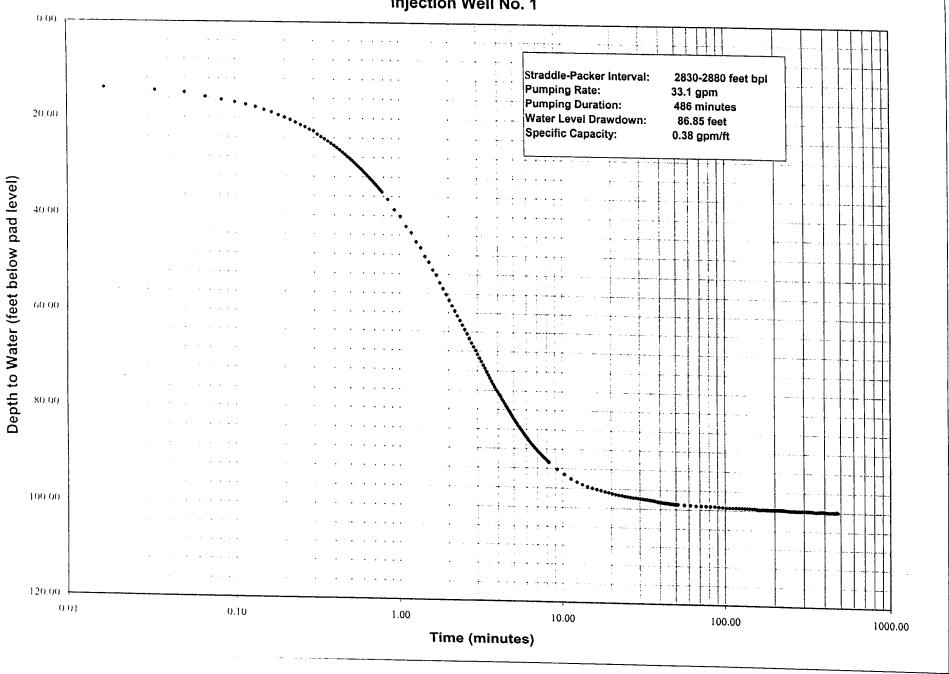
Source File: C:\AQUA4\WESTPORT\PT6DD.DAT

Note: Bold number indicates assumed stabilized depth to water at the end of pumping (99.97 feet bpl)

Double line indicates start of pump

Date	Time	Minutes	Water Level	Depth to Water	Drawdown
		(from start of pumping)	(feet above transducer)	(feet bpl)	(ft below static)
05/03/03	6:17:12		206.88	13.12	0.00
05/03/03	6:17:12		206.87	13.13	0.01
05/03/03	6:17:12		206.88	13.12	0.00
05/03/03	6:17:12		206.87	13.13	0.01
05/03/03	6:17:12		206.88	13.12	0.00
05/03/03	6:17:12		206.88	13.12	0.00
05/03/03	6:17:12		206.88	13.12	0.00
05/03/03	6:17:12		206.88	13.12	0.00
05/03/03	6:17:13		206.87	13.13	0.01
05/03/03	6:17:13		206.87	13.13	0.01
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:13		206.87	13.13	0.01
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:13		206.88	13.12	0.00
05/03/03	6:17:14		206.88	13.12	0.00
05/03/03	6:17:14		206.88	13.12	0.00
05/03/03	6:17:14		206.87	13.13	0.01
05/03/03	6:17:14		206.88	13.12	0.00
05/03/03	6:17:14		206.87	13.13	0.01
05/03/03	6:17:14		206.88	13.12	0.00
05/03/03	6:17:14		206.87	13.13	0.01
05/03/03	6:17:14		206.87	13.13	0.01
05/03/03	6:17:14		206.87	13.13	0.01
05.03.03	6:17:14		206.87	13.13	0.01
05 03 03	6:17:15		206.87	13.13	0.01
05 03 03	6:17:15		206 88	13.12	0 00
05 03 03	6:17:15		206.87	13.13	0.01
05 03 03	6:17.15		206.87	13.13	0.01
05 03 03	6:17:15		206.88	13 12	0.00
05 03 03	6/17/15		206.88	13.12	0.00
05 03 03	6:17:15		206 88	13.12	0.00
05 03 03	6:17:15		206 88	13.12	0.00
05 03 03	6.17.15		206.88	13.12	0.00
05 03 03 05 03 03	617.16		206.87	13.13	0.01

Straddle-Packer Test No. 7 - Drawdown
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1



STRADDLE PACKER TEST 7 OF INJECTION WELL, PACKER INTERVAL 2830-2880 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA MAY 3, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963)

Drawdown Data

ENTER	
0.38	= specific capacity of pumped well, gpm/ft
1	= ratio of screen length to full aquifer thickness (decimal)
0.25	= radius of pumped well, feet
0.099	= outer radius of pump column, feet (if unknown or insignificant compared to well radius, enter 0)
50	= thickness of aquifer, feet

0.380000489 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

	0000	
l i	2000 = multiplier factor (may range from	1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
		1300 IOI UIICONINED to 2230 for classic contined 1750 is good for most comi unconfined to
		To the state of the second commed, the second secon
	leaky aquifers [Sheahan, 1970]}	
	icaky additors (Chearlan, 1970)	
~ /	0.0000	Name - 1 apr of many (gr
1 7 t	60.0009774 Eeffective transmissivily of min	

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

15:20001954 = hydraulic conque in ty spoiso

22.14470837 =time until the offee of resing so rate dissipates minutes (raparionnies contro	- 2005-T
47.92829207 stime until the offection easing storage dissipates minutes கொள் செர்ந்த	Gail 101:16

Port St. Lucie, Westport Injection Well System, Packer Test 7 Drawdown

Test Interval: 2830-2880.7 feet bpl, May 3, 2003

ENTER DATA

33.1	= pumping rate, gpm
0.8	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

	= F(u, B)
100000	= 1/u
5.2	= s, feet
0.122	= t, time, minutes
0.00001	= B

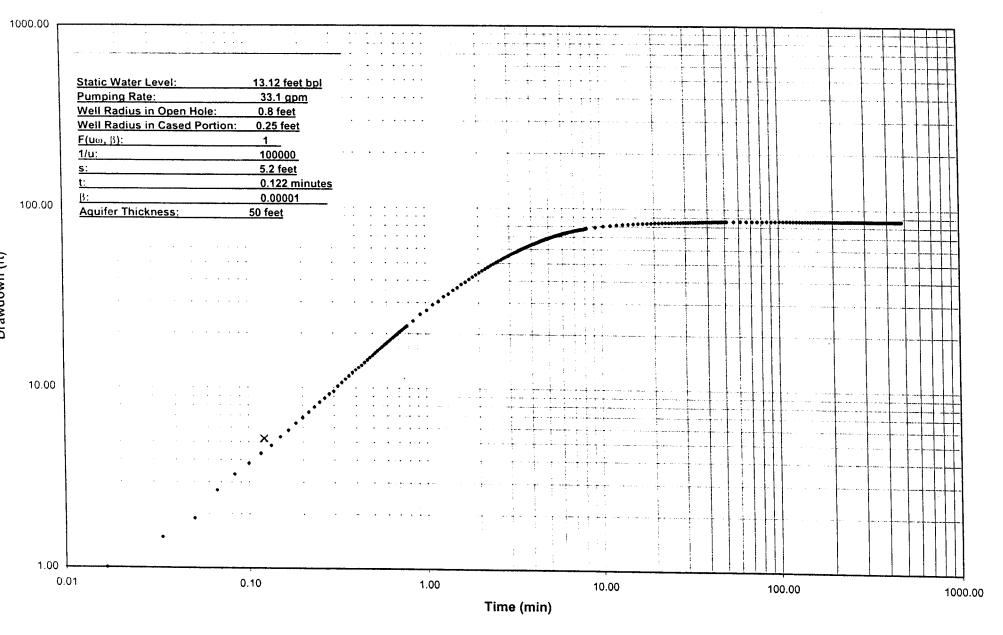
97.50331295	= Transmissivity, sq ft/day
729.3247809	= Transmissivity, gpd/ft

5.16294E-07	= Storage Coefficient from 1/u value, dimensionless
9.76563E-07	= Storage Coefficient from B value, dimensionless

Note: Since the form of the type curve differs only very slightly when B differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

50.7	= effective aquifer thickness, feet
1.923142267	= permeability or hydraulic conductivity, ft/dayl
14.38510416	= permeability or hydraulic conductivity, and/sa ft
0.000678442	= permeability or hydraulic conductivity, cm/sec

Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 7 - Drawdown



Straddle-Packer Test No. 7 - Recovery City of Port St. Lucie, Westport Injection Well System

Injection Well No.1

injection were ito:		00.07.5.41.1	
Packer Depth Interval:	2830-2880 feet bpl	Assumed Stabilized DTW:	99.97 feet opi
	5/3/03 14:23:10	Start of Pumping:	5/3/03 6:17:57
Start of Logging:	5/3/03 18:05:11	Pumping Duration:	486 minutes
End of Logging:		Total Test Time:	703 minutes
Pumping Rate:	33.1 gpm	Total Test Time.	

Data Collected Using Aquastar Data Logger (ARCADIS)

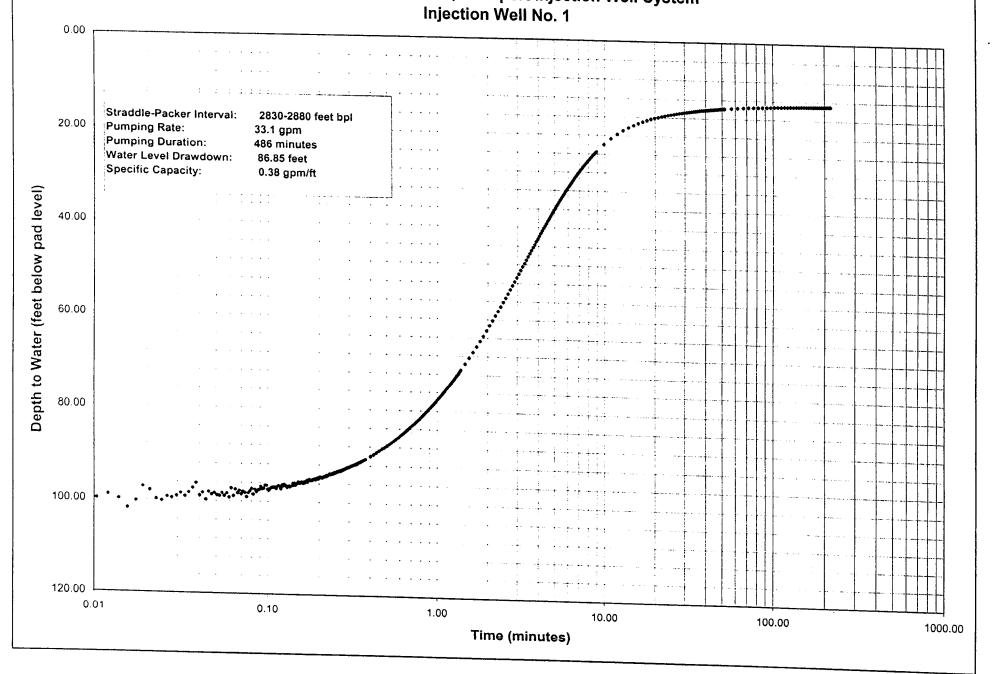
Source File: C:\AQUA4\WESTPORT\PT7REC.DAT

Note: Bold number indicates assumed stabilized depth to water

Double line indicates end of pumping

Date	d of pumping Time	Minutes	Water Level	Depth to Water	Calculated
Duto		(from start of pumping)	(feet above transducer)	(feet bpl)	Recovery (ft
05/03/03	14:23:10		120.03	99.97	0.00
05/03/03	14:23:10		120.08	99.92	0.05
05/03/03	14:23:10		120.05	99.95	0.02
05/03/03	14:23:10		120.11	99.89	0.08
05/03/03	14:23:10		120.13	99.87	0.10
05/03/03	14:23:10		120.09	99.91	0.06
05/03/03	14:23:10		120.08	99.92	0.05
05/03/03	14:23:10		120.05	99.95	0.02
05/03/03	14:23:10		120.08	99.92	0.05
05/03/03	14:23:11		120.08	99.92	0.05
05/03/03	14:23:11		120.08	99.92	0.05
05/03/03	14:23:11		120.08	99.92	0.05
05/03/03	14:23:11		120.08	99.92	0.05
05/03/03	14:23:11		120.05	99.95	0.02
05/03/03	14:23:11		120.05	99.95	0.02
05/03/03	14:23:11		120.08	99.92	0.05
05/03/03	14:23:11		120.08	99.92	0.05
05/03/03	14:23:11		120.11	99.89	0.08
05/03/03	14:23:11		120.13	99.87	0.10
	14:23:12		120.09	99.91	0.06
05/03/03	14:23:12		120.07	99.93	0.04
05/03/03	14:23:12		120.08	99.92	0.05
05/03/03	14:23:12		120.07	99.93	0.04
05/03/03	14:23:12		120.08	99.92	0.05
05/03/03	14:23:12		120.05	99.95	0.02
05/03/03	14:23:12		120.09	99.91	0.06
05/03/03	14:23:12		120.08	99.92	0.05
05/03/03	14:23:12		120.05	99.95	0.02
05.03.03	14:23:12		120.04	99.96	0.01
05.03.03	14:23:12		120.03	99.97	0.00
05 03 03			120.05	99.95	0.02
05 03 03	14:23:13		120.07	99.93	0.04
05 03 03	14:23:13		120.07	99,93	0.04
05 03 03	14:23:13		120.05	99,95	0.02
05 03 03	14:23:13		120.07	99.93	0.04
05 03 03	14:23:13			99.92	0.05
05 03 03	14:23:13		120.08	99,95	0.02
05 03 03	14/23/13		120.05	99 90	0.07
05 03 03	14:23:13		120.10	99 92	0.05
05 03 03	14:23:14		120 08		0.03
05 03 03	14:23:14		120 07	99,93	
05 03 03	14:23:14		120.08	99 92	0.05
05 03 03	14:23:14		120.07	99 93	0.04





STRADDLE PACKER TEST 7 OF INJECTION WELL, PACKER INTERVAL 2830-2880.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA May 3, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963) **Recovery Data**

ENTER		
0.38	= specific capacity of pumped w	ell. apm/ft
1	= ratio of screen length to full aquifer thickness (decimal)	
0.25	= radius of pumped well, feet	(docirriar)
50.7	= thickness of aquifer, feet	

0.38 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

0.30 - specific capacity of well penetrating full aquifer thickness, gpm/ft-dd	
2000 = multiplier factor (may range from 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to	
leading wife (5) that range from 1300 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to	
leaky aquifers [Sheahan, 1970]}	
760:001 Foliactive transmission of collegenerating well spoint?	
Note: If you don't have a gooth	

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

14.99016 = hydraulic conductivity grains it

Port St. Lucie, Westport Injection Well System, Packer Test 7 Recovery Test Interval: 2830-2880.7 feet bpl, May 3, 2003

ENTER DATA

33.1	= pumping rate, gpm
0.8	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

	= F(u, β)	
1000000	= 1/u	
	= s, feet	
	= t, time, m	inutes
0.00001	= β	

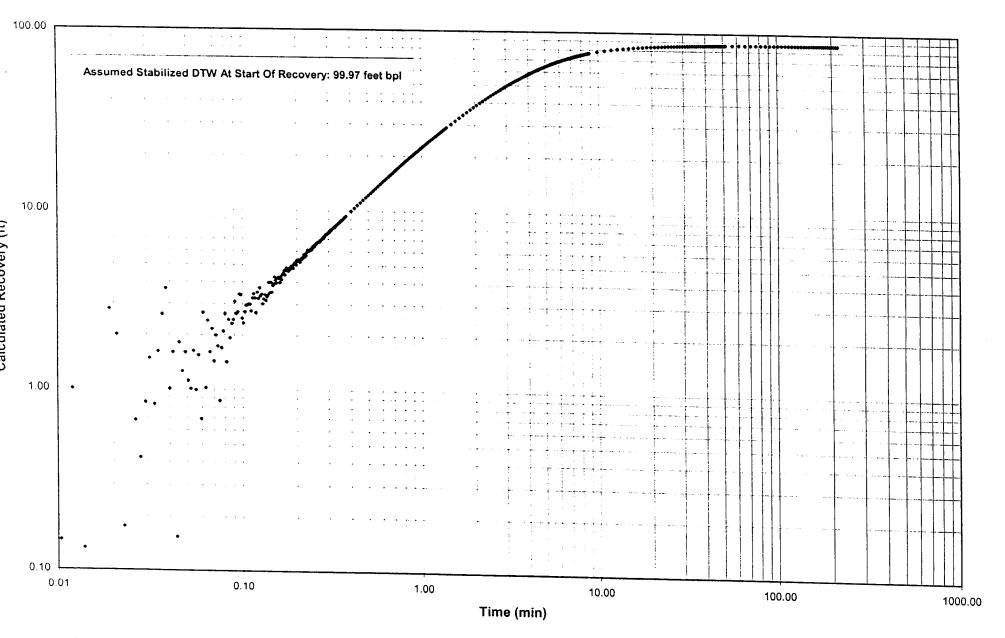
97.50331295	= Transmissivity, sq ft/day
729.3247809	= Transmissivity, gpd/ft

•			
	7.19425E-07	= Storage Coefficient from 1/u value, dimensionless	Ξ
		Cierage Coefficient from the value, difficiationless	
	9.76563F_07	= Storage Coefficient from β value, dimensionless	_
		- Storage Coefficient horrib value, dimensionless	

Note: Since the form of the type curve differs only very slightly when β differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

50.7	= effective aquifer thickness, feet
1.923142267	= permeability or hydraulic conductivity, ft/day
14.38510416	= permeability or hydraulic conductivity, and/sq ft
0.000678442	= permeability or hydraulic conductivity, cm/sec

Injection Well No. 1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 7 - Recovery





PACKER TEST WATER QUALITY SUMMARY

Injection Well No. 1 Straddle Packer Test No. 8

Start day/ time:

4/27/2003

9:53:20

End day/time:

4/27/2003

17:54:20

Flowmeter Total-Start (gal) :

60630 63800

Packer Depth Interval (feet bpl):

3450 2636.0- 2653.7

owmeter Total- End (gal) : verage Test Pumping Rate (gpm) : 6.6

Pump Setting Depth (feet bpl): 240

36.0- 2653.7

Development Duration (min):

766

Transducer Depth (feet bpi):

Open Hole Total Depth (feet bpl):

220

atic DTW Before Test (feet bmp):

19.22

Date	Time	Elapsed	Pump	Total	Depth to	Temp.	Conductivity	Chlorides	pН	Comments
,	1	Time	Rate	Volume	Water	i			į	
<u> </u>		(min)	(gpm)	(gal)	(feet bmp)	(°C)	(umhos/cm)	(mg/L)		
Devel	pment	<u></u>	·							
'26/03	12:17	0	11.0	0	20.4	na	na	na	na	Pump- on, begin development.
/26/03	13:50	93	6.2	640	184	26.5	50200	16500	6.88	Packers pressure: 395 psi
4/26/03	14:35	138	6.2	919	na	na	na	na	na	Pump- off due to malfunction
4/26/03	18:32	138	6.4	919	na	na	na	na	na	Resume development.
26/03	19:15	181	6.4	1194	193	na	na	na	na	in the second of
/26/03	20:56	292	6.0	1860	na	na	na	na	na	Hermit Reading: 194.28 ft bpl
4/26/03	21:40	336	6.1	2129	na	па	па	na	na	Hermit Reading: 193.9 ft bpl
1/26/03	23:37	453	6.3	3010	na	na	na	na	na	Totalizer: 58480 (3010 gal. pumped)
'27/03	1:00	536	6.2	3540	na	25.5	49900	17000	6.67	Gallons pumped: 3540
27/03	1:30	566	6.2	3770	na	25.6	50000	17500	6.77	Packer: 400, Hermit: 193.7 ft bpl
4/27/03	2:00	596	6.2	3940	na	25.5	49800	18000	6.86	
27/03	2:30	626	6.2	4100	na	26.2	50400	18000	6.99	Totalizer: 59570, Hermit: 193.7 ft bpl
27/03	3:00	656	6.2	4220	na	26.1	48400	17500	7.06	Hermit: 193.8 ft bpl
4/27/03	4:00	686	6.2	4690	na	25.6	50200	18000	7.07	
4/27/03	4:30	716	6.2	na	na	26.2	50100	18000	7.39	1
27/03	5:00	746	6.2	na	na	26.2	50300	18000	7.43	
27/03	5:22	766	6.2	5160	na	na	na	na	na	pump off, post development recovery.
Pumpii	ng Test									
1/27/03	9:53:20	0	12	0	19.22	na	na	na	na	Pump- on, start test #8.
27/03	10:53	60	6.5	430	na .	27.5	51200	18000	6.68	
-, 27/03	12:13	140	6.2	1040	na	27.7	51800	18000	na	Packer pressure 415psi
4/27/03	13:23	210	6.3	1480	210.7	27.7	51600	18000	6.65	•
27/03	14:53	300	6.3	2050	209.5	27.8	51500	18000	na	Packer pressure 410psi
27/03	16:23	390	6.4	2600	na	28.0	51900	18000	na	
4/27/03	17:23	450	6.3	2980	na	27.7	50900	18000	6.65	Collect lab. Sample
4/27/03	17:56:20	483	6.3	3170	na	na .	na	na	na	Pump-off, begin recovery.

proximately 4,110 gallons in one pipe and packer zone volume

[&]quot; denotes gallons

^{&#}x27;yem" denotes gallons per minute

[&]quot;min" denotes minutes

[&]quot;feet bpf" denotes feet below pad level

if bmp" denotes feet below measuring point (pipe flange), 7.1 feet above the pad

denotes degrees celcius

[&]quot;urrihos/cm" denotes micromhos per centimeter

[&]quot;mg/L" denotes milligrams per liter

[&]quot;not" denotes pressure in pounds per square inch

^{&#}x27; denotes data not available

S lic depth to water (DTW) is measured just prior to pumping test startup

Straddle-Packer Test No. 8 - Drawdown City of Port St. Lucie, Westport Injection Well System Injection Well No. 1

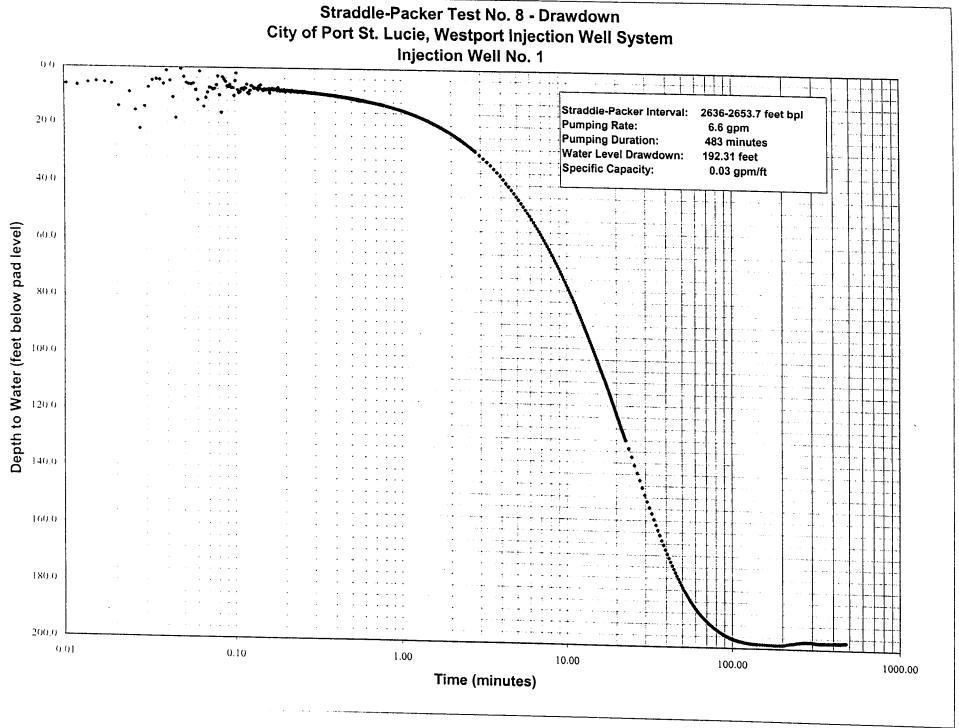
Packer Depth Interval:	2636-2653.7 feet bpl	Static Water Level:	6.41 feet bpl
Start of Logging:	4/27/03 9:56:15	Start of Pumping:	4/27/03 9:56:30
End of Logging:	4/27/03 17:52:20	End of Pumping:	4/27/03 17:59:23
Pumping Rate:	6.6 gpm	Pumping Duration:	483 minutes

Data Collected Using Aquastar Data Logger (ARCADIS)

Note: Bold number indicates assumed stabilized depth to water at the end of pumping (198.72 feet bpl)

Double line indicates start of pump

Date	Time	Minutes	Water Level	Depth to Water	Drawdown
		(from start of pumping)	(feet above transducer)	(feet bpl)	(ft below static)
04/27/03	9:56:15		208.59	6.41	0.00
04/27/03	9:56:15		208.58	6.42	0.01
04/27/03	9:56:15		208.58	6.42	0.01
04/27/03	9:56:15	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	208.59	6.41	0.00
04/27/03	9:56:15		208.59	6.41	0.00
04/27/03	9:56:15	· · · · · · · · · · · · · · · · · · ·	208.58	6.42	0.01
04/27/03	9:56:15		208.57	6.43	0.02
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:16		208.59	6.41	0.00
04/27/03	9:56:17		208.58	6.42	0.01
04/27/03	9:56:17		208.59	6.41	0.00
04/27/03	9:56:17		208.59	6.41	0.00
04/27/03	9:56:17		208.59	6.41	0.00
04/27/03	9:56:17		208.58	6.42	0.01
04/27/03	9:56:17		208.59	6.41	0.00
04/27/03	9:56:17		208.57	6.43	0.02
04/27/03	9:56:17		208.59	6.41	0.00
04/27/03	9:56:17		208.58	6.42	0.01
04/27 03	9:56:18		208.59	6.41	0.00
04/27/03	9:56:18		208.58	6.42	0.01
04/27/03	9:56:18		208.59	6.41	0.00
04/27/03	9:56:18		208.59	6.41	0.00
04 27 03	9:56:18		208.58	6.42	0.01
04 27 03	9:56:18		208.58	6.42	0.01
04 27 03	9:56:18		208 59	6.41	0.00
04 27 03	9:56:18		208 59	6.41	0.00
04 27 03	9:56:18		208 59	6.41	0.00
04 27 03	9:56:18		208 58	6.42	0.01
	9.56.19		208 58	6.42	0.01
04 27 03					
04 27 03	9:56:19		208.58	6.42	0.01
04.27.03	9.56.19		208.59	6.41	0.00



STRADDLE PACKER TEST 8 OF INJECTION WELL, PACKER INTERVAL 2636-2653.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA APRIL 27, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963)

Dr	a	w	d	o	w	n	D	a	ta

ENTER	
0.034	= specific capacity of pumped well, gpm/ft
1	= ratio of screen length to full aquifer thickness (decimal)
0.25	= radius of pumped well, feet
0.099	= outer radius of pump column, feet (if unknown or insignificant compared to well radius, enter 0)
17.7	= thickness of aquifer, feet

0.034000073 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

2000 = multiplier factor (may range from 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
leaky aquifers [Sheahan, 1970]}
68.00014693 =effective transmissivity of fully represented well-goods.

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

3.841816214 hydraulic conductivity gpd/sqst

247:4994652 = time until the effect of casing storage	െ പ്രവ്യാര്യം ബന്ധ്യം (ഉപ്പാര്യാവരം-ഭംഗാരം വര്യം)
535.6686778 Stime until the effect of Security Story	ह राज्यात्रकार (अन्यात्रकार विकास का कार्यकार (अन्यात्रकार विकास कार्यकार (अन्यात्रकार विकास कार्यकार (अन्यात्र इ.स.च्याप्रस्थात्रकार (अन्यात्रकार विकास कार्यकार (अन्यात्रकार विकास कार्यकार (अन्यात्रकार विकास कार्यकार (अन्य
The state of the s	aussipales animulos schalar 1978 in Descol 1986

Port St. Lucie, Westport Injection Well System, Packer Test 8 Drawdown Test Interval: 2636-2653.7 feet bpl, April 27, 2003

ENTER DATA

6.6	= pumping rate, gpm
0.66	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

	= F(u, B)
100000	= 1/u
12.6	= s, feet
0.88	= t, time, minutes
0.00001	= B

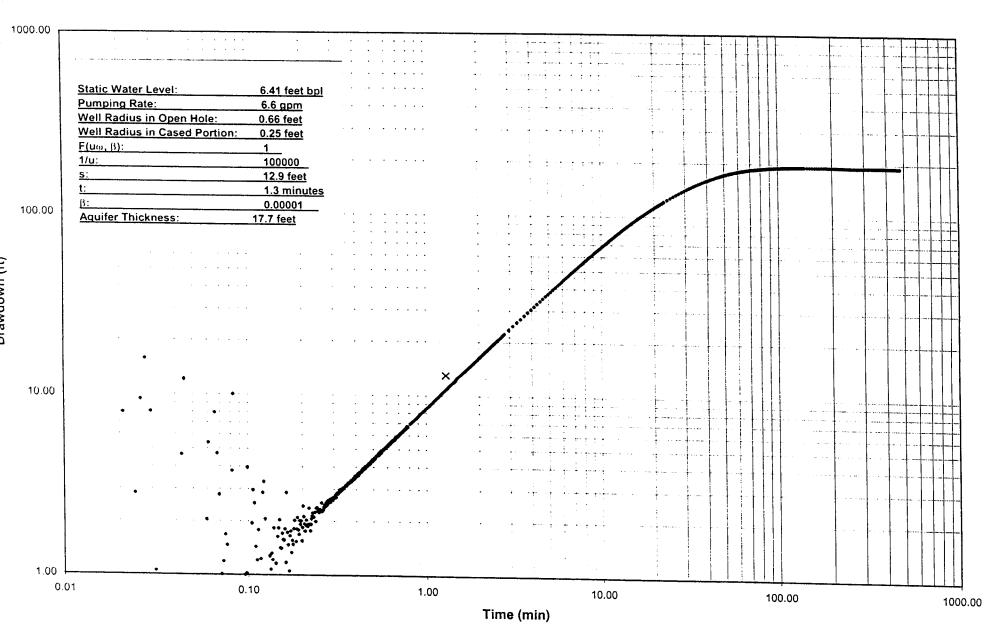
8.02357862	3 = Transmissivity, sq ft/day
60.016368	1 = Transmissivity, gpd/ft

4.50257E-07	= Storage Coefficient from 1/u value, dimensionless
1.4348E-06	= Storage Coefficient from B value, dimensionless

Note: Since the form of the type curve differs only very slightly when B differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

1	7.7 = effective aquifer thickness, feet
0.4533095	27 = permeability or hydraulic conductivity, ft/day
3.390/55	26] = permeability or hydraulic conductivity, and/sa ft
0.0001599	118 = permeability or hydraulic conductivity, cm/sec

Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 8 - Drawdown



Straddle-Packer Test No. 8 - Recovery City of Port St. Lucie, Westport Injection Well System

Injection Well No. 1

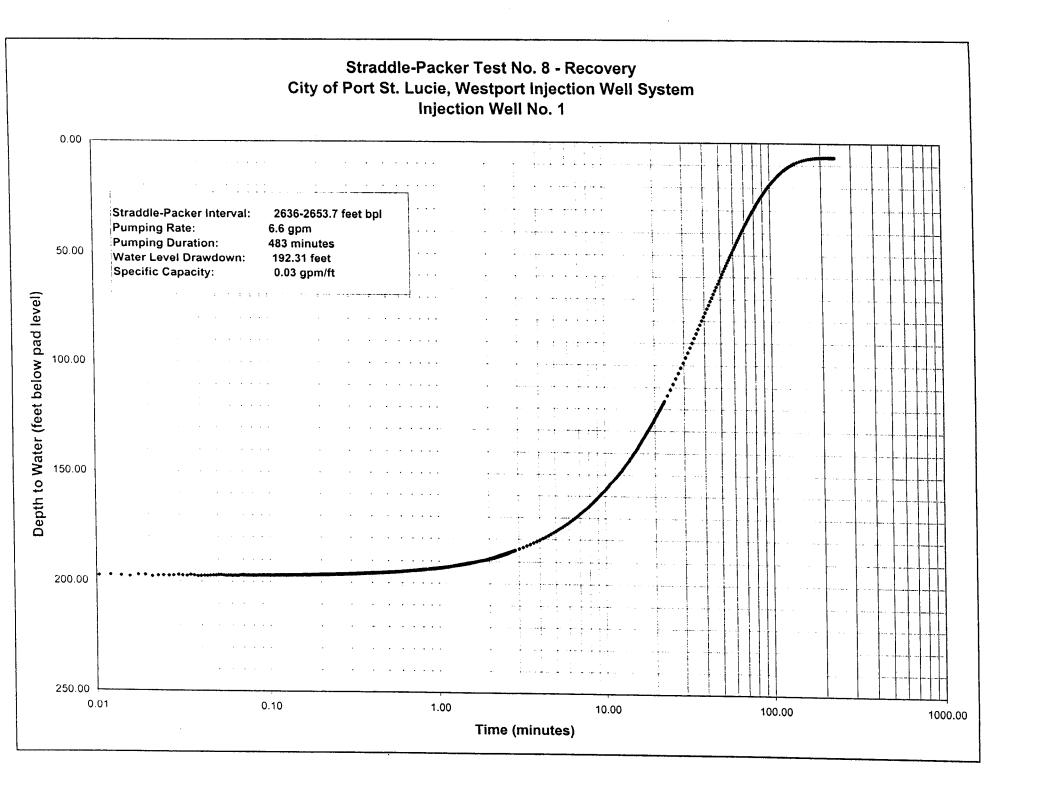
Packer Depth Interval:	2636-2653.7 feet bpl	Assumed Stabilized DTW:	198.72 feet bpl
Start of Logging:	4/27/03 17:59:11	Start of Pumping:	4/27/03 9:56:30
End of Logging:	4/27/03 22:00:14	Pumping Duration:	483 minutes
Pumping Rate:	6.6 gpm	Total Test Time:	724 minutes

Data collected with Aquastar Data Logger (ARCADIS)

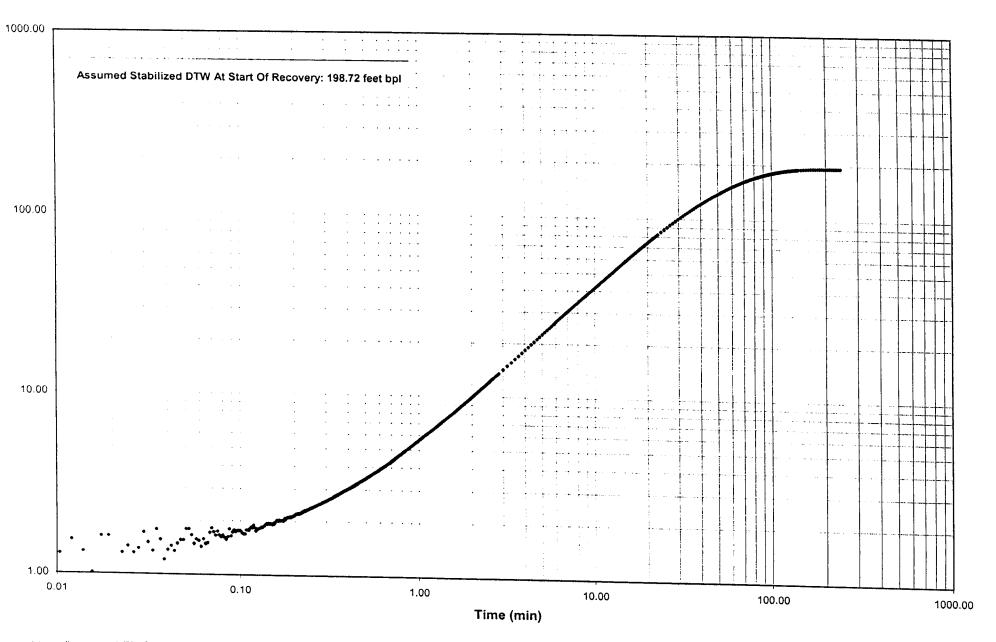
Source File: C:\AQUA4\PT4REC.DAT

Note: Double line indicates end of pumping

Date	Time	Minutes	Water Level	Depth to Water	Calculated
		(end of pump)	(feet above transducer)	(feet bpl)	Recovery (ft.)
4/27/03	17:59:11		17.55	197.45	1.27
4/27/03	17:59:11		17.55	197.45	1.27
4/27/03	17:59:11		17.55	197.45	1.27
4/27/03	17:59:11		17.51	197.49	1.23
4/27/03	17:59:12		17.53	197.47	1.25
4/27/03	17:59:12		17.57	197.43	1.29
4/27/03	17:59:12		17.53	197.47	1.25
4/27/03	17:59:12		17.54	197.46	1.26
4/27/03	17:59:12		17.58	197.42	1.30
4/27/03	17:59:12		17.56	197.44	1.28
4/27/03	17:59:12		17.57	197.43	1.29
4/27/03	17:59:12		17.57	197.43	1.29
4/27/03	17:59:12		17.55	197.45	1.27
4/27/03	17:59:12		17.50	197.50	1.22
4/27/03	17:59:13		17.53	197.47	1.25
4/27/03	17:59:13		17.59	197.41	1.31
4/27/03	17:59:13		17.56	197.44	1.28
4/27/03	17:59:13		17.53	197.47	1.25
4/27/03	17:59:13		17.58	197.42	1.30
4/27/03	17:59:13		17.57	197.43	1.29
4/27/03	17:59:13		17.58	197.42	1.30
4/27/03	17:59:13		17.58	197.42	1.30
4/27/03	17:59:13		17.58	197.42	1.30
4/27/03	17:59:13		17.53	197.47	1.25
4/27/03	17:59:14		17.52	197.48	1.24
4/27/03	17:59:14		17.58	197.42	1.30
4/27/03	17:59:14		17.58	197.42	1.30
4/27/03	17:59:14		17.57	197.43	1.29
4/27/03	17:59:14		17.58	197.42	1.30
4.27.03	17:59:14		17.57	197.43	1.29
4 27-03	17:59:14		17.57	197.43	1.29
4 27 03	17:59:14		17.57	197.43	1 29
4 27 03	17:59:14		17.58	197.42	1.30
4 27 03	17:59:15		17.57	197.43	1.29
4 27 03	17 59:15		17.54	197.46	1 26
4 27 03	17:59:15		17.58	197.42	1.30
	17/59/15		17.58	197 42	1.30
4 27 03	17:59:15		17.57	197 43	1 29
4 27 03				197.40	1.32
4.27.03	17:59:15		17 60	14.40	1.24



Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 8 - Recovery



STRADDLE PACKER TEST 8 OF INJECTION WELL, PACKER INTERVAL 2636-2653.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA APRIL 27, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963) **Recovery Data**

ENTER		
0.034	= specific capacity of pumped well	. gpm/ft
1	= ratio of screen length to full agui	fer thickness (decimal)
0.25	= radius of pumped well, feet	(30)
17.7	= thickness of aquifer, feet	

0.034 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

1	occol specific capacity of well penetrating full aquifer thickness, gpm/ft-dd
	2000 = multiplier factor (may range from 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
	leading if the standard for incident to the continued to 2250 for classic confined; 1750 is good for most semi upporting to
	leaky aquifers [Sheahan, 1970]}
	68:00015 = effective transmission of the senetrating wall spotti
	CONTROL SHIP SHIP SHIP SHIP SHIP SHIP SHIP SHIP
	Note: If you don't have a pretty good idea of the said will be a side of th

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

3.841816 inydraulic conductivity, gpd/sq.ti-

Port St. Lucie, Westport Injection Well System, Packer Test 8 Recovery

Test Interval: 2636-2653.7 feet bpl, April 27, 2003

ENTER DATA

6.6	= pumping rate, gpm
	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet
ENTED MATE	Former, 1000, 1000

ENTER MATCH POINTS

	··· • • · · · · •	
	= F(u, B)	!
100000	= 1/u	
12.2	= s, feet	
2.1	= t, time, m	inutes
0.00001	= B	

8.286646775	= Transmissivity, sq ft/day
61.98411787	= Transmissivity, gpd/ft

1 100715 06 - 54 0 (5)	
1.10971E-06 = Storage Coefficient from 1/u value, dimensionless	
1 4348F-06 = Storage Coefficient from D	
1.4348E-06 = Storage Coefficient from B value, dimensionless	

Note: Since the form of the type curve differs only very slightly when B differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

17.7 = effective aquifer thickness, feet
0.468172124 = 20772 = 1.114
0.468172134 = permeability or hydraulic conductivity, ft/day
3 501027564
3.501927564 = permeability or hydraulic conductivity, gpd/sq ft
0.000165161
0.000165161 = permeability or hydraulic conductivity, cm/sec
y de de la conductivity, chi/sec



PACKER TEST WATER QUALITY SUMMARY

Injection Well No. 1 Straddle Packer Test No. 9

Start day/ time: 4/28/2003

2:56:40

End day/time: 4/29/2003

19:17:13

Flowmeter Total-Start (gal):	63810
"owmeter Total- End (gal):	64205
rerage Test Pumping Rate (gpm):	2.0
Development Duration (min):	na

Open Hole Total Depth (feet bpl): 3450 Packer Depth Interval (feet bpi): 2580-2597.7 Pump Setting Depth (feet bpl):

232

6.59 Collect lab samples.

na Pump off. Start recovery.

atic DTW Before Test (feet bmp):

19.21

Transducer Depth (feet bpl): 214

Date	Time	Elapsed	Pump	Total	Depth to	Temp.	Cond.	Chlorides	pН	Comments
		Time	Rate	Volume	Water	1	:			
	!	(min)	(gpm)	(gal)	(feet bpl)	(°C)	(umhos/cm)	(mg/L)		
evelo	pment									
4/28/03	2:56	0	0.2	0	19.21	na	na	na	na	Pump- on, begin development.
28/03	3:12	16	0.2	3	na	25.4	40900	16500	6.14	Packers pressure: 430 psi, Ann.DTW:16.276 ft. bmp.
28/03	4:45	109	0.2	22	na	25.7	40800	16500	6.09	Stop airlifting, Water level below transducers
/28/03	11:20		па	na	na	na	na	na	na	Water still below transducers
1/28/03	11:21		6.0	na	na	па	па	na	na	Fill drill pipe to 14.85 ft bpl (w/potable water)
28/03	14:55			i						Water level stable at 19.67 feet bpl
. 28/03	15:15			Į.,						Begin logging for pump test, pump started at 2.5 gpm
ımpiı	1g Test			· · · · · · · · · · · · · · · · · · ·		i	· · · · · · · · · · · · · · · · · · ·			
28/03	15:15	0.0	2.5	0	18.63	na	па	na	na	Begin pump test
/28/03	15:18	3.0	2.0	7.5	28.48	26.1	36100	13000	6.51	
/28/03	15:25	10.0	2.0	21.5	na .	26.1	36100	13000	6.51	
28/03	15:30	15.0	2.0	32	50.29	26.7	19920	8000	6.85	
28/03	15:46	31.0	2.1	66	70.1	26.6	2280	1500	7.18	
/28/03	16:20	65	1.9	131	110.7	26.6	3480	1000	7.14	
	17:06	111	1.5	200	158.2	26.8	5600	1750	6.61	
/28/03	17.00									
/28/03 !8/03	17:32	137	na	na	179.88	na	na	na	na	

8400

na

na

26.3

na

na

na

163

165

4/28/03

1/28/03

17:58

18:00

na

na

roximately 3,978 gallons in one pipe and packer zone volume

[&]quot;gal" denotes gallons

[&]quot;gpm" denotes gallons per minute

[&]quot; denotes minutes : bpl" denotes feet below pad level

bmp" denotes feet below measuring point (pipe flange), about 8 feet above the pad

denotes degrees celcius

[&]quot;umhos/cm" denotes micromhos per centimeter

L* denotes milligrams per liter

denotes pressure in pounds per square inch

denotes data not available

Static depth to water (DTW) is measured just prior to pumping test startup.

Straddle-Packer Test No. 9 - Drawdown City of Port St. Lucie, Westport Injection Well System

Time

15/17/34

15:17:34

15 17:34

15:17:34

15 17 34

04 28 03

04 28 03

04/28/03

04 28 03

04/28/03

Injection Well No. 1

Date

Packer Depth Interv	al: 2580-2598 feet bpl	Static Water Level:	18.71 feet bpl
Start of Logging:	4/28/03 15:17:00	Start of Pumping:	4/28/03 15:17:00
End of Logging:	4/28/03 18:03:00	End of Pumping:	4/28/03 18:06:31
Pumping Rate:	2.0 gpm	Pumping Duration:	169 minutes

Minutes

Water Level

195.29

195.28

195.28

195.27

195.28

Depth to Water

18.71

18.72

18.72

18.73

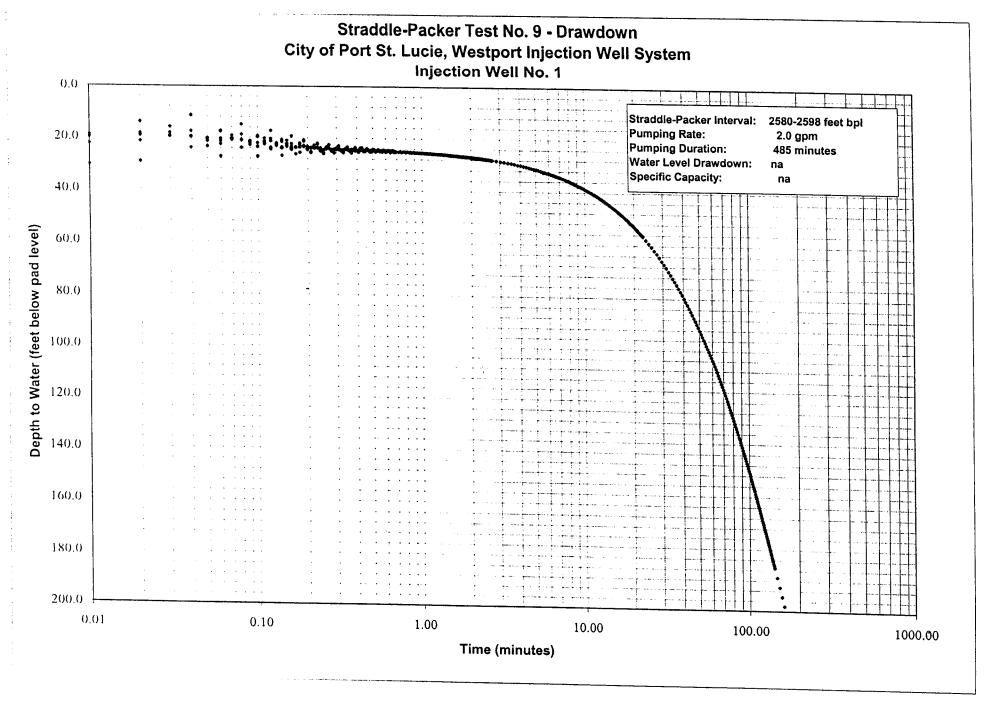
18.72

Data Collected Using Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\WESTPORT\PT9DD.DAT

Note: Double line indicates the start of pump

		(from start of pumping)	(feet above transducer)	(feet bpl)
04/28/03	15:17:30		195.28	18.72
04/28/03	15:17:30		195.27	18.73
04/28/03	15:17:30		195.29	18.71
04/28/03	15:17:30		195.29	18.71
04/28/03	15:17:31		195.29	18.71
04/28/03	15:17:31		195.29	18.71
04/28/03	15:17:31		195.27	18.73
04/28/03	15:17:31		195.28	18.72
04/28/03	15:17:31		195.29	18.71
04/28/03	15:17:31		195.28	18.72
04/28/03	15:17:31		195.28	18.72
04/28/03	15:17:31		195.29	18.71
04/28/03	15:17:31		195.29	18.71
04/28/03	15:17:31		195.29	18.71
04/28/03	15:17:32		195.29	18.71
04/28/03	15:17:32		195.29	18.71
04/28/03	15:17:32		195.27	18.73
04/28/03	15:17:32		195.29	18.71
04/28/03	15:17:32		195.30	18.70
04/28/03	15:17:32		195.28	18.72
04/28/03	15:17:32		195.28	18.72
04/28/03	15:17:32		195.29	18.71
04/28/03	15:17:32		195.28	18.72
04/28/03	15:17:32		195.28	18.72
04/28/03	15:17:33		195.29	18.71
04/28/03	15:17:33		195.29	18.71
04/28/03	15:17:33		195.29	18.71
04/28/03	15:17:33		195.29	18.71
04/28/03	15:17:33		195.29	18.71
04/28/03	15:17:33		195.29	18.71
04/28/03	15:17:33		195.29	18.71
04 28 03	15:17:33		195.28	18 72
04 28 03	15:17:33		195 27	18.73
04 28 03	15 17 34		195 30	18 70
· · · · · · ·				10.21



Straddle-Packer Test No. 9 - Recovery City of Port St. Lucie, Westport Injection Well System

Injection Well No. 1

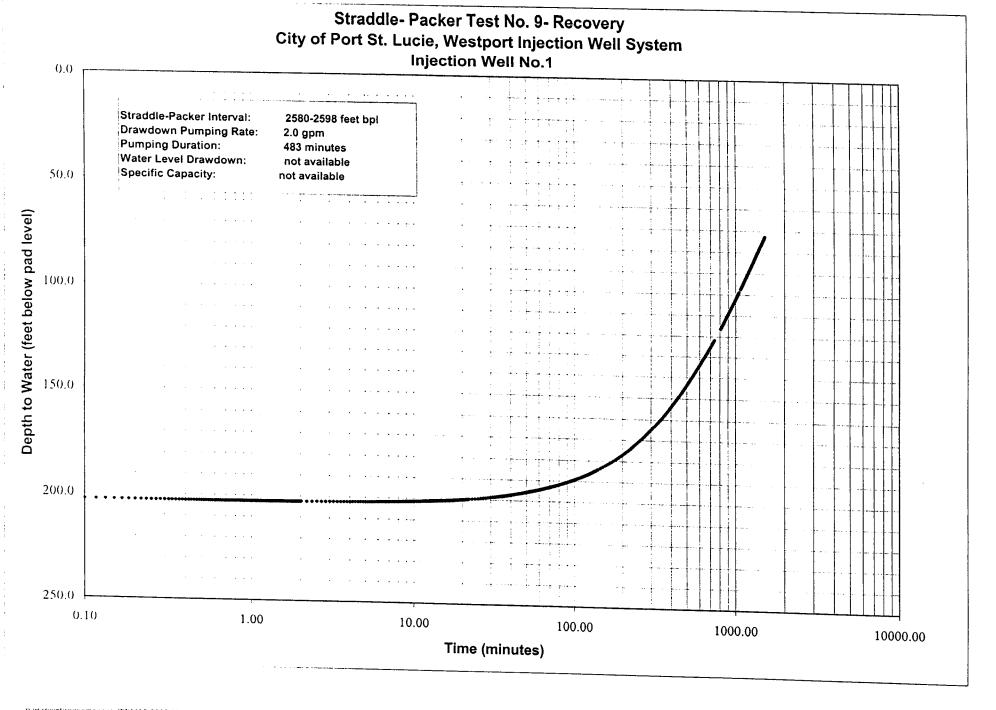
Packer Depth Interval:	2580-2597.7 feet bpl	Assumed Stabilized DTW:	12.11 feet bpl
Start of Logging:	4/28/03 18:05:00	Start of Pumping:	4/28/03 15:15:00
End of Logging:	4/29/03 19:16:00	Pumping Duration:	165 minutes
Pumping Rate:	2.0 gpm	Total Test Time:	28 hrs

Data collected with Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\PT4REC.DAT

Note: Double line indicates end of pumping

Date	Time	Minutes	Water Level	Depth to Water
		(end of pump)	(feet above transducer)	(feet bpl)
4/28/03	18:05:28		11.16	202.84
4/28/03	18:05:29		11.19	202.81
4/28/03	18:05:29		11.21	202.79
4/28/03	18:05:29		11.22	202.78
4/28/03	18:05:29		11.23	202.77
4/28/03	18:05:29		11.26	202.74
4/28/03	18:05:29		11.22	202.78
4/28/03	18:05:29		11.21	202.79
4/28/03	18:05:29		11.20	202.80
4/28/03	18:05:30		11.20	202.80
4/28/03	18:05:30	.,,	11.21	202.79
4/28/03	18:05:30		11.27	202.73
4/28/03	18:05:30		11.29	202.71
4/28/03	18:05:30		11.24	202.76
4/28/03	18:05:30		11.19	202.81
4/28/03	18:05:30		11.15	202.85
4/28/03	18:05:30		11.18	202.82
4/28/03	18:05:30		11.17	202.83
4/28/03	18:05:31		11.20	202.80
4/28/03	18:05:31		11.19	202.81
4/28/03	18:05:31		11.16	202.84
4/28/03	18:05:31		11.17	202.83
4/28/03	18:05:31		11.17	202.83
4/28/03	18:05:31		11.20	202.80
4/28/03	18:05:31		11.17	202.83
4/28/03	18:05:31		11.14	202.86
4/28/03	18:05:32		11.16	202.84
4/28/03	18:05:32		11.22	202.78
4.28/03	18:05:32		11.23	202.77
4 28/03	18:05:32		11.26	202.74
4 28 03	18:05:32		11.24	202.76
4 28 03	18:05:32		11.20	202.80
4 28 03	18:05:32		11.20	202.80
4 28 03	18/05/32		11.18	202.82
4 28 03	18:05:33		11 19	202 81
	18.05/33		11.17	202.83
4 28 03	18/05/33		11 12	202 88
4 28 03	18 05 33		11.12	202 88
4 28 03	18/05/33		11.15	202 85





City of Port St. Lucie Westport Injection Well System Port St. Lucie, Florida

PACKER TEST WATER QUALITY SUMMARY

3450

Injection Well No. 1 Straddle Packer Test No. 10

Start day/ time:

4/30/2003

9:36:30

End day/time:

4/30/2003

18:18:30

Flowmeter Total-Start (gal): 66700 68070 owmeter Total- End (gai): Average Test Pumping Rate (gpm): 2.6

Packer Depth Interval (feet bpi): Pump Setting Depth (feet bpl):

Open Hole Total Depth (feet bpl) :

2217.0-2234.7 240

Development Duration (min):

1070 14.15 Transducer Depth (feet bpl):

220

a١	IIC	υı	W	Before	rest	(teer	ompj.
_			_				

Date	Time	Elapsed	Pump	Total	Depth to	Temp.	Conductivity	Chlorides	pH	Comments
	,	Time	Rate	Volume	Water				:	
	1	(min)	(gpm)	(gal)	(feet bmp)	(°C)	(umhos/cm)	(mg/L)	!	
Develo	pment									
/30/03	0:32	0	50.0	0	16.58	na	па	na	na	Pump- on, begin development.
′30/02	1:15	43	2.2	190	200	27.6	51200	17000	6.61	Packers pressure: 400 psi
4/30/02	12:02	690	2.0	1710	180	28.1	52100	17000	6.52	
4/30/02	15:02	870	2.0	2080	na	28.2	52200	17000	na	Packers pressure: 395 psi
30/02	18:02	1050	2.0	ת	na	28.2	52400	17000	6.53	
30/02	18:22	1070	2.0	2490	178	na	na	na	na	Pump- off, begin post development
										recovery
iqmı	ng Test									
/1/03	9:36:30	0 .	5.7	2490	178	na	na :	na	na	Pump- on, start test #10.
5/1/03	10:36	60	3.6	2750	na .	27.6	52500	17500	6.54	Packers pressure: 392 psi
5/1/03	12:06	150	2.4	3020	204.7	27.8	52200	17500	na	Lower pump rate to 2.0 gpm
/1/03	13:36	240	2.1	3180	197.6	28.1	49900	17000	6.69	
/1/03	15:36	360	2.1	3430	na	29.0	43500	15000	6.64	Packers pressure: 392 psi
5/1/03	17:15	459	2.0	3634	na .	26.8	39800	13500	6.84	
5/1/03	17:35	479	2.0	3674	na	26.7	40100	13500	na	
1/03	17:55	499	2.0	3714	na	26.8	40300	13500	6.88	Collect lab. Sample
1/03	18:18:30	522	2.0	3860	na	na .	na	na .	na	Pump-off, begin recovery.

Approximately 3,300 gallons in one pipe and packer zone volume

"gai" denotes gallons

Static depth to water (DTW) is measured just prior to pumping test startup

n" denotes gallons per minute

n" denotes minutes

ut bpl" denotes feet below pad level

[&]quot;feet bmp" denotes feet below measuring point (pipe flange), 6.0 feet above the pad

[&]quot;C" denotes dearees celcius

hos/cm" denotes micromhos per centimeter

[/]L" denotes milligrams per liter

denotes pressure in pounds per square inch

[&]quot;na" denotes data not available

Straddle-Packer Test No.10 - Drawdown City of Port St. Lucie, Westport Injection Well System

Injection Well No. 1

Packer Depth Interval:	2217-2235 feet bpl	Static Water Level:	7.17 feet bpl
Start of Logging:	5/1/03 9:37:20	Start of Pumping:	5/1/03 9:37:25
End of Logging:	5/1/03 18:09:22	End of Pumping:	5/1/03 18:19:13
Pumping Rate:	2.6 gpm	Pumping Duration:	512 minutes

Data Collected Using Aquastar Data Logger (ARCADIS)

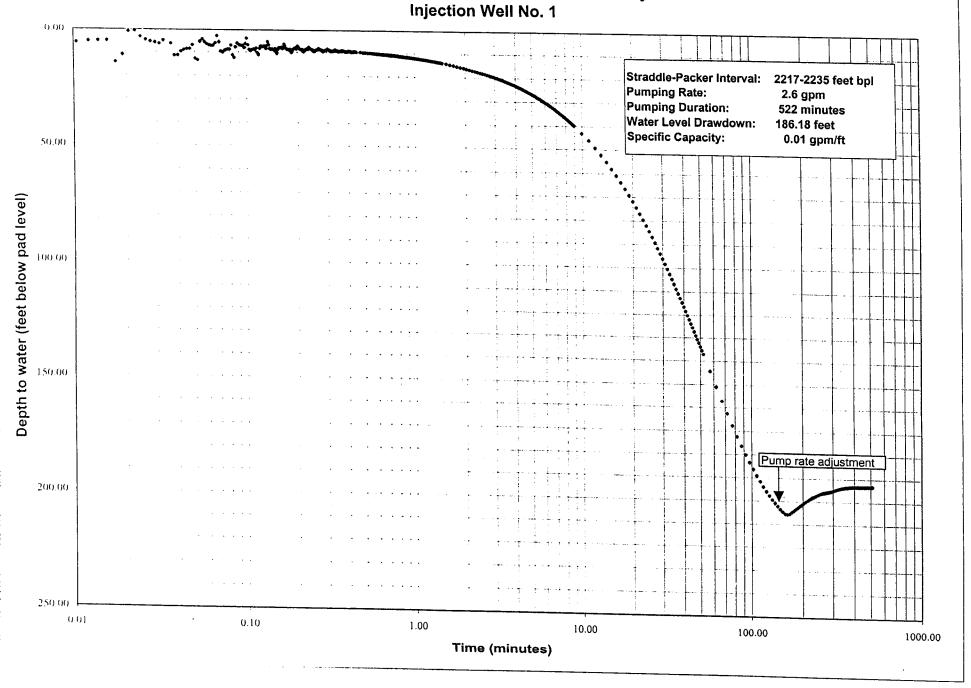
Source File: C:\AQUA4\PT10DD.DAT

Note: Bold number indicates assumed stabilized depth to water at the end of pumping (193.35 feet bpl)

Double line indicates start of pump

Date	Time	Minutes	Water Level	Depth to Water	Drawdown
		(from start of pumping)	(feet above transducer)	(feet bpl)	(ft below static)
05/01/03	9:37:20		212.81	7.19	0.02
05/01/03	9:37:20		212.82	7.18	0.01
05/01/03	9:37:20		212.80	7.20	0.03
05/01/03	9:37:20		212.83	7.17	0.00
05/01/03	9:37:20		212.82	7.18	0.01
05/01/03	9:37:20		212.83	7.17	0.00
05/01/03	9:37:21		212.83	7.17	0.00
05/01/03	9:37:21		212.80	7.20	0.03
05/01/03	9:37:21		212.81	7.19	0.02
05/01/03	9:37:21		212.82	7.18	0.01
05/01/03	9:37:21		212.82	7.18	0.01
05/01/03	9:37:21		212.81	7.19	0.02
05/01/03	9:37:21		212.83	7.17	0.00
05/01/03	9:37:21		212.81	7.19	0.02
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:22		212.82	7.18	10.0
05/01/03	9:37:22		212.81	7.19	0.02
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:22		212.82	7.18	0.01
05/01/03	9:37:23		212.82	7.18	0.01
05/01/03	9:37:23		212.81	7.19	0.02
05/01/03	9:37:23		212.83	7.17	0.00
05/01/03	9:37:23		212.82	7.18	0.01
05/01/03	9:37:23		212.82	7.18	0.01
05/01/03	9:37:23		212.83	7.17	0.00
05 01 03	9:37:23		212.82	7 18	0.01
05:01:03	9:37:23		212.81	7.19	0.02
05 01 03	9:37:24		212.81	2.19	0.02
05 01 03	9-37-24		212.82	7.18	0.01
05 01 03	9,37,24		212.83	7.17	0.00
05 01 03	9:37:24		212.82	7.18	0.01
	9:37:24		212.81	~ 19	0.02
05 01 03	9/37/24		212.81	7.19	0.02
05 01 03 05 01 03	9.37:24		212.83	7.17	0.00

Straddle-Packer Test No. 10 - Drawdown
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1



STRADDLE PACKER TEST 10 OF INJECTION WELL, PACKER INTERVAL 2217-2234.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA MAY 2, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963)

Drawdown Data

ENTER		
0.0	14:	specific capacity of pumped well, gpm/ft
	1 :	= ratio of screen length to full aquifer thickness (decimal)
0.	.25	= radius of pumped well, feet
0.0	99	= outer radius of pump column, feet (if unknown or insignificant compared to well radius, enter 0)
		= thickness of aquifer, feet

0.01400003 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

2000 = multiplier factor (may range from 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
leaky aquifers [Sheahan, 1970]}
28 0000605 Follective transmissivity of rule reportation well appells

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

1.581924322 = hydraulic conclusioning operson

601:0701298 =time until the effect of casing storage dissipates, minutes (Papadopulos Gonga: இல்) 1300:909646 =time until the offect of casing storage dissipates, minutes (Sahater, 1976 in Bristan), 1976

Port St. Lucie, Westport Injection Well System, Packer Test 10 Drawdown Test Interval: 2217-2234.7 feet bpl, May 2, 2003

ENTER DATA

	= pumping rate, gpm
0.65	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

ENTER MATO	III Ontio
1	= F(u, B)
100000	= 1/u
14.5	= s, feet
2.93	= t, time, minutes
0.00001	= B

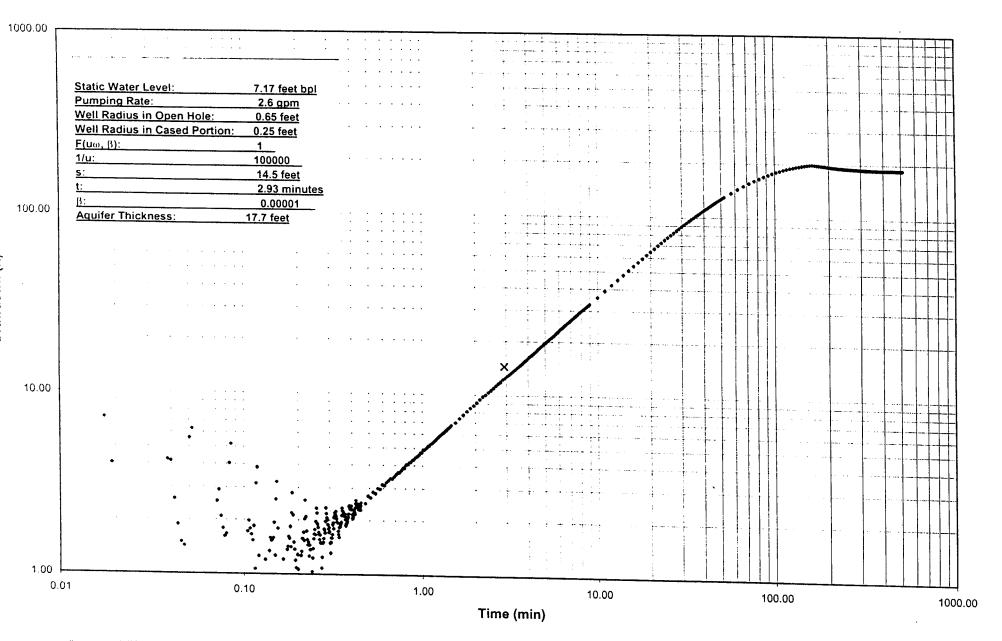
2.746629422	= Transmissivity, sq ft/day
20.54478808	= Transmissivity, gpd/ft

5.29101E-07	= Storage Coefficient from 1/u value, dimensionless
1.47929E-06	= Storage Coefficient from B value, dimensionless

Note: Since the form of the type curve differs only very slightly when B differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

- 1	, our so mass.
	17.7 = effective aquifer thickness, feet
	0.155176804 = permeability or hydraulic conductivity, ft/day
	1.16072249 = permeability or hydraulic conductivity, gpd/sq ft
	5.47429E-05 = permeability or hydraulic conductivity, cm/sec
	7 - 7

Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 10 - Drawdown



Straddle-Packer Test No. 10 - Recovery City of Port St. Lucie, Westport Injection Well System

Injection Well No. 1

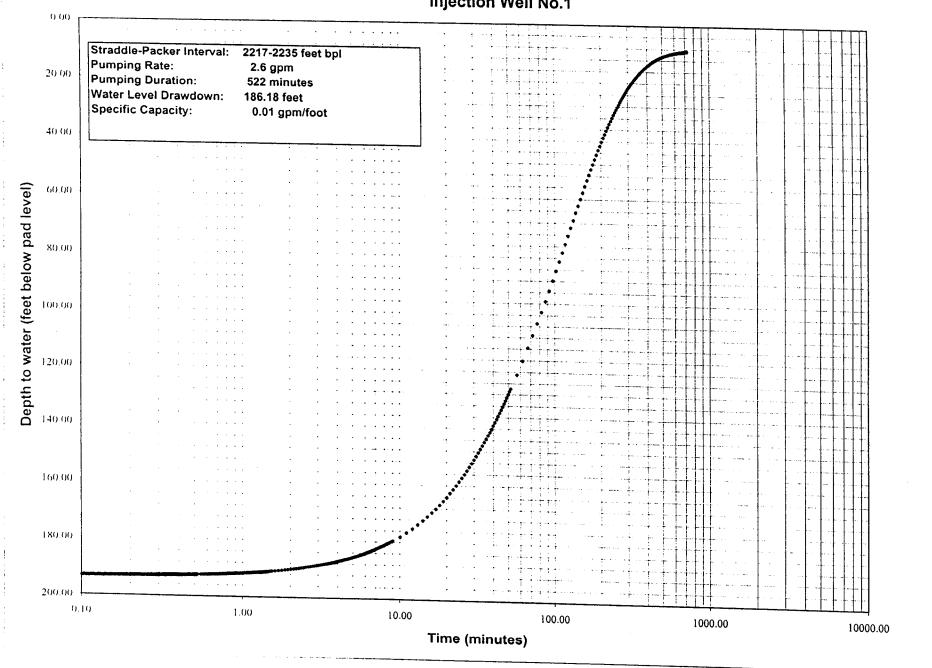
Packer Depth Interval:	2217- 2235 feet bpl	Assumed Stabilized DTW:	193.35 feet bpl
Start of Logging:	5/1/03 18:19:13	Start of Pumping:	5/1/03 9:37:25
End of Logging:	5/2/03 6:21:15	Pumping Duration:	522
Pumping Rate:	2.6 gpm	Total Recovery Time:	1244 minutes

Data collected with Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\PT10REC.DAT

Date	Time	Minutes	Water Level	Depth to Water	Calculated
Duit		(end of pump)	(feet above transducer)	(feet bpl)	Recovery (ft)
05/01/03	18:19:13	0.00	26.79	193.21	0.14
05/01/03	18:19:13	0.00	26.73	193.27	0.08
05/01/03	18:19:13	0.00	26.70	193.30	0.05
05/01/03	18:19:13	0.01	26.68	193.32	0.03
05/01/03	18:19:13	0.01	26.73	193.27	0.08
05/01/03	18:19:13	0.01	26.83	193.17	0.18
05/01/03	18:19:13	0.01	26.84	193.16	0.19
05/01/03	18:19:13	0.01	26.83	193.17	0.18
05/01/03	18:19:14	0.01	26.79	193.21	0.14
05/01/03	18:19:14	0.02	26.75	193.25	0.10
05/01/03	18:19:14	0.02	26.78	193.22	0.13
05/01/03	18:19:14	0.02	26.83	193.17	0.18
05/01/03	18:19:14	0.02	26.86	193.14	0.21
05/01/03	18:19:14	0.02	26.79	193.21	0.14
05/01/03	18:19:14	0.02	26.70	193.30	0.05
05/01/03	18:19:14	0.03	26.78	193.22	0.13
05/01/03	18:19:15	0.03	26.77	193.23	0.12
05/01/03	18:19:15	0.03	26.83	193.17	0.18
05/01/03	18:19:15	0.03	26.82	193.18	0.17
05/01/03	18:19:15	0.03	26.73	193.27	0.08
05/01/03	18:19:15	0.03	26.72	193.28	0.07
05/01/03	18:19:15	0.04	26.81	193.19	0.16
05/01/03	18:19:15	0.04	26.88	193.12	0.23
05/01/03	18:19:15	0.04	26.85	193.15	0.20
05/01/03	18:19:16	0.04	26.77	193.23	0.12
05/01/03	18:19:16	0.04	26.72	193.28	0.07
05/01/03	18:19:16	0.05	26.75	193.25	0.10
05/01/03	18:19:16	0.05	26.89	193.11	0.24
05:01:03	18:19:16	0.05	26.87	193.13	0.22
05/01/03	18:19:16	0.05	26.81	193.19	0.16
05 01 03	18:19:16	0.05	26.75	193.25	0.10
05 01 03	18:19:16	0.05	26.75	193.25	0.10
05 01 03	18:19:16	0.06	26.80	193.20	0.15
05 01 03	18:19:17	0.06	26.84	193 16	0.19
05 01 03	18:19:17	0.06	26.81	193.19	0.16
05 01 03	18.19-17	0.06	26.75	193.25	0.10
05 01 03	18:19:17	0.06	26.70	193-30	0.05
05 01 03	18.19:17	0.06	26.77	193-23	0.12
05 01 03	18 19:17	0.07	26.87	193.13	0.22
02.01.02	15-17-1			· -	

Straddle- Packer Test No. 10 Recovery City of Port St. Lucie, Westport Injection Well System Injection Well No.1



STRADDLE PACKER TEST 10 OF INJECTION WELL, PACKER INTERVAL 2217-2234.7 FEET PORT ST. LUCIE, WESTPORT INJECTION WELL SYSTEM, FLORIDA MAY 2, 2003

Determining Aquifer Specific Capacity from the Specific Capacity of a Partially Penetrating Production Well (Turcan, 1963)

Recovery Data

ENTER		
0.014	= specific capacity of pumped well	, gpm/ft
1	= ratio of screen length to full aquit	fer thickness (decimal)
0.25	= radius of pumped well, feet	(
17.7	= thickness of aquifer, feet	

0.014 = specific capacity of well penetrating full aquifer thickness, gpm/ft-dd

ı	2000-1 July 2010 Annual State addition thickness, gph//t-dd
- 1	20001= multiplier factor (may range from 1500 for upper fined to 2000 for
ŀ	2000 = multiplier factor (may range from 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
ı	leaky aquifers [Sheahan, 1970]}
- 1	28.00006 Seffective reasonable of the presenting well godfit.
	The state of the s
•	

Note: If you don't have a pretty good idea of the aquifer thickness, don't rely on this transmissivity value.

12581924 ≡hydrauli∈ conductivity, gpd co

Determining Transmissivity by Papadopulos-Cooper (1967) Method for Low-Yield, Large Diameter Wells

Port St. Lucie, Westport Injection Well System, Packer Test 10 Recovery Test Interval: 2217-2234.7 feet bpl, May 2, 2003

ENTER DATA

2.6	= pumping rate, gpm
0.65	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

= F(u, B)	
= 1/u	
= s, feet	
= t, time, mi	nutes
= β	
	= F(u, B) = 1/u = s, feet = t, time, min = β

3.237896473	= Transmissivity,	sq ft/day
24.21946562	= Transmissivity,	gpd/ft

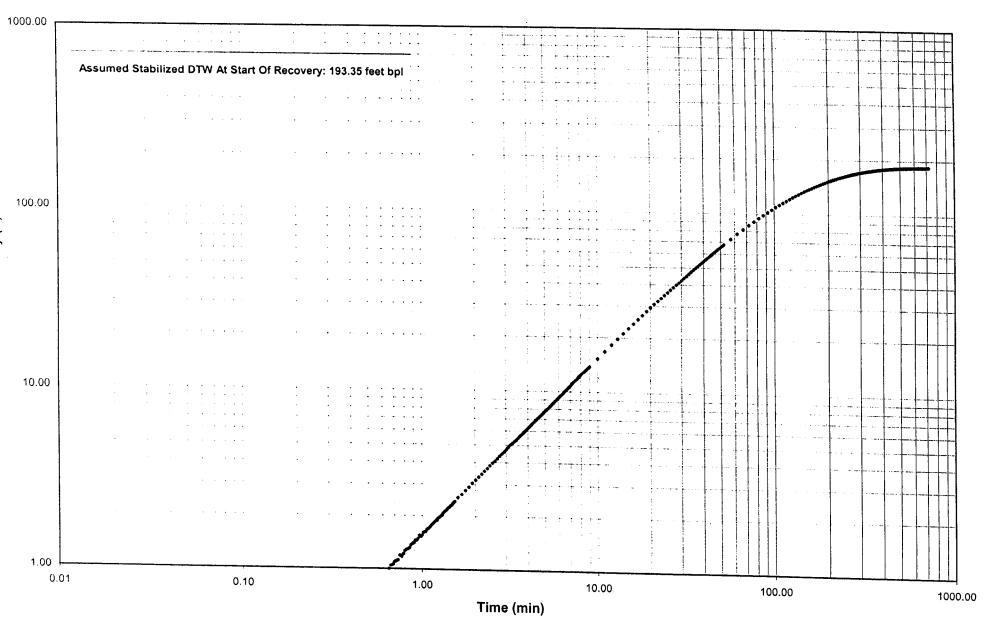
1.11762E-06 = 5	Storage Coefficient from 1/u value, dimensionless
1.47929E-06 = 8	Storage Coefficient from β value, dimensionless

Note: Since the form of the type curve differs only very slightly when β differs by an order of magnitude, a determination of the value of the Storage Coefficient by this method is unreliable.

If the effective thickness of the aquifer (thickness of the zone influenced by pumping) is known or assumed, an estimate of K (Permeability) can be made.

1	17.7	= effective aquifer thickness, feet
	0.182932004	= permeability or hydraulic conductivity, ft/day
	1.368331391	= permeability or hydraulic conductivity, and/sa ft
	6.45343E-05	= permeability or hydraulic conductivity, cm/sec

Injection Well No.1, Port St. Lucie Port St. Lucie, Westport Injection Well System Straddle-Packer Test No. 10 - Recovery



ARCADIS

Appendix G

Technical Memorandum (Text and Attachment A from Appendix E, ARCADIS *Injection Test Request,* July 21, 2003)

Demonstration of Mechanical Integrity

Hydrostatic-Pressure Test of the IW1 - 24-inch Outside-Diameter Casing

Youngquist Brothers, Inc. (Contractor) performed a hydrostatic-pressure test on the 24-inch outside-diameter final casing of IW1 on June 8, 2003. Using $2^7/_8$ -inch diameter, steel (tremie) tubing, the Contractor installed an inflatable packer assembly inside the 24-inch diameter casing and lowered the packer to a depth of 2,886 feet below pad level (bpl), measured from pad level to the inflation element centerline. The Contractor inflated the packer element. A temporary wellhead flange and stripper-head assembly was installed and the Contractor hydrostatically pressurized the casing with potable water (from the City of Port St. Lucie supply).

On June 8, 2003, the Contractor conducted a one-hour hydrostatic-pressure test of the 24-inch outside-diameter casing at an initial pressure of 154.2 pounds per square inch (psi). Pressure inside the casing remained relatively stable throughout the one-hour monitoring period; the casing pressure at the end of the one-hour test was 154.1 psi. The pressure change (0.1psi) is less than the 5 percent change (of the initial test pressure) allowed for during a one-hour pressure test per Florida Administrative Code Chapter 62-528. These results demonstrate that the final casing has internal mechanical integrity.

The Contractor slowly released the internal hydrostatic pressure on the 24-inch diameter casing and drained water from the casing into a 5-gallon bucket. The driller drained a total of approximately 47 gallons of water from the 24-inch diameter casing (this procedure provides assurance that the water column in the casing is open to the packed-off depth). The pressure-gauge calibration certificate is included in Attachment A with a certification of the test results.

The test was witnessed by Lech Kwapinski, P. G., of ARCADIS and Jay Swartzentruber of Youngquist Brothers, Inc. The Florida Department of Environmental Protection (FDEP) Southeast District Office was informed of the pressure test, but did not attend to witness the test.

Annular Hydrostatic-Pressure Test of the IW1 - 20-inch Outside-Diameter Tubing

On July 10, 2003, following the installation of the injection tubing assembly and annular fluid mixture, the Contractor successfully pressure tested the IW1 steel injection tubing, injection casing and YBI Positive Seal PackerTM by performing a hydrostatic-pressure test. The pressure test involved hydrostatically pressurizing the annulus between the 20-inch outside-diameter injection tubing (installed using a YBI Positive Seal-PackerTM) and the 24-inch outside-diameter final casing. The Contractor conducted a one-hour annular-pressure test at an initial hydrostatic pressure of 150.3 psi. Pressure inside the annulus decreased 1.1 psi during the one-hour monitoring period. The annular pressure at the end of the one-hour test was 149.2 psi. The pressure change (1.1 psi) is less than the 5 percent change (of the initial test pressure) allowed during a one-hour pressure test per Florida Administrative Code Chapter 62-528. These results demonstrate internal mechanical integrity of the 20-inch injection tubing, 24-inch final casing and YBI Positive Seal-PackerTM. The test was witnessed by Lech Kwapinski, P.G., of ARCADIS and Heidi Vandor of the Southeast District Office of the FDEP.

The Contractor then slowly released the internal hydrostatic pressure on the annular space and drained water from the annulus into a 5-gallon bucket. The driller drained a total of approximately 29 gallons of water from the annulus. The pressure-gauge calibration certificate is included in Attachment A with a certification of the test results.

Deep Monitor Well MW1 - Hydrostatic Pressure Test of Final Tubing

On June 25, 2003, using $2^{7}/_{8}$ -inch diameter, steel tremie tubing, the Contractor installed an inflatable packer assembly into the 5.43-inch inside-diameter, fiberglass reinforced plastic (FRP), lower monitor-zone final tubing to a depth of 1,902 feet bpl (measured from pad level to the center of the packer's inflation element) and pressurized the packer's inflation element to 200 psi.

On June 26, 2003, the tubing was "topped off" with potable water and hydrostatically pressurized to 80 psi. The Contractor performed a one-hour hydrostatic pressure test on the MW1 lower monitor-zone FRP final tubing. The test began at 9:10 a. m. An ARCADIS representative witnessed the pressure test. During the test, a net pressure increase of 0.1 psi was observed after the one-hour monitoring period (likely caused by rising ambient air temperature) and the test was terminated at 10:10 a. m. The Contractor then released the hydrostatic pressure on the tubing (at the temporary tubing header) and drained approximately 1 gallon of water from the tubing. The tubing pressure-test certification form and gauge-calibration certificate are included in Attachment A.

Television Survey of IW1 Injection Casing

On June 16, 2003, the Contractor pumped fresh water into IW1 from the City of Port St. Lucie potable supply, at a rate of 125 gallons per minute (gpm), in order to improve picture clarity prior to a television (TV) survey of the 23-inch inside-diameter injection casing. Within an hour of the start of pumping, the Contractor began a television survey of the 24-inch outside-diameter injection casing. Due to turbid water from the City supply line (the Contractor was tied into the water line near the end of a dead-end leg), the television survey was postponed while the Contractor continued to pump fresh potable water into the injection casing overnight. On June 17, 2003, the Contractor increased the pumping rate to approximately 250 gpm (for 2 hours) before the survey resumed. The TV survey then was completed to a depth of 2,897 feet bpl.

The TV survey extended below the base of the inner mandrel of the YBI Positive-Seal PackerTM which was shown at 2,883 feet bpl on the video tape counter. However, the depths recorded by the video tape are corrected from the calibrated depth-counter readings and typically are greater than actual depths. For this reason, the depths shown on the television survey are likely 2 to 4 feet deeper than the actual depth. The survey tape counter indicates that the survey was stopped at a depth of approximately 2,907 feet bpl (which is likely at an actual depth of between 2,903 and 2,905 feet bpl).

The Contractor did not lower the camera tool to the base of the casing below the rubber funnel plug assembly during the survey due to a concern that the wireline might damage the polished, stainless steel surface of the inner mandrel of the YBI Positive-Seal PackerTM. A narrative summary of the TV survey is provided in Appendix C of the document to which this Technical Memorandum is attached. A copy of the VHS videotape of the TV survey is enclosed.

Television Survey of IW1 Injection Tubing

A TV survey of the IW1 injection tubing, the base of the IW1 injection casing and the accessible portion of the open-hole was performed on July 10, 2003. The Contractor pumped potable water into the IW1 tubing until the well had been flushed with a total of approximately 45,000 gallons of water. The Contractor attached rubber pipe protectors to the wireline at 700-foot intervals during the survey. Water clarity was good and the condition of the injection tubing, tubing packer seat, injection casing seat and a portion of an open hole below the base of injection casing were clearly visible. The injection-tubing's internal (high-build glass-flake epoxy) coating was observed to be in good condition. A narrative summary of the TV survey is provided in Appendix

C of the document to which this Technical Memorandum is attached. The TV survey does not show features that may adversely impact the performance of the well. The 20-inch outside-diameter steel injection tubing coating appears to be in excellent condition. The TV survey was terminated at a depth of 3,030 feet bpl in the open-hole section of the well because of very poor water clarity. A copy of the VHS videotape of the TV survey is enclosed.

High-Resolution Temperature Logging Results

On July 17, 2003, the Contractor mobilized a geophysical-logging truck and crew to the project site and performed "background" high-resolution temperature and gamma-ray logging of the injection well. The Contractor placed the combination Radioactive Tracer Survey (RTS)/Temperature tool in a standpipe assembly in order to access the well through a gate valve installed near the top of the IW1 wellhead. The testing began when the Contractor conducted a high-resolution temperature log from pad level to a depth of approximately 3,150 feet bpl under "static" conditions. The Contractor attached rubberized centralizers to the wireline at (approximately) 500-foot intervals in order to protect the tubing coating. Because the pack-off valve was opened to allow the installation of the wireline centralizers, the well was not completely shut in, or "static" during the temperature log. The temperature log plot is included as Attachment B. A differential-temperature log plot also is presented on the temperature log.

The logging tool could not be lowered below 3,150 feet bpl, which preventing logging of the remainder of the borehole (total drilled depth of the borehole was 3,350 feet bpl). It is considered likely that the nominal 22-inch borehole below 3,150 feet bpl was not accessible to the RTS tool because of the tool's length (25.5 feet) and the highly fractured and cavernous nature of the borehole between 3,040 feet and 3,190 feet bpl.

Logging downhole, the temperature log indicates a temperature above 81 degrees Fahrenheit (F) from pad level to approximately 90 feet bpl. The water column previously was suppressed with a salt slurry in order to perform installation of the 20-inch diameter injection tubing (the water level at the time of temperature and background gamma logging was approximately 25 feet bpl.). Below 90 feet bpl, the water column temperature very slowly increases with depth from 80.3 degrees F at 90 feet at an average rate of one degree F for every 900 feet of depth to approximately 1,850 feet bpl. Below 1,850 feet, the temperature in the well increased steadily and reached a peak of 83.5 degrees F at approximately 2,460 feet bpl. Minor and anomalous temperature variations noted on the log plot between 2,140 feet and 2,180 feet bpl, and between 2,590 feet and 2,720 feet bpl, are believed to be caused by binding and slippage either of the wireline at the pack-off valve (installed on the wellhead) or of the rubberized centralizers (installed on the wireline) on the surface of the tubing. Based on the log plot, the water-column temperature remains steady between approximately 2,460 feet bpl and approximately 2,505 feet bpl, and then begins a gradual decrease to approximately 81.9 degrees F at approximately 2,903 feet bpl. That depth closely corresponds to the top of the Townley™ Funnel Plug attached to the base of the 24-inch casing. The temperature of the water column remains relatively steady between approximately 2,903 feet and 2,910 feet bpl, decreasing only very slightly in that interval. The temperature inside the injection tubing and injection casing is a function of a combination of factors, including the water temperature of the formation, the number, diameter and wall thickness of casings that "cover" the formation, the density and quality of the cement slurry used during casing cementing and the presence of a coating on the inside of the injection tubing. The coating and annular fluid both will tend to "smooth" the temperature differences present outside the tubing and casings.

Below 2,910 feet bpl (approximately corresponding to the top of the open hole, and just below the base of the 22-inch steel casing extension to the funnel plug), water-column temperature rapidly decreases to 79.0 degrees F at 2,935 feet. The water temperature then gradually decreased to 78.8 degrees F from 2,935 feet to 3,020 feet bpl. At 3,020 feet bpl, the water column temperature increases 0.6 degrees F to approximately 79.4 degrees F within a 2- to 3-foot interval. The temperature reading decreases slowly below this depth to approximately 79.2 degrees F at approximately 3,065 feet bpl.

The temperature readings below 3,065 feet indicate that water temperature generally decreases to 3,130 feet bpl, with the exception of unusually erratic readings at 3,090 feet bpl and from 3,125 feet to 3,130 feet bpl suggesting that highly permeable fractures exist at those depths.

Except for the erratic readings between 3,138 feet and 3,141 feet bpl, the temperature increased from approximately 78.0 degrees F to 78.3 degrees F between 3,130 feet and 3,150 feet bpl. The logging tool could not be lowered below 3,150 feet bpl, which preventing temperature logging of the remainder of the borehole. A copy of the high-resolution temperature log is provided in Attachment B.

Radioactive Tracer Survey Results

The RTS was performed on July 17, 2003. A copy of the RTS log is provided in Attachment B. Copies of the flowmeter calibration sheets (for meters used during the "low-rate" tests and the "high-rate" test) and the Iodine 131 assay shipping label are included in Attachment B.

On July 17, 2003, the Contractor placed the RTS tool into a standpipe assembly which then was raised and attached to the IW1 wellhead for the "background" gamma-ray logging. The Contractor attached the standpipe assembly to a valve connected to the top of the wellhead. Lech Kwapinski, P.G., of ARCADIS was on the site to observe the start of the background gamma-ray log. A schematic diagram of the RTS combination logging tool is presented on the RTS log copy included in Attachment B.

First Gamma-Ray Log

On July 17, 2003, the first Gamma-Ray Log (GRL), an out-of-position "background" GRL, was conducted from approximately 3,140 feet bpl up to pad level at a rate of approximately 47 feet per minute.

The logging tool consists of 3 gamma-ray detectors, one near the top (GRT), middle (GRM) and bottom (GRB) of the tool. An ejector (to discharge Iodine 131) is located between the GRT and the GRM. The "background" GRL is shown on the last section of the RTS log copy provided in Attachment B. The background GRL was "memorized" and subsequently reprinted (merged) on each subsequent "out-of-position" logging pass to serve as a means of comparison. Starting from the back section of the log, the various surveys are discussed in the same sequence as they were performed. A magnetic casing-collar locator (CCL) attached to the RTS tool indicated the base of the outer (injection) casing at a depth of approximately 2,909 feet bpl. The base of injection tubing (and the YBI packer mandrels) was located at a depth of approximately 2,879 feet bpl.

After background gamma-ray logging was complete to pad level, the logging tool and standpipe were removed from the well and the RTS tool's ejector chamber was loaded with 10 Millicuries (mCi) of liquid Sodium Iodide (Iodine 131). The logging tool was placed inside the stand pipe (which was raised and attached to the wellhead assembly) and lowered down the injection tubing.

Based on a telephone conversation between Joe May, P. G. (Southeast District FDEP office UIC Section Program Manager) and Mike Waldron, P. G. of ARCADIS the on site lake water was acceptable for the high-rate RTS test and the pending short-term injection test. A sample from the lake was collected on April 4, 2003 and analyzed for Primary and Secondary Drinking Water Standard and "municipal wastewater minimum criteria" parameters. The laboratory report is included in Appendix D of the document to which this Technical Memorandum is attached. The Contractor began injecting fresh water from the lake located on the site in order to create a fresh water "bubble" for the RTS logging; approximately 210,000 gallons were pumped into IW1 at pumping rates varying from 2,000 gallons per minute (gpm) to 9,000 gpm. After pumping approximately 210,000 gallons, the Contractor stopped pumping lake water into IW1 and the IW1 wellhead pressure stabilized at approximately 28 psi.

Dynamic (Low Flow) Monitoring "Test #1" [DYNAMIC TEST #1 (74 gpm)]

On July 17, 2002 at 11:45 a.m., the logging tool was positioned at 2,911.5 feet bpl (referenced to the bottom of the tool) with the ejector located (at approximately 2,898 feet bpl) 5 feet above the top of the outer-casing funnel plug assembly at approximately 2,903 feet bpl (see Figure 1 included with the letter report to which this memorandum is attached).

Time-drive monitoring for a low flow-rate "dynamic" test (DYNAMIC TEST #1) is shown in the next log segment. For this test, an injection flow rate of approximately 74 gallons per minute (gpm) of fresh water (potable water from the City of Port St. Lucie supply) was established into the injection tubing. The mark, arrow and text across the left and center track of the log indicates the time at which the tracer ("slug") was ejected. Each standard division represents 20 seconds on the "time-drive monitoring" log plots. The elapsed seconds since monitoring began are shown on the left track and the averaged number of API units are displayed on the center of each track (Note: "API" units refers to standard American Petroleum Institute units; 16.5 API units are equivalent to 1 microgram ra-eq/ton). A 1.5-mCi slug of Iodine 131 was ejected at 11:52:00 a.m. and monitored for 60 minutes after release. The slug first was detected by the GRM (middle) detector within approximately 15 seconds after release. Readings at the middle detector (GRM) increased from background values of approximately 20 API units to nearly 1800 API units within the next 20 seconds. The GRM reading spiked within about 1 minute, then began to decrease. After 2 minutes and 40 seconds, the GRM detector (located at 2,901 feet bpl) shows a minor increase for about one minute, likely from the slug moving upward outside the top of the funnel plug assembly (located at approximately 2,903 feet). Readings at the middle detector then generally decreased for the remainder of the monitoring period.

Within 1 minute and 40 seconds of ejection, the slug encountered the GRB (bottom) detector, which was reading approximately 20 API units prior to the detection. The readings spiked quickly (within about 30 seconds), then decreased and increased again within 1 minute and 20 seconds. The readings remained steady for another minute and then generally decreased for the remainder of the monitoring period.

Readings from the GRT (at a depth of approximately 2,888.5 feet bpl) show a slight detection indicating "saturation" of the GRB detector at 1 minute and 40 seconds after ejection. The GRT also detected the slug outside the outer casing about 3 minutes and 45 seconds after ejection, increasing from "background" readings of less than 20 API units to approximately 41 API units at 5 minutes after ejection (again, indicating a portion of the original slug moving upward outside the top of the funnel plug assembly). Readings decreased to background levels during the next 4 minutes and remained below 20 API units for the remainder of the one-hour monitoring period.

Second Gamma-Ray Log [Log Out of Position (LOP #1)]

The second GRL, an "out-of-position" log plot of the gamma-ray levels while the RTS tool is moved up the well, is presented in the next section (as the first Log Out of Position, or "LOP #1"). This GRL was conducted from 2,911 feet to 2,694 feet bpl.

The GRT log results closely resemble the original background data. Little evidence of tool staining was observed. The injection of potable water continued during the LOP; the Contractor maintained injection of potable water at a rate of approximately 69 gpm.

Dynamic (Low Flow) Monitoring Test #2 [DYNAMIC TEST #2 (69 gpm)]

The logging tool was positioned (at approximately 2,911 feet bpl) with the ejector located at approximately 2,898 feet bpl, 5 feet above the top of the outer casing funnel plug assembly (at approximately 2,903 feet bpl). An injection flow rate of approximately 69 gpm was maintained into the injection tubing. Time-drive monitoring began and a 2-mCi slug of Iodine 131 was ejected at a depth of 2,898 feet. Time-drive monitoring for the second low flow-rate "dynamic" test is shown in the next log segment.

The slug reached the middle detector within the first 20 seconds of monitoring. Readings from the GRM, after increasing rapidly, stabilized for nearly one minute then started to decrease. After 3 minutes and 40 seconds, the GRM detector (located at 2,901 feet bpl) shows a minor increase for about one minute, likely from the slug moving upward outside the funnel plug assembly (located at approximately 2,903 feet bpl).

The slug reached the lower detector (GRB) within approximately 1 minute and 20 seconds of ejection and the GRB readings stabilized for nearly 1 minute and 30 seconds before gradually decreasing for the remainder of the one-hour monitoring period. Readings from the GRT (at a depth of approximately 2,888.5 feet bpl) detected the saturation of the GRB detector at 1 minute and 35 seconds after ejection. The GRT also detected the slug outside the outer casing about 4 minutes after ejection, increasing slightly from "background" readings of less than 20 API units to approximately 34 API units at 4 minutes and 20 seconds after ejection. Readings decreased to background levels during the next 3 minutes and remained near 20 API units for the remainder of the one-hour monitoring period.

Third Gamma-Ray Log (Log Out of Position)

Following the time-drive monitoring data, the third GRL (another "out-of-position" pass) results are presented (LOP #2). This LOP was conducted from 2,911 feet bpl to approximately 2,685 feet bpl. The injection of potable water continued during this LOP; the Contractor maintained injection of potable water at a flow rate of approximately 69 gpm into the injection tubing.

The GRT log results closely resemble the "background" GRL. Minor tool staining is apparent, based on slightly elevated GRM and GRB detector readings below 2,860 feet bpl. As the RTS tool was raised above 2,860 feet bpl, the minor tool staining was no longer noticeable.

Fourth Gamma-Ray Log (LAF #2)

The fourth GRL, a "log after flush" (or LAF #2), is presented in the next section. This "out-of-position" log was conducted from 2,911 feet to 2,698 feet bpl. The Contractor maintained injection of potable water at a flow rate of approximately 69 gpm into the injection tubing. In order to minimize the use of the lake water, lake water was not used to flush the RTS tool prior to

this LAF pass. Both the GRT and GRB logs very closely resemble the original background data (first GRL). The GRB log plot "tracks" the background GRL above 2,902 feet bpl.

Dynamic (High Rate) Monitoring Test #3 [Test #3 (5,200 gpm)]

Next, the logging tool again was positioned with the ejector located at a depth (2,898 feet bpl), about 5 feet above the casing seat. Utilizing diesel-powered pumps and water from the onsite lake, an injection flow rate of approximately 5,200 gpm was established into the injection tubing. Time-drive monitoring began and a 3.5-mCi slug of Iodine 131 was ejected. Time-drive monitoring results for the third (high-rate) dynamic test are shown in the next log segment (Test #3 [5,200 gpm]).

The slug appears to reach the middle (GRM) and bottom (GRB) detectors almost immediately. The slug was displaced below the GRM and GRB over the next 1 minute and 40 seconds. Although both detectors were slightly stained, the GRM and GRB readings remained relatively steady for the remainder of the 30-minute monitoring period.

Readings from the GRT (upper detector) remained steady between 16 and 23 API units through the entire 30-minute monitoring period.

Fifth Gamma-Ray Log (LOP #3)

Following the time-drive monitoring data, the fifth GRL (another "out-of-position" pass) results are presented. This LOP (LOP #3) was conducted from 2,911 feet to 2,711 feet bpl.

The GRT log results closely resemble the "background" GRL results and the results of the previous GRT LAF #2 plot. No evidence of staining was apparent during this log. In general, both the GRT and GRB results correlate very well with the results of the first GRL.

Sixth Gamma-Ray Log (Final Gamma Ray)

The RTS tool was lowered to 3,346 feet bpl. The sixth and final GRL (an out-of-position log) was performed from 3,150 feet bpl to pad level. Between 3,150 feet and 3,050 feet bpl, this log (FINAL GRL) was conducted with the remaining 3 MCI of Iodine 131 in the RTS tool. Between 3,050 feet and 3,030 feet bpl, the log recorded high gamma-ray levels as the remaining 3 mCi of Iodine (in the ejector chamber) was discharged from the RTS tool ("dumped"). Above 3,030 feet bpl, the GRT and GRB results closely track the respective background log plots from this interval. Except for near the outer casing seat, the final background readings from the GRT, GRB and GRM closely resemble the original background data. A "braided" pattern exists (above 2,890 feet bpl) between the final GRL log results and the "memorized" background GRL, providing evidence of casing and cement integrity. Following the completion of the survey, the Contractor removed the RTS tool and returned the wellhead to its original configuration.

Interpretation

The GRL results indicate that the cement sheath around the outer (24-inch outside-diameter) injection casing is intact and a good bond is present between the cement and the formation, as well as between the casing and the cement, above a depth of approximately 2,900 feet bpl. Based on the RTS and temperature log results described above, the injection zone is located at approximately 2,900 feet bpl in the immediate vicinity of IW1. The RTS logging results suggest that an adequate degree of confinement is provided by the formation (exists) above that depth.

Attachment A

Hydrostatic-Pressure Test Certifications and Pressure Gauge Calibration Certificates

MW1 Final Tubing

IW1 Injection Casing

IW1 Injection Tubing

ARCADIS

HYDROSTATIC PRESSURE TEST DATA DEEP MONITOR WELL MW1 CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM PORT ST. LUCIE, FLORIDA

Hydrostatic-Pressure Test of the Lower Monitoring Zone, $6^5/_8$ -inch Diameter (5.43-inch Inside-Diameter), Fiberglass Reinforced Plastic Tubing

Date:

June 26, 2003

Project:

City of Port St. Lucie - Westport Injection Well System

ARCADIS

Project No. PF001153.0003

Time (hours)	Delta Time (min.)	Pressure (psi)
0910	0	80.1
0915	5	80.1
0920	10	80.2
0925	15	80.2
0930	20	80.2
0935	25	80.1
0940	30	80.1
0945	35	80.1
0950	40	80.1
0955	45	80.1
1000	50	80.2
1005	55	80.2
1010	60	80.2

Note: "McDaniel" test gauge calibrated May 8, 2003, Serial # 8064187.

I, Michael J. Waldron, certify that the above data is true and accurate.

Michael J. Waldron, PG



Kimball Electronic Laboratory, Inc.

Precision Measurement Equipment Specialists

Certificate of Calibration # 120793

YOUNGQUIST BROTHERS, INC. 15465 PINE RIDGE ROAD FORT MYERS, FL 33908

Customer P.O.# N/A

Manufacturer: MCDANIEL

Model Number: 160 PSI

Nomenclature: PRESSURE GAUGE

8064187 SN/ID/Asset #

Bar Code #

N/A

+/-0.25% FS Specifications:

Cal. Procedure: MP16/C1-NAV

KELI Control # YOU-55274

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Labs., Inc. or derived by the ratio of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL 540-1.

In Tolerance When Received? Y

Cal. Tech: 098

Relative Humidity: 50%

Temperature: 72 Deg. F

In-House Y

Cal. Cycle: 12 Mos. | Calibration Date: 05/08/2003

Calibration Due: 05/08/2004

Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

Standards Used

1.D.# 391

EATON UPS 3000BAA PRESSURE INDICATOR

Cal. Date

Cal. Due

12/06/2001

12/06/2003

Kimball Electronic Lab., Inc. + 8081 W. 21 Lane + Hialcah, Flerida 33016

pulsed extending for oness permission for the robotom of an armeded losh documents of a marring from KFD of



Kimball Electronic Laboratory, Inc. Precision Measurement Equipment Specialists

Certificate of Test # 120793

Customer: YOUNGQUIST BROTHERS, INC.

15465 PINE RIDGE ROAD FORT MYERS, FL 33908 Manufacturer/Model: MCDANIEL 160 PSI

Nomenclature: PRESSURE GAUGE

S.N./I.D. 8064187

KELI # YOU-55274

W.O. # 267537 Customer P.O.# N/A

Rar.ge	Nominal	?re-Cal	Post-Cal	Low Limit High Limit
160 PSI	30	30.0	30.0	29.6 30.4
25-	sc	60.C	60.0	59.6 60.4
	90	89.9	89.9	39.6 90.4
	120	119.8	119.8	119.6 120.4
	160	159.7	159.7	159.6 160.4

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Labs., Inc. or derived by the ratio of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL 540-1.

Cal. Procedure: MP16/C1-NAV

Revd. in tol. Y

Tech: 098

Temp. (F): 72 R.H. % 50

Specifications: + '-0.25% FS

In-House: Y

Cal. Date: 05/08/2003 | Cal. Due: 05/08/2004

Remarks. PERFORMED ROUTINE CALIBRATION CERTIFICATION

ID = Standards Used

Cal Date Cal Due

ARCADIS

HYDROSTATIC PRESSURE TEST DATA
INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM
PORT ST. LUCIE, FLORIDA

Hydrostatic Pressure Test on the 24-inch Outside Diameter, 0.500-inch Wall Thickness Steel Injection Casing

Packer Setting Depth: 2,886 Feet Below Pad Level

Date: June 8, 2003

Project: City of Port St. Lucie - Westport Injection Well System, Injection Well No.1

ARCADIS Project No. PF001153.0003

Time (hours)	Delta Time (min.)	Pressure (psi)	
2210	0	154.2	
2215	5	154.2	
2220	10	154.3	
2225	15	154.4	
2230	20	154.3	
2235	25	154.2	
2240	30	154.2	
2245	35	154.2	
2250	40	154.2	
2255	45	154.2	
2300	50	154.1	
305	55	154.1	
310	60	154.1	

Note: "McDaniel" test gauge calibrated February 3, 2003, Serial # 1C118.

I, Michael J. Waldron, certify that the above data is true and accurate.

Michael J. Waldron, PG



Kimball Electronic Laboratory, Inc. Precision Measurement Equipment Specialists

Certificate of Calibration # 116053

YOUNGQUIST BROTHERS, INC. 15465 PINE RIDGE ROAD FORT MYERS, FL 33908

Customer P.O.# N/A

Manufacturer: **MCDANIEL**

Model Number: 300 PSI

Nomenclature: PRESSURE GAUGE

SN/ID/Asset # IC118 Bar Code # N/A Specifications: +/-.25% Cal. Procedure: MP16/G2

KELI Control # YOU-94864

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Labs., Inc. or derived by the ratio of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL 540-1.

In Tolerance When Received? Y

Cal. Tech: 098

Relative Humidity: 50%

Temperature: 72 Deg. F

Cal. Cycle: 12 Mos. Calibration Date: 02/03/2003

Calibration Due: 02/03/2004

Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

Standards Used

I.D. # Cal. Date Cal. Due DRESSER PTE-1 PRESSURE CALIBRATOR 609 07/13/2002 07/13/2003 DRESSER HSQ-2 PRESSURE TRANSDUCER 610 07/13/2002 07/13/2003

Quality Assurance



Kimball Electronic Laboratory, Inc. Precision Measurement Equipment Specialists

Certificate of Test # 116053

Customer: YOUNGQUIST BROTHERS, INC.

15465 PINE RIDGE ROAD

FORT MYERS, FL 33908

Manufacturer/Model: MCDANIEL 300 PSI

Nomenclature: PRESSURE GAUGE

S.N./I.D. IC118

KELI# YOU-94864

W.O. # 260381

Customer P.O.# N/A

Range	Nominal	Pre-Cal	Post-Cal	Low Limit High Limit
300 PSI	50	49.44	49.44	49.25 50.75
527	100	99.46	99.46	99.25 100.75
	150	149.46	149.46	149.25 150.75
	200	199.62	199.62	199.25 200.75
	300	239.70	299.70	299.25 300.75

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Labs., Inc. or derived by the ratio of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL 540-1.

Cal. Procedure: MP16/G2

Revd. in tol. Y

Tech: 098

Temp. (F): 72 R.H.% 50

Specifications: +/-.25%

In-House: Y

Cal. Date: 02/93/2003 Cal. Due: 02/03/2004

Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

ID # Standards Used

639 DRESSER PTE-1 PRESSURE CALIBRATOR

611 DRESSER HSQ-2 PRESSURE TRANSDUCER

Cal. Date Cal. Due 07/13/2002 07/13/2003

omkia 2002 om ia 1003

page 1 of 1

ARCADIS

HYDROSTATIC PRESSURE TEST DATA
INJECTION WELL NO. 1 (IW1)
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM
PORT ST. LUCIE, FLORIDA

Annular Hydrostatic-Pressure Test of the 20-inch Outside-Diameter, 0.438-inch Wall Thickness Internally-Coated Steel Injection Tubing

Date: July 10, 2003

Project: City of Port St. Lucie - Westport Injection Well System, Injection Well IW1

ARCADIS Project No. RF001121.0001.PF001

Time (hours)	Delta Time (min.)	Pressure (psi)
1055	0	150.3
1100	5	150.2
1105	10	150.1
1110	15	150.0
1115	20	150.0
1120	25	149.9
1125	30	149.8
1130	35	149.7
1135	40	149.6
1140	45	149.5
1145	50	149.4
1150	55	149.3
1155	60	149.2

Note: "McDaniel" test gauge calibrated February 3, 2003, Serial # 1C118.

I, Michael J. Waldron, certify that the above data is true and accurate.

Michael J. Waldron, P.G.



Kimball Electronic Laboratory, Inc.

Precision Measurement Equipment Specialists

Certificate of Calibration # 116053

YOUNGQUIST BROTHERS, INC. 15465 PINE RIDGE ROAD FORT MYERS, FL 33908

Customer P.O.# N/A

Manufacturer: **MCDANIEL**

Model Number: 300 PSI

Nomenclature: PRESSURE GAUGE

SN/ID/Asset # IC118 Bar Code # N/A Specifications: +/-.25% Cal. Procedure: MP16/G2

KELI Control # YOU-94864

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Labs., Inc. or derived by the ratio of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL 540-1.

In Tolerance When Received? Y

Cal. Tech: 098

Relative Humidity: 50%

Temperature: 72 Deg. F

In-House Y

Cal. Cycle: 12 Mos. Calibration Date: 02/03/2003

Calibration Due: 02/03/2004

Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

Standards Used

Cal. Date I.D. # Cal. Due DRESSER PTE-1 PRESSURE CALIBRATOR 07/13/2002 07/13/2003 609 DRESSER HSQ-2 PRESSURE TRANSDUCER 07/13/2002 07/13/2003 610



Kimball Electronic Laboratory, Inc.

Precision Measurement Equipment Specialists

Certificate of Test # 116053

Customer: YOUNGQUIST BROTHERS, INC. 15465 PINE RIDGE ROAD

FORT MYERS, FL 33908

Manufacturer/Model: MCDANIEL 300 PSI

Nomenclature: PRESSURE GAUGE

S.N./I.D. IC118 W.O. # 260381 KELI# YOU-94864

Customer P.O.# N/A

Range	Nominal	Pre-Cal	Post-Cal	Low Limit High	h Limit
300	50	49.44	49.44	49.25	50.75
PSI	100	99.46	99.46	99.25	100.75
	150	149.46	149.46	149.25	150.75
	200	199.62	199.62	199.25	200.75
	300	299.70	299.70	299.25	300.75

The accuracy and calibration of this instrument is traceable to the National Institute of Standards and Technology through certified standards maintained in the laboratories of KELI Labs., Inc. or derived by the ratio of self-calibration techniques and is guaranteed to meet published specifications. The metrology procedures utilized satisfy the requirements set forth in ANSI/NCSL 540-1.

Cal. Procedure: MP16/G2

Rcvd. in tol. Y Tech: 098

Temp. (F): 72 R.H.% 50

m. 2313 (2011)

Specifications: +/-.25%

In-House: Y

Cal. Date: 02/93/2003 Cal. Due: 02/03/2004

Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

1D# Standards Used

609 DRESSER PTE-1 PRESSURE CALIBRATOR

611 ORESSER HSQ-2 PRESSURE TRANSDUCER

Cal. Due 27/13/2002 27/13/2003

27/13 2000 07 13 2003

page 1 of 1

ARCADIS

Appendix H

Laboratory Analytical Reports for:

Deep Monitor Well MW1 Upper and Lower Monitor-Zone Background Water Samples

Injection Well IW1 Injection-Zone Water Sample

Westport WWTP Secondarily-Treated Wastewater

Coliform Results from Deep Monitor Well Monitor-Zone Water Samples Collected After Injection Testing

CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03 Received on: 06/25/03

PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Aluminum	0.32	200.7	0.10 mg/L	07/10/03	APR
Arsenic	0.015	200.7	0.010 mg/L	06/28/03	APR
Barium	0.095	200.7	0.010 mg/L	06/28/03	APR
Beryllium	σ	200.7	0.0030 mg/L	06/28/03	APR
Cadmium	σ	200.7	0.0040 mg/L	06/28/03	APR
Chromium	ប	200.7	0.010 mg/L	06/28/03	APR
Copper	U	200.7	0.010 mg/L	06/28/03	APR
Iron	0.15	200.7	0.010 mg/L	07/02/03	KYT
Manganese	0.043	200.7	0.010 mg/L	06/28/03	APR
Nickel	บ	200.7	0.010 mg/L	06/28/03	APR
Silver	σ	200.7	0.010 mg/L	06/28/03	APR
Sodium	800	200.7	100 mg/L	07/02/03	KYT
Zinc	0.21	200.7	0.010 mg/L	06/28/03	APR
Antimony	σ	200.8	0.0010 mg/L	07/01/03	APR
Lead	σ	200.8	0.00020 mg/L	07/01/03	APR
Selenium	0.010	200.8	0.0010 mg/L	07/01/03	APR
Thallium	σ	200.8	0.00030 mg/L	07/01/03	APR
Mercury	υ	245.1	0.00003 mg/L	06/30/03	KYT

CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03 Received on: 06/25/03

PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Dibromochloropropane (DBCP)	U	504.1	0.020 μg/L	06/28/03	СММ
1,2-Dibromoethane (EDB)	σ	504.1	0.020 μg/L	06/28/03	СММ
Benzo(a)pyrene	υ	525.2	0.20 <i>μ</i> g/L	07/02/03	SPH
Di(2-ethylhexyl)adipate	υ	525.2	1.0 <i>μ</i> g/L	07/02/03	SPH
Di(2-ethylhexyl)phthalate	υ	525.2	1.0 <i>μ</i> g/L	07/02/03	SPH
Carbofuran	υ	531.1	1.0 <i>μ</i> g/L	06/26/03	MLD
Oxamyl (Vydate)	υ	531.1	1.0 <i>μ</i> g/L	06/26/03	MLD
Glyphosate	υ	547	40 <i>μ</i> g/L	06/28/03	E86515
Endothall	υ	548.1	50 <i>μ</i> g/L	07/02/03	E86515
Diquat	υ	549	1.44 <i>μ</i> g/L	07/08/03	E86515
Biochemical Oxygen Demand	2.0	405.1	2.0 mg/L	06/25/03	JGT
Chloride	2400	SM4500CL-E	3 200 mg/L	06/26/03	JNM
Chemical Oxygen Demand	49	410.4	5.0 mg/L	06/27/03	JGT
Color	5	110.2	5 CU	06/25/03	JMJ
Specific Conductance	5300	120.1	μmhos/cm	06/30/03	JNM
Cyanide, Total	υ	335.4	0.0040 mg/L	06/26/03	JNM
Fluoride	0.57	SM4500F-C	0.10 mg/L	06/26/03	JMJ
Gross Alpha	11±4	900.0	1.0 pCi/L	07/08/03	E84088
Surfactants (as LAS, MW = 340)	0.15	425.1	0.010 mg/L	06/26/03	JGT,

CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003

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Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03 Received on: 06/25/03

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PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Ammonia, as N	0.56	350.1	0.020 mg/L	06/27/03	JGT
Nitrite, as Nitrogen	U	353.2	0.020 mg/L	06/25/03	JGT
Nitrate, as Nitrogen	U	353.2	0.020 mg/L	06/25/03	JGT
Nitrate-Nitrite, as Nitrogen	υ	353.2	0.020 mg/L	06/25/03	JGT
Odor	1	SM2150B	1 T.O.N.	06/25/03	JMJ
pH (Laboratory)	7.7	150.1	pH Units	06/26/03	MM
Radium 226	1.8±0.1	903.1	0.1 pCi/L	07/15/03	E84088
Radium 228	0.5±0.5 U	RA-05	0.5 pCi/L	07/03/03	E84088
Sulfate	290	375.4	50 mg/L	06/30/03	JNM
Total Coliform Bacteria	<1	SM9222B	1 cfu/100 ml	06/25/03	JGT
Total Coliform Date & Time S Total Coliform Date & Time A					
Total Dissolved Solids	3300	160.1	10 mg/L	06/27/03	DNS
Total Kjeldahl Nitrogen	0.72	351.2	0.10 mg/L	06/30/03	JMJ
Organic Nitrogen	υ	351-350	0.50 mg/L	06/30/03	JMJ
Phosphorus, Total	U	365.4	0.010 mg/L	06/30/03	JMJ

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CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Date of Analysis: 06/29/03 Date of Extraction: 06/26/03

508 GROUP I UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST
Aldrin	บ	0.10 μg/L	CMM
Dieldrin	บ	0.10 μg/L	CMM

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Date of Analysis:

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 UMZ

Date of Extraction: 06/26/03

06/29/03

508 ORGANOHALIDE PESTICIDES 62-550.310(2)(c) FAC

PARAMETER	RESULT	DL UNITS	ANALYST	
Chlordane	υ	0.50 μg/L	СММ	
Endrin	U	$0.10 \mu \text{g/L}$	CMM	
Heptachlor	U	$0.10 \mu g/L$	CMM	
Heptachlor epoxide	U	$0.10 \mu g/L$	CMM	
Hexachlorobenzene	U	$0.10 \mu g/L$	CMM	
Lindane	U	$0.10 \mu \text{g/L}$	CMM	
Methoxychlor	U	0.20 μg/L	CMM	
Toxaphene	ΰ	$1.0 \mu g/L$	CMM	
PCB 1016	Ū	$0.20~\mu \text{g/L}$	CMM	
PCB 1221	Ū	$0.20 \mu g/L$	CMM	
PCB 1240	บ	0.20 μg/L	CMM	
PCB 1242	Ū	0.20 μg/L	CMM	
PCB 1248	σ	0.20 μg/L	CMM	
PCB 1254	Ū	0.20 μg/L	CMM	
PCB 1260	บ	$0.20 \mu g/L$	CMM	

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ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003

Report: 2003/06454 Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 UMZ

Date of Analysis: 06/29/03 Date of Extraction: 06/26/03

508.1 CHLORINATED PESTICIDES (62-550 FAC)

PARAMETER	RESULT	DL UNITS	ANALYST	
Alachlor	U	0.10 μg/L	CMM	
Atrazine	ប	$1.0 \mu \text{g/L}$	CMM	
Hexachlorocyclopentadiene	U	$0.10 \mu g/L$	CMM	
Simazine	U	$1.0 \mu \text{g/L}$	CMM	

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July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03 Received on: 06/25/03

SAMPLE ID: MW-1 UMZ

Date of Analysis: 06/30/03 Date of Extraction: 06/27/03

515.1 HERBICIDES (62-550 FAC)

PARAMETER	RESULT	DL UNITS	ANALYST	
Dalapon	U	0.50 μg/L	СММ	
Dinoseb	ប	$0.50 \mu \text{g/L}$	CMM	
Pentachlorophenol	ប	$0.50 \mu \mathrm{g/L}$	CMM	
Picloram .	υ	$0.50 \mu \mathrm{g/L}$	CMM	
2,4-D	υ	$0.50 \mu \text{g/L}$	CMM	
2,4,5-TP (Silvex)	Ū	$0.10 \mu \text{g/L}$	CMM	

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712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03

Received on: 06/25/03

Date of Analysis:

06/27/03

524.2 GROUP II UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST	
Bromobenzene	Ŭ	0.5 μg/L	EMH	_
Bromodichloromethane	υ	$0.5 \mu g/L$	EMH	
Bromoform	U	$0.5 \mu g/L$	EMH	
Bromomethane	U	$0.5 \mu g/L$	EMH	
Chloroethane	U	$0.5 \mu g/L$	EMH	
Chloroform	U	$0.5 \mu g/L$	EMH	
Chloromethane	U	$0.5 \mu g/L$	EMH	
o-Chlorotoluene	U	$0.5 \mu g/L$	EMH	
p-Chlorotoluene	U	$0.5 \mu g/L$	EMH	
Dibromochloromethane	U	$0.5 \mu g/L$	ЕМН	
Dibromomethane	U	$0.5 \mu g/L$	EMH	
m-Dichlorobenzene	U	$0.5 \mu \text{g/L}$	EMH	
Dichlorodifluoromethane	ប	$0.5 \mu g/L$	ЕМН	
1,1-Dichloroethane	U	$0.5 \mu g/L$	EMH	
2,2-Dichloropropane	U	$0.5 \mu g/L$	EMH	
1,1-Dichloropropylene	U	$0.5 \mu g/L$	EMH	
1,3-Dichloropropane	U	0.5 μg/L	EMH	
1,3-Dichloropropene	U	$0.5 \mu g/L$	EMH	
Methyl tert-butyl-ether (MTBE)	บ	$0.5 \mu g/L$	EMH	
1,1,1,2-Tetrachloroethane	บ	$0.5 \mu g/L$	EMH	
1,1,2,2-Tetrachloroethane	U	0.5 μg/L	EMH	
Trichlorofluoromethane	ט	$0.5 \mu g/L$	EMH	
1,2,3-Trichloropropane	υ	$0.5 \mu g/L$	EMH	

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CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Date of Analysis: 06/27/03

524.2 TRIHALOMETHANES (THM'S)

PARAMETER	RESULT	DL UNITS	ANALYST	
Bromodichloromethane	U	$0.5 \mu g/L$	ЕМН	
Bromoform	U	$0.5 \mu \text{g/L}$	EMH	
Chloroform	U	$0.5 \mu g/L$	EMH	
Dibromochloromethane	U	$0.5 \mu \text{g/L}$	EMH	
Total Trihalomethanes	U	$0.5 \mu g/L$	EMH	

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CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

06/27/03 Date of Analysis:

SAMPLE ID: MW-1 UMZ

524.2 VOLATILE ORGANIC COMPOUNDS (62-550)

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	U	$0.5~\mu \mathrm{g/L}$	ЕМН
Carbon tetrachloride	U	$0.5 \mu \mathrm{g/L}$	EMH
Chlorobenzene	U	$0.5 \mu \text{g/L}$	EMH
1,2-Dichlorobenzene	U	$0.5 \mu \text{g/L}$	ЕМН
1,4-Dichlorobenzene	U	$0.5 \mu \mathrm{g/L}$	EMH
1,2-Dichloroethane	U	$0.5 \mu g/L$	EMH
1,1-Dichloroethene	Ū	$0.5 \mu \text{g/L}$	ЕМН
cis-1,2-Dichloroethene	U	$0.5 \mu \mathrm{g/L}$	EMH
trans-1,2-Dichloroethene	U	$0.5 \mu g/L$	EMH
Dichloromethane	U	$0.5 \mu g/L$	EMH
1,2-Dichloropropane	บ	$0.5 \mu g/L$	EMH
Ethylbenzene	U	$0.5 \mu g/L$	EMH
Styrene	υ	$0.5 \mu g/L$	EMH
Tetrachloroethylene	U	$0.5 \mu \text{g/L}$	EMH
Toluene	U	$0.5 \mu \text{g/L}$	EMH
1,2,4-Trichlorobenzene	U	$0.5 \mu \text{g/L}$	EMH
1,1,1-Trichloroethane	U	$0.5 \mu g/L$	EMH
1,1,2-Trichloroethane	U	$0.5 \mu g/L$	EMH
Trichloroethylene	U	$0.5 \mu g/L$	ЕМН
Vinyl chloride	U	$0.5 \mu g/L$	EMH
Xylenes, Total	υ	$0.5 \mu g/L$	EMH

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CERTIFICATE OF ANALYSIS

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Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Date of Analysis: 06/26/03

531.1 GROUP I UNREGULATED ORGANIC PESTICIDES

PARAMETER	RESULT	DL UNITS	ANALYST	
Aldicarb	υ	1.0 μg/L	MLD	
Aldicarb sulfone	ប	$1.0 \mu \mathrm{g/L}$	MLD	
Aldicarb sulfoxide	ប	$1.0 \mu \text{g/L}$	MLD	
Carbaryl	ប	$1.0 \mu \text{g/L}$	MLD	
3-Hydroxycarbofuran	ប	$1.0~\mu \mathrm{g/L}$	MLD	
Methomyl	U	$1.0 \mu \text{g/L}$	MLD	

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CERTIFICATE OF ANALYSIS

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003

Report: 2003/06454 Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Fort St. Lucie, TL

Collected on: 06/24/03 Received on: 06/25/03

Date of Analysis: 06/29/03 Date of Extraction: 06/27/03

SAMPLE ID: MW-1 UMZ

625 GROUP III UNREGULATED ORGANIC CONTAMINANTS

Collected by: Lech Kwapinski

PARAMETER	RESULT	DL UNITS	ANALYST	
Butyl benzyl phthalate	ŭ	1.0 µg/L	SPH	
2-Chlorophenol	U	$1.0 \mu g/L$	SPH	
Di-n-butylphthalate	U	1.0 μg/L	SPH	
Diethylphthalate	U	$1.0 \mu \text{g/L}$	SPH	
Dimethylphthalate	บ	$1.0 \mu \text{g/L}$	SPH	
Di-n-octyl phthalate	U	$1.0 \mu g/L$	SPH	
2,4-Dinitrotoluene	U	$1.0 \mu g/L$	SPH	
Isophorone	U	1.0 μg/L	SPH	
2-Methyl-4,6-dinitrophenol	U	$1.0 \mu g/L$	SPH	
Phenol	U	$1.0 \mu g/L$	SPH	
2,4,6-Trichlorophenol	U	$1.0 \mu g/L$	SPH	

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CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 UMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03 Received on: 06/25/03

Date of Analysis: Date of Extraction: 06/27/03

06/29/03

625 MUNICIPAL WASTEWATER MINIMUM CRITERIA

PARAMETER	RESULT	DL UNITS	ANALYST	
Anthracene	U	1.0 μg/L	SPH	
Naphthalene Phenanthrene	บ บ	1.0 $\mu { m g/L}$ 1.0 $\mu { m g/L}$	SPH SPH	

cfu = Colony forming units

Analysis contained herein conform to EPA, Standard Methods and DEP approved methods. Subcontracted analyses are denoted by certification number in the analyst column. All relevant quality assurance samples were within specified control limits unless otherwise stated. Uncertainties for test results are available upon request. Envirodyne certifies that its test results meet all requirements of the NELAC standards, where applicable. For questions, please call the project manager at the number listed above.

This is the last page of the report. See bottom of page for total pages.

Project Manager

Quality Assurance Officer

ARCADIS GE	RAGHTY&MILLE	R Labo	ratory Task O	rder No.	/P.O. No.	NA	(HAIN-C	OF-CUST	ODY RE	CORD	Page	1 of_1_
Project Numb	er/Name 💯	-001153	1.0003/RM	A WESTA	cer			ANALYS	IS / METHO	D / SIZE			
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ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03 Received on: 06/25/03

PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Aluminum	0.32	200.7	0.10 mg/L	07/10/03	APR
Arsenic	υ	200.7	0.010 mg/L	06/28/03	APR
Barium	0.075	200.7	0.010 mg/L	06/28/03	APR
Beryllium	บ	200.7	0.0030 mg/L	06/28/03	APR
Cadmium	σ	200.7	0.0040 mg/L	06/28/03	APR
Chromium	U	200.7	0.010 mg/L	06/28/03	APR
Copper	0.016	200.7	0.010 mg/L	06/28/03	APR
Iron	0.51	200.7	0.010 mg/L	07/02/03	KYT
Manganese	0.072	200.7	0.010 mg/L	06/28/03	APR
Nickel	0.019	200.7	0.010 mg/L	06/28/03	APR
Silver	υ	200.7	0.010 mg/L	06/28/03	APR
Sodium	7800	200.7	1000 mg/L	07/02/03	KYT
Zinc	0.031	200.7	0.010 mg/L	06/28/03	APR
Antimony	0.0014	200.8	0.0010 mg/L	07/01/03	APR
Lead	0.042	200.8	0.00020 mg/L	07/01/03	APR
Selenium	0.066	200.8	0.0010 mg/L	07/01/03	APR
Thallium	U	200.8	0.00030 mg/L	07/01/03	APR
Mercury	U	245.1	0.00003 mg/L	06/30/03	KYT

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

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Port St. Lucie, FL

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03 Received on: 06/25/03

PARAMETER	RESUL'	METHOD	DL UNITS	DATE	ANALYST
Dibromochloropropane (DBCP)	U	504.1	0.020 μg/L	06/28/03	СММ
1,2-Dibromoethane (EDB)	υ	504.1	0.020 μg/L	06/28/03	СММ
Benzo(a)pyrene	U	525.2	0.20 <i>μ</i> g/L	07/02/03	SPH
Di(2-ethylhexyl)adipate	U	525.2	1.0 <i>μ</i> g/L	07/02/03	SPH
Di(2-ethylhexyl)phthalate	υ	525.2	1.0 <i>μ</i> g/L	07/02/03	SPH
Carbofuran	ט	531.1	1.0 <i>μ</i> g/L	06/26/03	MLD
Oxamyl (Vydate)	บ	531.1	1.0 <i>μ</i> g/L	06/26/03	MLD
Glyphosate	σ	547	40 <i>μ</i> g/L	06/28/03	E86515
Endothall	σ	548.1	50 <i>μ</i> g/L	07/02/03	E86515
Diquat	υ	549	1.44 <i>μ</i> g/L	07/08/03	E86515
Biochemical Oxygen Demand	8.1	405.1	2.0 mg/L	06/25/03	JGT
Chloride	15000	SM4500CL-I	B 200 mg/L	06/26/03	JNM
Chemical Oxygen Demand	640	410.4	5.0 mg/L	06/27/03	JGT
Color	5	110.2	5 CU	06/25/03	JMJ
Specific Conductance	41000	120.1	μmhos/cm	06/30/03	JNM
Cyanide, Total	U	335.4	0.0040 mg/L	06/26/03	JNM
Fluoride	0.25	SM4500F-0	0.10 mg/L	06/26/03	JMJ
Gross Alpha	6±3	900.0	1.0 pCi/L	07/08/03	E84088
Surfactants (as LAS, MW = 340)	0.41	425.1	0.010 mg/L	06/26/03	JGT

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454 Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03 **SAMPLE ID: MW-1 LMZ** Collected by: Lech Kwapinski Received on: 06/25/03

PARAMETER	RESULT	METHOD	DI INITMO	55 A 111 E	3 373 T 17 0 m				
PARAMEIER	RESULI	MEIHOD	DL UNITS	DATE	ANALYST				
Ammonia, as N	0.53	350.1	0.020 mg/L	06/27/03	JGT				
Nitrite, as Nitrogen	U	353.2	0.020 mg/L	06/25/03	JGT				
Nitrate, as Nitrogen	υ	353.2	0.020 mg/L	06/25/03	JGT				
Nitrate-Nitrite, as Nitrogen	υ	353.2	0.020 mg/L	06/25/03	JGT				
Odor	2	SM2150B	1 T.O.N.	06/25/03	JMJ				
pH (Laboratory)	8.0	150.1	pH Units	06/26/03	MM				
Radium 226	7.0±0.3	903.1	0.1 pCi/L	07/15/03	E84088				
Radium 228	0.5±0.5 U	RA-05	0.5 pCi/L	07/03/03	E84088				
Sulfate	1700	375.4	250 mg/L	06/30/03	JNM				
Total Coliform Bacteria	<1	SM9222B	1 cfu/100 ml	06/25/03	JGT				
	Total Coliform Date & Time Sampled: 06/24/03 14:00 Total Coliform Date & Time Analyzed: 06/25/03 18:01								
Total Dissolved Solids	27000	160.1	10 mg/L	06/27/03	DNS				
Total Kjeldahl Nitrogen	0.82	351.2	0.10 mg/L	06/30/03	JMJ				
Organic Nitrogen	υ	351-350	0.50 mg/L	06/30/03	JMJ				
Phosphorus, Total	0.093	365.4	0.010 mg/L	06/30/03	LML				

4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Date of Analysis: 06/29/03 Date of Extraction: 06/26/03

508 GROUP I UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST	
Aldrin	บ	0.10 μg/L	CMM	
Dieldrin	บ	0.10 μg/L	CMM	

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03

Received on: 06/25/03

Date of Analysis: Date of Extraction: 06/26/03

06/29/03

508 ORGANOHALIDE PESTICIDES 62-550.310(2)(c) FAC

PARAMETER	RESULT	DL UNITS	ANALYST	
Chlordane	Ŭ	0.50 μg/L	СММ	
Endrin	ប	0.10 μg/L	CMM	
Heptachlor	Ū	0.10 μg/L	CMM	
Heptachlor epoxide	Ū	0.10 μg/L	CMM	
Hexachlorobenzene	Ū	0.10 μg/L	CMM	
Lindane	Ū	0.10 μg/L	CMM	
Methoxychlor	Ū	0.20 μg/L	CMM	
Toxaphene	Ū	1.0 μg/L	CMM	
PCB 1016	Ū	0.20 μg/L	CMM	
PCB 1221	บ	0.20 μg/L	CMM	
PCB 1240	Ū	0.20 μg/L 0.20 μg/L	CMM	
PCB 1242	Ū	0.20 μg/L 0.20 μg/L	CMM	
PCB 1248	Ū	0.20 μg/L 0.20 μg/L	CMM	
PCB 1254	Ū	0.20 μ g/L	CMM	
PCB 1260	Ū	0.20 μ g/L 0.20 μ g/L	CMM	

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July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 LMZ

06/29/03

Date of Analysis: Date of Extraction: 06/26/03

508.1 CHLORINATED PESTICIDES (62-550 FAC)

Collected by: Lech Kwapinski

PARAMETER	RESULT	DL UNITS	ANALYST	
Alachlor	U	0.10 μg/L	СММ	
Atrazine	U	$1.0 \mu \text{g/L}$	CMM	
Hexachlorocyclopentadiene	ซ	$0.10~\mu\mathrm{g/L}$	CMM	
Simazine	U	$1.0~\mu \mathrm{g/L}$	CMM	

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ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Date of Analysis: 06/30/03 Date of Extraction: 06/27/03

515.1 HERBICIDES (62-550 FAC)

PARAMETER	RESULT	DL UNITS	ANALYST	
Dalapon	Ū	0.50 μg/L	СММ	
Dinoseb	U	$0.50 \mu \text{g/L}$	CMM	
Pentachlorophenol	ប	$0.50 \mu g/L$	CMM	
Picloram	ប	$0.50 \mu \text{g/L}$	CMM	
2,4-D	ប	$0.50 \mu \text{g/L}$	CMM	
2,4,5-TP (Silvex)	ប	$0.10~\mu \mathrm{g/L}$	CMM	

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

SAMPLE ID: MW-1 LMZ

July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03 Received on: 06/25/03

Date of Analysis:

06/27/03

524.2 GROUP II UNREGULATED ORGANIC CONTAMINANTS

Collected by: Lech Kwapinski

PARAMETER	RESULT	DL UNITS	ANALYST	
Bromobenzene	U	0.5 μg/L	EMH	
Bromodichloromethane	U	0.5 μg/L	EMH	
Bromoform	U	$0.5 \mu g/L$	EMH	
Bromomethane	U	$0.5 \mu g/L$	EMH	
Chloroethane	U	$0.5 \mu g/L$	EMH	
Chloroform	υ	$0.5 \mu g/L$	EMH	
Chloromethane	U	$0.5 \mu g/L$	EMH	
o-Chlorotoluene	U	$0.5 \mu g/L$	EMH	
p-Chlorotoluene	U	$0.5 \mu g/L$	EMH	
Dibromochloromethane	ซ	$0.5 \mu g/L$	EMH	
Dibromomethane	U	$0.5 \mu g/L$	EMH	
m-Dichlorobenzene	U	$0.5 \mu g/L$	EMH	
Dichlorodifluoromethane	U	$0.5 \mu g/L$	EMH	
1,1-Dichloroethane	U	$0.5 \mu g/L$	ЕМН	
2,2-Dichloropropane	U	$0.5 \mu g/L$	ЕМН	
1,1-Dichloropropylene	U	$0.5 \mu g/L$	ЕМН	
1,3-Dichloropropane	ប	$0.5 \mu g/L$	EMH	
1,3-Dichloropropene	U	$0.5 \mu \text{g/L}$	EMH	
Methyl tert-butyl-ether (MTBE)	U	$0.5 \mu g/L$	EMH	
1,1,1,2-Tetrachloroethane	U	$0.5 \mu g/L$	EMH	
1,1,2,2-Tetrachloroethane	U	$0.5 \mu g/L$	EMH	
Trichlorofluoromethane	ซ	$0.5 \mu g/L$	EMH	
1,2,3-Trichloropropane	υ	$0.5 \mu g/L$	EMH	

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ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

Sample No: 2003/06454- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Date of Analysis:

06/27/03

524.2 TRIHALOMETHANES (THM'S)

PARAMETER	RESULT	DL UNITS	ANALYST	
Bromodichloromethane	U	0.5 μg/L	EMH	
Bromoform	U	$0.5 \mu g/L$	EMH	
Chloroform	U	$0.5 \mu g/L$	EMH	
Dibromochloromethane	U	$0.5 \mu g/L$	EMH	
Total Trihalomethanes	U	$0.5 \mu g/L$	EMH	

4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

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Sample No: 2003/06454- 1

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Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

Collected by: Lech Kwapinski

Date of Analysis: 06/27/03

SAMPLE ID: MW-1 LMZ

524.2 VOLATILE ORGANIC COMPOUNDS (62-550)

PARAMETER	RESULT	DL UNITS	ANALYST	
Benzene	U	0.5 μg/L	EMH	
Carbon tetrachloride	U	$0.5~\mu\mathrm{g/L}$	EMH	
Chlorobenzene	U	$0.5 \mu g/L$	EMH	
1,2-Dichlorobenzene	บ	$0.5 \mu g/L$	EMH	
1,4-Dichlorobenzene	υ	$0.5 \mu g/L$	EMH	
1,2-Dichloroethane	U	$0.5 \mu g/L$	EMH	
1,1-Dichloroethene	U	$0.5 \mu g/L$	EMH	
cis-1,2-Dichloroethene	U	$0.5 \mu g/L$	EMH	
trans-1,2-Dichloroethene	U	$0.5 \mu g/L$	EMH	
Dichloromethane	U	$0.5 \mu g/L$	EMH	
1,2-Dichloropropane	U	$0.5 \mu g/L$	EMH	
Ethylbenzene	U	$0.5 \mu g/L$	EMH	
Styrene	U	$0.5 \mu g/L$	EMH	
Tetrachloroethylene	ซ	$0.5 \mu \text{g/L}$	EMH	
Toluene	U	$0.5 \mu g/L$	EMH	
1,2,4-Trichlorobenzene	U	$0.5 \mu g/L$	EMH	
1,1,1-Trichloroethane	U	0.5 μg/L	EMH	
1,1,2-Trichloroethane	Ū	$0.5 \mu g/L$	EMH	
Trichloroethylene	Ū	$0.5 \mu g/L$	EMH	
Vinyl chloride	Ū	$0.5 \mu \text{g/L}$	EMH	
Xylenes, Total	Ü	$0.5 \mu g/L$	EMH	

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712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 23, 2003 Report: 2003/06454

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Port St. Lucie, FL

Collected on: 06/24/03

Received on: 06/25/03

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Date of Analysis: 06/26/03

531.1 GROUP I UNREGULATED ORGANIC PESTICIDES

PARAMETER	RESULT	DL UNITS	ANALYST	
Aldicarb	U	1.0 μg/L	MLD	
Aldicarb sulfone	U	$1.0 \mu g/L$	MLD	
Aldicarb sulfoxide	ប	$1.0 \mu g/L$	MLD	
Carbaryl	U	1.0 μg/L	MLD	
3-Hydroxycarbofuran	U	$1.0 \mu \text{g/L}$	MLD	
Methomyl	U	$1.0 \mu \text{g/L}$	MLD	

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Port St. Lucie, FL

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03

Received on: 06/25/03

Date of Analysis: 06/29/03 Date of Extraction: 06/27/03

625 GROUP III UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST	
Butyl benzyl phthalate	Ū	1.0 μg/L	SPH	
2-Chlorophenol	Ū	$1.0 \mu g/L$	SPH	
Di-n-butylphthalate	บ	1.0 μg/L	SPH	
Diethylphthalate	Ū	1.0 μg/L	SPH	
Dimethylphthalate	Ū	1.0 μg/L	SPH	
Di-n-octyl phthalate	30	1.0 μg/L	SPH	
2,4-Dinitrotoluene	ד	1.0 μg/L	SPH	
Isophorone	บ	1.0 μg/L	SPH	
2-Methyl-4,6-dinitrophenol	Ū	1.0 μg/L	SPH	
Phenol	Ū	1.0 μg/L	SPH	
2,4,6-Trichlorophenol	Ū	1.0 μg/L	SPH	

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Attention: Michael J. Waldron, P.G.

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Port St. Lucie, FL

SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03

Received on: 06/25/03

Date of Analysis: Date of Extraction: 06/27/03

06/29/03

625 MUNICIPAL WASTEWATER MINIMUM CRITERIA

PARAMETER	RESULT	DL UNITS	ANALYST
Anthracene	U	1.0 μg/L	SPH
Naphthalene	U	1.0 μg/L	SPH
Phenanthrene	U	1.0 μg/L	SPH

ARCADIS GE	ERAGHTY&MILLE	R Labo	ratory Task O	rder No.	/P.O. No	. M/A	C	HAIN-	OF-CUST	ODY RE	CORD	Page	of 1
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ARCADIS GERAGHTY&I	Labo MILLER	ratory Task O	rder No./	P.O. No		C	_ CHAIN-OF-CUSTODY RECORD v Page of						
ARCADIS GERAGHTY&I Project Number/Name	ePORT ST.L	JCIE /DFOC	<u>1153</u> .α	x03			ANALYS	IS / METHO	O / SIZE				
Project Location Poe						ps		ln/n					
Laboratory Evy IR	ODYNE			4	S	F		7. 4. V					
Project Manager <u>M</u>	KE WH	Deal						AN A	See My	Vari / Log	# 200	306299	
Sampler(s)/Affiliation	SALLY	DULALL	 	8	7 0 Da	Z, 2/	14 5 2	T. Co.	or Was	k 7		- 0 02 1 /	
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ARCADIS GERAGHTY&MILLER		atory Task Or				CHAIN-OF-CUSTODY RECORD Page							of_4
roject Number/Name C774	OF PSI	L / PF0011.	<u>53.</u> ∞	3	ζ.		ANALYSIS	/ METHO	D / SIZE				
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ARCADIS GERAGHTY&MILL	LLIN							CHAIN-OF-CUSTODY RECORD						of_4
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Project Manager Mrk	E WAG	DROW		/.	/3'	$\langle \omega \rangle$			· /-	Ž		/1 na #	200=	0629
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ARCADIS GERAGHTY&MILLER	GERAGHTY&MILLER Laboratory Task Order No./P.O. No CF								CHAIN-OF-CUSTODY RECORD Page 4 of 4					
Project Number/Name	1 OF PS	L/PFOO	153.00	03			ΔΝΔΙ ΥSIS	/ METHOD) / SIZE	, <u></u>				
Project Location Poet St	Luci	E, FL			,			/ /	/ 3121	7	-			
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ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03 Received on: 06/17/03

PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Aluminum	0.16	200.7	0.10 mg/L	06/18/03	KYT
Arsenic	u .	200.7	0.010 mg/L	06/18/03	KYT
Barium	0.099	200.7	0.010 mg/L	06/18/03	KYT
Beryllium	υ	200.7	0.0030 mg/L	06/18/03	KYT
Cadmium	υ	200.7	0.0040 mg/L	06/18/03	KYT
Chromium	υ	200.7	0.010 mg/L	06/18/03	KYT
Copper	U	200.7	0.010 mg/L	06/18/03	KYT
Iron	0.91	200.7	0.010 mg/L	06/18/03	KYT
Manganese	0.057	200.7	0.010 mg/L	06/18/03	KYT
Nickel	0.026	200.7	0.010 mg/L	06/18/03	KYT
Silver	υ	200.7	0.010 mg/L	06/19/03	APR
Sodium	10000	200.7	500 mg/L	06/23/03	KYT
Zinc	0.046	200.7	0.010 mg/L	06/18/03	KYT
Antimony	0.0034	200.8	0.0010 mg/L	06/19/03	APR
Lead	0.0045	200.8	0.00020 mg/L	06/19/03	APR
Selenium	0.038	200.8	0.0010 mg/L	06/19/03	APR
Thallium	υ	200.8	0.00030 mg/L	06/19/03	APR
Mercury	υ	245.1	0.00003 mg/L	06/19/03	KYT

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 11, 2003 Report: 2003/06299 Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03 Received on: 06/17/03

PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Dibromochloropropane (DBCP)	U	504.1	0.020 μg/L	06/20/03	СММ
1,2-Dibromoethane (EDB)	U	504.1	0.020 <i>μ</i> g/L	06/20/03	СММ
Benzo(a)pyrene	U	525.2	0.20 <i>μ</i> g/L	06/24/03	SPH
Di(2-ethylhexyl)adipate	σ	525.2	1.0 <i>μ</i> g/L	06/24/03	SPH
Di(2-ethylhexyl)phthalate	16	525.2	1.0 <i>μ</i> g/L	06/24/03	SPH
Carbofuran	U	531.1	1.0 <i>μ</i> g/L	06/18/03	MLD
Oxamyl (Vydate)	U	531.1	1.0 <i>μ</i> g/L	06/18/03	MLD
Glyphosate	U	547	40 <i>μ</i> g/L	06/27/03	E86515
Endothall	บ	548.1	50 <i>μ</i> g/L	06/27/03	E86515
Diquat	U	549	1.44 <i>μ</i> g/L	06/26/03	E86515
Biochemical Oxygen Demand	U	405.1	2.0 mg/L	06/18/03	JGT
Chloride	22000	SM4500CL-	B 200.0 mg/L	06/18/03	JNM
Chemical Oxygen Demand	2500	410.4	25 mg/L	06/18/03	DNS
Color	10	110.2	5 CU	06/18/03	DNS
Specific Conductance	52000	120.1	μmhos/cm	06/18/03	JNM
Cyanide, Total	U	335.4	0.0040 mg/L	06/20/03	DNS
Fluoride	0.39	SM4500F-0	C 0.10 mg/L	06/19/03	JMJ
Gross Alpha	33±32	900.0	1.0 pCi/L	06/27/03	E84088
Surfactants (as LAS, MW = 340)	0.32	425.1	0.010 mg/L	06/17/03	JMJ

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

Attention: Michael Waldron

July 11, 2003 Report: 2003/06299 Sample No: 2003/06299- 1

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03 Received on: 06/17/03

PARAMETER	RESULT	METHOD	DL UNITS	DATE	ANALYST
Ammonia, as N	0.10	350.1	0.020 mg/L	06/19/03	JGT
Nitrite, as Nitrogen	0.04	353.2	0.020 mg/L	06/18/03	JGT
Nitrate, as Nitrogen	1.4	353.2	0.020 mg/L	06/18/03	JGT
Nitrate-Nitrite, as Nitrogen	1.4	353.2	0.020 mg/L	06/18/03	JGT
Odor	1	SM2150B	T.O.N.	06/18/03	DNS
pH (Laboratory)	7.6	150.1	pH Units	06/17/03	JNM
Radium 226	21.9±0.5	903.1	0.1 pCi/L	07/01/03	E84088
Radium 228	0.5±0.5 U	RA-05	0.5 pCi/L	07/01/03	E84088
Sulfate	3000	375.4	500.0 mg/L	06/18/03	JNM
Total Coliform Bacteria	<1	SM9222B	1 cfu/100 ml	06/17/03	JGT
Total Coliform Date & Time S Total Coliform Date & Time A	ampled: 06/16/ .nalyzed: 06/17/	03 09:39 03 18:11			
Total Dissolved Solids	34000	160.1	10 mg/L	06/18/03	JNM
Total Kjeldahl Nitrogen	0.41	351.2	0.10 mg/L	06/20/03	JMJ
Organic Nitrogen	υ	351-350	0.50 mg/L	06/20/03	JMJ
Phosphorus, Total	0.15	365.4	0.010 mg/L	06/20/03	JMJ

4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

CERTIFICATE OF ANALYSIS

ARCADIS

July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Date of Analysis: 06/23/03 Date of Extraction: 06/19/03

508 GROUP I UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST
Aldrin	U	0.10 μg/L	CMM
Dieldrin	U	0.10 μg/L	CMM

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CERTIFICATE OF ANALYSIS

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Date of Analysis: 06/23/03 Date of Extraction: 06/19/03

508 ORGANOHALIDE PESTICIDES 62-550.310(2)(c) FAC

PARAMETER	RESULT	DL UNITS	ANALYST	
Chlordane	ע	0.50 μg/L	СММ	
Endrin	ប	$0.10 \mu \mathrm{g/L}$	CMM	
Heptachlor	ប	$0.10 \mu \text{g/L}$	СММ	
Heptachlor epoxide	ប	$0.10 \mu \text{g/L}$	CMM	
Hexachlorobenzene	ប	$0.10~\mu\mathrm{g/L}$	CMM	
Lindane	υ	$0.10 \mu \text{g/L}$	CMM	
Methoxychlor	ប	0.20 μg/L	CMM	
Toxaphene	ប	$1.0 \mu g/L$	CMM	
PCB 1016	U	$0.20 \mu \text{g/L}$	CMM	
PCB 1221	U	0.20 μg/L	CMM	
PCB 1240	U	0.20 μg/L	СММ	
PCB 1242	U	0.20 μg/L	CMM	
PCB 1248	บ	$0.20 \mu \text{g/L}$	CMM	
PCB 1254	U	0.20 μg/L	CMM	
PCB 1260	U	$0.20 \mu \text{g/L}$	СММ	

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ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 11, 2003

Report: 2003/06299 Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

06/24/03 Date of Analysis: Date of Extraction: 06/19/03

508.1 CHLORINATED PESTICIDES (62-550 FAC)

PARAMETER	RESULT	DL UNITS	ANALYST	
Alachlor	U	0.10 μg/L	СММ	
Atrazine	U	$1.0 \mu \text{g/L}$	CMM	
Hexachlorocyclopentadiene	ซ	$0.10~\mu \mathrm{g/L}$	CMM	
Simazine	υ	$1.0~\mu\mathrm{g/L}$	CMM	

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July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

off St. Lucie, I'L

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Date of Analysis: 06/22/03 Date of Extraction: 06/22/03

515.1 HERBICIDES (62-550 FAC)

Collected by: Sally Durall

PARAMETER	RESULT	DL UNITS	ANALYST	
Dalapon	U	0.50 μg/L	СММ	
Dinoseb	υ	$0.50 \mu \text{g/L}$	CMM	
Pentachlorophenol	υ	$0.50 \mu \mathrm{g/L}$	CMM	
Picloram	U	$0.50 \mu \text{g/L}$	CMM	
2,4-D	U	$0.50 \mu \text{g/L}$	CMM	
2,4,5-TP (Silvex)	U	$0.10 \mu \text{g/L}$	CMM	

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ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Date of Analysis:

06/18/03

524.2 GROUP II UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST	
Bromobenzene	σ	0.5 μg/L	ЕМН	
Bromodichloromethane	υ	$0.5 \mu g/L$	EMH	
Bromoform	U	$0.5 \mu g/L$	EMH	
Bromomethane	ប	$0.5 \mu g/L$	EMH	
Chloroethane	ט	$0.5 \mu g/L$	EMH	
Chloroform	U	$0.5 \mu g/L$	EMH	
Chloromethane	ប	$0.5 \mu g/L$	EMH	
o-Chlorotoluene	U	0.5 μg/L	EMH	
p-Chlorotoluene	U	0.5 μg/L	EMH	
Dibromochloromethane	U	0.5 μg/L	EMH	
Dibromomethane	U	0.5 μg/L	EMH	
m-Dichlorobenzene	ซ	$0.5 \mu g/L$	EMH	
Dichlorodifluoromethane	υ	$0.5 \mu g/L$	EMH	
1,1-Dichloroethane	บ	$0.5 \mu g/L$	EMH	
2,2-Dichloropropane	U	$0.5 \mu g/L$	EMH	
1,1-Dichloropropylene	U	$0.5 \mu g/L$	EMH	
1,3-Dichloropropane	U	$0.5 \mu g/L$	EMH	
1,3-Dichloropropene	ΰ	$0.5 \mu \text{g/L}$	EMH	
Methyl tert-butyl-ether (MTBE)	U	$0.5 \mu g/L$	EMH	
1,1,1,2-Tetrachloroethane	υ	$0.5 \mu g/L$	EMH	
1,1,2,2-Tetrachloroethane	ซ	0.5 μg/L	EMH	
Trichlorofluoromethane	บ	$0.5 \mu g/L$	EMH	
1,2,3-Trichloropropane	Ū	0.5 μg/L	EMH	

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ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 11, 2003 Report: 2003/06299 Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03 Received on: 06/17/03

Date of Analysis:

06/18/03

524.2 TRIHALOMETHANES (THM'S)

PARAMETER	RESULT	DL UNITS	ANALYST	
Bromodichloromethane Bromoform Chloroform Dibromochloromethane Total Trihalomethanes	บ บ บ บ	0.50 μg/L 0.50 μg/L 0.50 μg/L 0.50 μg/L 0.50 μg/L	EMH EMH EMH EMH EMH	

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Date of Analysis:

06/18/03

524.2 VOLATILE ORGANIC COMPOUNDS (62-550)

PARAMETER	RESULT	DL UNITS	ANALYST
Benzene	U	0.5 μg/L	ЕМН
Carbon tetrachloride	U	$0.5 \mu g/L$	EMH
Chlorobenzene	U	$0.5 \mu g/L$	EMH
1,2-Dichlorobenzene	U	$0.5 \mu g/L$	EMH
1,4-Dichlorobenzene	U	$0.5 \mu g/L$	EMH
1,2-Dichloroethane	U	$0.5 \mu g/L$	EMH
1,1-Dichloroethene	U	$0.5 \mu g/L$	EMH
cis-1,2-Dichloroethene	U	$0.5~\mu\mathrm{g/L}$	EMH
trans-1,2-Dichloroethene	ប	$0.5 \mu g/L$	EMH
Dichloromethane	U	$0.5 \mu g/L$	EMH
1,2-Dichloropropane	U	$0.5 \mu \text{g/L}$	EMH
Ethylbenzene	U	$0.5 \mu g/L$	EMH
Styrene	U	$0.5 \mu \mathrm{g/L}$	EMH
Tetrachloroethylene	U	$0.5 \mu g/L$	EMH
Toluene	U	$0.5 \mu g/L$	EMH
1,2,4-Trichlorobenzene	U	$0.5 \mu g/L$	EMH
1,1,1-Trichloroethane	U	$0.5 \mu g/L$	EMH
1,1,2-Trichloroethane	U	$0.5 \mu g/L$	EMH
Trichloroethylene	U	$0.5 \mu g/L$	ЕМН
Vinyl chloride	ט	$0.5 \mu g/L$	EMH
Xylenes, Total	บ	$0.5 \mu g/L$	EMH

4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

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ARCADIS

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July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water) Date of Analysis:

06/18/03

Collected by: Sally Durall

531.1 GROUP I UNREGULATED ORGANIC PESTICIDES

PARAMETER	RESULT	DL UNITS	ANALYST	
Aldicarb	U	1.0 μg/L	MLD	
Aldicarb sulfone	υ	$1.0~\mu \mathrm{g/L}$	MLD	
Aldicarb sulfoxide	ប	$1.0 \mu \text{g/L}$	MLD	
Carbaryl	υ	$1.0 \mu \text{g/L}$	MLD	
3-Hydroxycarbofuran	U	$1.0 \mu g/L$	MLD	
Methomyl	U	$1.0 \mu g/L$	MLD	

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712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 11, 2003 Report: 2003/06299

Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

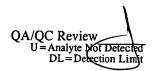
SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durali

Date of Analysis: 06/21/03 Date of Extraction: 06/19/03

625 GROUP III UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL UNITS	ANALYST	
Butyl benzyl phthalate	ט	1.0 μg/L	SPH	
2-Chlorophenol	บ	$1.0~\mu \mathrm{g/L}$	SPH	
Di-n-butylphthalate	U	$1.0 \mu \text{g/L}$	SPH	
Diethylphthalate	Ū	$1.0 \mu \text{g/L}$	SPH	
Dimethylphthalate	U	$1.0 \mu \mathrm{g/L}$	SPH	
Di-n-octyl phthalate	υ	$1.0 \mu g/L$	SPH	
2,4-Dinitrotoluene	U	$1.0 \mu \mathrm{g/L}$	SPH	
Isophorone	U	$1.0 \mu \text{g/L}$	SPH	
2-Methyl-4,6-dinitrophenol	U	$1.0 \mu \mathrm{g/L}$	SPH	
Phenol	U	$1.0 \mu \mathrm{g/L}$	SPH	
2,4,6-Trichlorophenol	σ	1.0 μg/L	SPH	



4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

CERTIFICATE OF ANALYSIS

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 11, 2003 Report: 2003/06299

Report: 2003/06299 Sample No: 2003/06299- 1

Attention: Michael Waldron

Project: PF001153.0003 City of Port St. Lucie

Port St. Lucie, FL

Collected on: 06/16/03

Received on: 06/17/03

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Date of Analysis: 06/21/03 Date of Extraction: 06/19/03

625 MUNICIPAL WASTEWATER MINIMUM CRITERIA

PARAMETER	RESULT	DL UNITS	ANALYST	
Anthracene	U	$1.0~\mu \mathrm{g/L}$	SPH	
Naphthalene	U	$1.0 \mu \mathrm{g/L}$	SPH	
Phenanthrene	ប	$1.0~\mu \mathrm{g/L}$	SPH	

cfu = Colony forming units

Project Manager

Analysis contained herein conform to EPA, Standard Methods and DEP approved methods. Subcontracted analyses are denoted by certification number in the analyst column. All relevant quality assurance samples were within specified control limits unless otherwise stated. Uncertainties for test results are available upon request. Envirodyne certifies that its test results meet all requirements of the NELAC standards, where applicable. For questions, please call the project manager at the number listed above.

This is the last page of the report. See bottom of page for total pages.

Quality Assurance Officer

QA/QC Review
U=Analyte Not Detected
DL=Detection Limit

NP 1º 1 2º Devised Remort

USBiosystems

Post-ite Fax Note 7671 Date 6 3 pages 9

To gim macon From Brad Macek

Co. Spept. Reac Macon Co. City of PSL

Phone # Phone # Phone # 1

Fax # 561-433-8011 Fax #772-873-6405

Page: Page 1 of 4 Date: 06/02/2003 Log #: L70735-1

Client #: FTL-11-050102

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, FL 34983

Wes Upham

Sample Description:

EFA-1

Westport Annual

Analytical Report: 29455

Date Sampled: 12/11/02 Time Sampled: 11:15

Date Received: 12/12/02 00:00

Collected By: Client

					Extr.	Analysis	
Parameter	Results	Units	hod:teK	MOL	Date	Date	Analyst
Radiochemical Analysis	62-550.310(S) (PWS033)					
Gross Alpha	<2.1+/-1.	pCi/l	9(-0.0	2.1	12/17 09:00	12/18 00:00	su
Radium 226	0.2+/-0.1	pCi/1	9(3.1	0.20	12/17 00:00	12/24 00:00	su
Radium 228	<1.0+/-0.	pCi/l	Re 05	1.0	12/17 00:00	12/24 00:00	su
Inorganic Analysis 52-	550:310(1) (PWS0	30)					
Arsenic	บ	mg/l	2(0.7	0.0036	12/19 00:00	12/19 00:00	su
Barium	U	mg/1	200.7	0.00010	12/26 08:00	12/27 12:38	SB
Cadmium	U	mg/l	260.7	0.00022	12/26 C8:00	12/27 12:38	SB
Chromium	บ	mg/1	200.7	0.0088	12/26 08:00	12/27 12:38	SB
Cyanide	0.0055	mg/l	335.3	0.0017	12/19 14:30	12/24 11:30	IG
Pluoride	0.55	mg/l	300.0	0.066	12/13 07:33	12/13 07:33	MG
Lead	σ	mg/l	SM3113B	0.0050	12/17 15:30	12/18 18:03	VR
Mercury	U	mg/l	245.1	0.000004	-	12/31 12:04	LL
Nickel	υ	mg/l	200.7	0.00097	12/26 08:00	12/27 12:38	SB
Nitrate	1.2	mg/l	300.0	0.016	12/13 07:33	12/13 07:33	MG
Nitrite	ט	mg/l	300.0	0.016	12/13 07:33	12/13 07:33	MG
Selenium	υ	mg/1	SM31138	0.0041	12/17 10:30	12/26 22:23	VR
Sodium	68	mg/1	200.7	0.13	12/26 08:00	12/26 08:00	ER
Antimony	U	mg/1	SM31138	0.0074	12/17 10:30	12/19 17:18	VIR.
Beryllium	Ū	mg/l	200.7	0.00025	12/26 08:00	12/27 12:38	SB
Thallium	ប	mg/1	200.9	0.0027	12/17 10:30	12/28 15:58	EB
Tribalomathane Analysis	62-550.310(2)(a)) (PW8027)					
Total THM's	0.0047	mg/1	524.2	0.0010	12/24 21:35	12/24 21:35	BL
Dilution Factor	1.0	.	524.2	n/e	12/24 21:35	12/24 21:35	BL BL
Surrogate Recoveries:					,,,	**/** **.33	86
4-Bromofluorobenzene	95.0	*	524.2	70-130	12/24 21:35	12/24 21:35	BL
1,2-Dichlorobenzens-d4	95.0	*	521.2	70-136	12/24 21:35	12/24 21:35	BL

VIII VI IND UIIDIIID

Client #: FTL-11-050102

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, PL 34983

Wes Upham

Sample Description:

EFA-1

Westport Annual

Page: Page 2 of 4 Date: 06/02/2003

Log #: L70735-1

Analytical Report: 29455

Date Sampled: 12/11/02

Time Sampled: 11:15 Date Received: 12/12/02 00:00

Collected By: Client

					Extr.	Analysis	
Parameter	Results	Units	Merchod	MDL	Date	Date	Analyst
Volatile Organic Analysis							
1,2,4-Trichlorobenzene	U	ug/l	534.2	0.20	12/24 21:35	12/24 21:35	BL
cis-1,2-Dichloroethylene	U	ug/l	534.2	0.50	12/24 71:35	12/24 21:35	BL
Total Xylenes	ប	ug/l	504.2	0.59	12/24 21:35	12/24 21:35	BL
Dichloromethane	U	ug/1	534.2	0.50	12/24 21:35	12/24 21:35	BC
o-Dichlorobenzene	U	ug/1	5::4,2	0.13	12/24 21:35	12/24 21:35	BL
p-Dichlorobenzene	U	ug/l	524.2	0.14	12/24 21:35	12/24 21:35	BL
Vinyl Chloride	ŭ	ug/l	524.2	0.13	12/24 21:35	12/24 21:35	BL
1,1-Dichloroethylene	ŭ	ug/l	514.2	0.50	12/24 21:35	12/24 21:35	BL
trans-1,2-Dichloroethylene	σ	ug/l	574.2	0.14	12/24 21:35	12/24 21:35	ÐL
1.2-Dichloroethane	σ	ug/1	524.2	0.092	12/24 21:35	12/24 21:35	BL
1,1,1-Trichloroethane	U	ug/1	524.2	0.13	12/24 21:35	12/24 21:35	BL
Carbon Tetrachloride	U	ug/l	524.2	0.16	12/24 21:35	12/24 21:35	BL
1,2-Dichloropropane	U	ug/l	524.2	0.11	12/24 21:35	12/24 21:35	BL
Trichloroethylene	O	ug/l	524.2	0.50	12/24 21:35	12/24 21:35	BI.
1,1,2-Trichloroethane	ט	ug/l	524.2	0.12	12/24 21:35	12/24 21:35	BL
Tetrachloroethylene	Ū	ug/1	524.2	0.16	12/24 21:35	12/24 21:35	BL
Monochlorobenzene	Ü	ug/l	524.2	0.10	12/24 21:35	12/24 21:35	BL
Benzene	Ū	ug/l	524.2	0.12	12/24 21:35	12/24 21:35	BL
Toluene	ū	ug/l	524.2	0.11	12/24 21:35	12/24 21:35	BL
Ethylbenzene	บ	ug/l	524.2	0.14	12/24 21:35	12/24 21:35	BL
Styrene	U	ug/l	524.2	0.12	12/24 21:35	12/24 21:35	ВĽ
Dilution Factor	1.0		524.2	n/e	12/24 21:35	12/24 21:35	BL
Surrogate Recoveries:							
1-Bromofluorobenzene	95.0	*	524.2	70-130	12/24 21:35	12/24 21:35	BL
1,2-Dichlorobenzene-d4	95.0	*	521.2	70-130	12/24 21:35	12/24 21:35	BL
Subcontracted Services							
Subcontract Lab 1	E83033		R. UDS	n/e			su
Subcontract Lab 2	B83079		PPDW/As	n/e			SU
Subcontract Lab 3	E87634		1613	n/e			SU
Becondary Chemical Analysis	62-550.320	(PWS031)					
Aluminum	ប	mg/l	200.7	0.050	12/26 08:00	12/27 12:38	SB
Chloride	150	mg/l	325.2	1.0	12/14 10:15	12/14 10:15	PR
Copper	U	mg/l	200.7	0.010	12/26 08:00	12/27 12:38	SB
Iron	0.10	mg/1	200.7	0.050	12/26 08:00	12/27 12:38	SB
Manganese	נו	mg/1	200.7	0.010	12/26 08:00	12/27 12:38	SB
Silver	U	mg/l	20(7	0.010	12/26 08:00	12/27 12:38	SB
Sulfate	32	mg/l	300.0	1.0	12/13 07:33	12/13 07:33	MG
2inc	0.062	mg/l	20(.7	0.020	12/26 08:00	12/27 12:38	SB
		=				, -, 12.30	JE

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, FL 34983

Wes Upham

Sample Description:

EFA-1

Westport Annual

Page: Page 3 of 4 Date: 06/02/2003

Log #: L70735-1

Analytical Report: 29455

Date Sampled: 12/11/02 Time Sampled: 11:15

Date Received: 12/12/02 00:00

Collected By: Client

					Extr.	Analysis	
Parameter	Results	Units	Method	MOL	Date	Date	Analyst
Secondary Chemical Analysi	8 62-550.32	0 (PWS031)	(continu	.ed1			
Fluoride	0.55	mg/l	300.0	1.0	12/13 07:33	12/13 07:33	MG
Color	50	pcu	110.2	1.0	12/12 17:10	12/12 17:10	9C
рн	7.05	pH Units	150.1	1.0	12/19 14:34	12/18 14:34	PR
TDS	420	mg/l	160.1	7.4	12/13 16:10	12/13 16:10	OC OC
MBAS	0.16	mg/l	425.1	0.10	12/13 10:00	12/13 10:00	IG
Pesticide/PCB Chemical Ana	lysis 62-55().310(2)(c)	(PWS029)				
Endrin	u	ug/1	508.1	1.0	12/24 00:00	12/24 00:00	SU
Lindane	U	ug/l	509.1	1.0	12/24 00:00	12/24 00:00	SU
Methoxychlor	U	ug/l	503.1	1.0	12/24 00:00	12/24 00:00	SU
Toxaphene	บ	ug/l	503.1	1.0	12/24 00:00	12/24 00:00	ຣບ
Dalapon	ט	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
Diquat	U	ug/l	549.2	1.0	12/16 00:00	12/16 00:00	SU
Endothal1	ប	ug/1	543.1	1.0	12/18 00:00	12/18 00:00	SÜ
Glyphosate	U	ug/l	547	1.0	12/23 00:00	12/23 00:00	รบ
Bis(2-Ethylhexyl)Adipate	ប	ug/l	525.2	1.0	12/18 00:00	12/18 00:00	SU
Oxamyl(Vydate)	U	ug/l	531.1	1.0	12/18 00:00	12/18 00:00	SU
Simazine	σ	ug/1	508.1	1.0	12/24 00:00	12/24 00:00	SU
Bis(2-Ethylhexyl)Phthalate	Ū	ug/1	525.2	1.0	12/18 00:00	12/18 00:00	su
Picloram	ช	ug/1	515.1	1.0	12/19 00:00	12/19 00:00	SU
Dinoseb	υ	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	so
Hexachlorocyclopentadiene	U	ug/l	50#.1	1.0	12/24 00:00	12/24 00:00	SU
Carbofuran	ប	ug/1	5311	1.0	12/18 00:00	12/18 00:00	รช
Atrazine	υ	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Alachlor	υ	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
2,3,7,8-TCDD (Dioxin)	ND	ng/l	1613	0.010	12/19 00:00	12/27 00:00	รบ
Heptachlor	υ	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Heptachlor Epoxide	u	ug/l	50E . 1	1.0	12/24 00:00	12/24 00:00	su
2,4-D	U	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
2,4,5-TP (Silvex)	U	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
Hexachlorobenzene	σ	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Benzc(a) pyrene	U	ug/l	525.2	1.0	12/18 00:00	12/18 00:00	so
Pentachlorophenol	U	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
PCB	υ .	ug/1	508.1	1.0	12/24 00:00	12/24 00:00	SU
Dibromachloropropane	Ü	- ug/1	504.1	0.020	12/16 11:00	12/17 00:15	PO
Ethylene Dibromide	σ	ug/l	5G4.1	0.020	12/16 11:00	12/17 00:15	FO
Chlordane	ប	ug/1	508.1	1.0	12/24 00:00	12/24 00:00	SU
Dilution Factor	1.0	-		n/e	12/16 11:00	12/17 00:15	FO

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, FL 34983

Wes Upham

Sample Description:

EPA-1

Westport Annual

Page: Page 4 of 4 Date: 06/02/2003

Log #: L70735-1

Analytical Report: 29455

Date Sampled: 12/11/02 Time Sampled: 11:15

Date Received: 12/12/02 00:00

Collected By: Client

Parameter	Results	Units	Xethod		Bxtr.	Analysis	
Unregulated Group I Analy				MDL	Date	Date	Analyst
Carbaryl			,				
· -• ·	บ	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Mechomyl	υ	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Aldicarb Sulfoxide	U	ug/1	521.1	2.0	12/17 00:00		
Aldicarb Sulfone	U	-				12/18 00:00	SU
	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	Su
Aldicarb	t	ug/1	\$31.1	2.0	12/17 00:00	12/18 00:00	รบ
3-Hydroxycarbofuran	U	ug/l	531.1	2.0	12/12 22 22		30
Dilution Factor		-31-	231.1	2.0	12/17 00:00	12/18 00:00	SU
Director Factor	1.0			n/e	12/17 00:00	12/18 00:00	SU

All analyses were performed using EPA, ASTM. NIOSH, USGS, or Standard Methods and certified to meet NELAC requirements. Flags: BDL or U-below reporting limit; DL-diluted out; IL-meets internal lab limits; MI-matrix interference; NA-not appl. Plags: CPR-Pb/Cu rule; ND-non detect(RL estimated); NPL-no Free liquids; dw-dry wt; ww-wet wt; C(#)-see attached USB code FLDEP Flags: J(#)-estimated 1:surr. fail 2:no known QC req. 3:QC fail %R or %RPD; 4:matrix int. 5:improper fld. protocol PLDEP Flags: L-exceeds calibration; Q-holding time exceeded; T-value < MCL; V-present in blank FLDEP Flags: Y-improper preservation; a-colonies exceed rance; I-result between MDL and PQL

QAP# 980126 SUB DOH# 86122,86109,286048 ADEM ID# 40850

DOH# E86240

NC CERT# 444

SC CERT# 96031001

TN CERT# 02985

IL CERT# 200020

USACE

GA CERT# 917

VA CERT# 00395

USDA Soil Permit# S-35240

Respectfully submitted,

LouAnn Jones Project Manager

TEL JULIUS CURUCIOLOGIA CITI OF

CULTITION TO

E UU

DRINKING WATER **BACTERIOLOGICAL ANALYSIS** LAB #: E 56718



City of Port St. Lucie **Utility Systems** 900 S.E. Ogden Lane Port St. Lucie, Floirda 34983 (561) 873-6400

SYSTEM ID#: PWS-4560954 SYSTEM PHONE #: (561) 873-6400 SYSTEM NAME: City of Port St. Lucie Utility Systems

ADDRESS: 900 S.E. Ogden Lane, Port St. Lucie, Florida 34983

COUNTY: St. Lucie

DEP DISTRICT: S.E.

COLLECTOR: JP

SAMPLE SITE (Locally or Subdivision): Port St. Lucie, Florida

COLLECTOR PHONE#: (561) 873-6400

DATE COLLECTED: 5/29/2003

TYPE OF SUPPLY (Circle one): Community Water Systems

NonCommunity Water System

Non-transient - noncommunity water system

Private Well

Bottled water

Other public water system

TYPE OF SAMPLE:

Compliance Repeat Replacement

Main C. Well Survey Other Line Repair

REMARKS:

[] Dist [] Raw [] TNTC or C

ANALYSIS METHOD: (ME) MTE MMO-MLIG DA

				ULIVI.	ו מוט ו	AID ITIO	J. WILL.	ALTE TATIA	D-MOG	ra .	i
	Coll. Time	Location Id	Sample Point (Specific Address)	C12 Resid.		Sample Number		"Total Coliform			In D
1									f		Ti
	10:28	2377	WESTPORT WWTP GFA-I	0.0	3	9932	2	A			Te

nto incubator

5/29/2003 Date: Time: <u>13:21</u> ech:

Results Read (out of incubator) Date: 5/30/2003 Time: 11:51

Tech.: GS

* Results in this column are preliminary. Fecal coliform confirmation on community and noncommunity water systems and total coliform confirmation on all types of water systems will follow in 24-48 hours.

P - Coliforms are present A - Coliforms are absent C - Confluent Growth TA - Turbid, Absence of gas or acid

TNTC - Too numerous to count

NAME AND ADDRESS OF PERSON/FIRM TO RECEIVE REPORT:

INTERPRETATIONS -REMARKS BY PROGRAM REVIEWER

SATISFACTORY

INCOMPLETE COLLECTION INFORMATION

REPEAT SAMPLES

REPLACEMENT SAMPLES

RECEIVED

MAY 3 0 2003

REVIEWING OFFICIAL:

TITLE:

Laboratory Director

UTILITY ENGINEERING DIVISION

l of 1

Laboratory Sample Data Entry Form

Main Vient New Record

Sample#:

29710 | Site: WP

Location : EFF-1

Date Collected:2/27/2003

SPWWTP Laboratory 1615 Sunshine Ave Port St. Lucie, Fla 34952 772-344-4252

			,	r						
Sample Chain	SP Lab	Lab	CAS#	Contam	Ext. Lab	Contaminant	Data	Result	Fecal	Units
of Custody	Group			tur-	Id#		Qual.		Result	
52 5 4275 7	2240						 		Result	
Sample#: 29710		SPWWTP		7		Specific Conductance	 	620		μmho/cm
Site: WP	F-4	SPWWTP		8		Temperature	1	25		°C
	Ext		7664-41-7	100		Nitrogen - Ammonia		34		mg/L as N
Loc: EFF-1	Lab	USBIOSYS		105		BioChemical Oxygen		3.2		mg/L
Type: C	Grps	USBIOSYS		106		Chemical Oxygen		50		mg/L
Code:		USBIOSYS	7727-37-9	117		Nitrogen - Total Organic		2.		mg org-N/L
		USBIOSYS	7723-14-0	124		Phosphorus - Total as		0.97		mg/L as
Collected By: JRP		USBIOSYS		129		Nitrogen-Total Kjeldahl		36		mg/L as N
Date: 2/27/2003		USBIOSYS		1925		pН		7.55		SU
Time: 1005		USBIOSYS		2064		2,3,7,8-TCDD (Dioxin) -	U	0		mg/L
Trans. By: JRP		USBIOSYS		3022		Chloroethane	U	0.3		mg/L
		USBIOSYS		3023		Chloroform		3		mg/L
		USBIOSYS		3024		Anthracene	U	0.98		mg/L
Date: 2/27/2003		USBIOSYS		3025		Butylbenzylphthalate	U	. 1.6		mg/L
Time: 1120		USBIOSYS		3026		Dimethylphthalate	U	0.86		mg/L
	السيب	USBIOSYS		3027		Naphthalene	U	0.75		mg/L
		USBIOSYS		3028		Phenanthrene	U	l		mg/L
		USBIOSYS		3029		Aldrin	U	0.012		mg/L
	1	USBIOSYS		3030		Dieldrin	U	0.0072		mg/L
		USBIOSYS		3031		2-Chlorophenol	V	4.7		mg/L
		USBIOSYS		3033		2,4,6-Trichlorophenol	U	4.8		mg/L
	1									
	1		I	1	1					1
	4		A						النبيي	

These test results meet all requirements of the NELAC Standards



RECEIVED

MAR 2 5 2003

UTILITY ENGINEERING DIVISION

Page: Page 1 of 3

Date: 03/07/2003

Log #: L73594-1

Client #: FTL-11-050102

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, FL 34983

Wes Upham

Analytical Report: 29710

Date Sampled: 02/27/03 Time Sampled: 10:05

Date Received: 02/28/03 11:25

Collected By: Client

Sample Description:

EFF-1 Westport

Parameter	Results	Units	Method	NDŁ	Extr. * Date	Analysis Date	Analyst
Total Toxic Organics (Volat	iles)						
Chloroethane	บ	<u>49/1</u>	524	0.30	***************************************		
Chloroform	3.0	ug/1	524		03/04 17:49	03/04 17:49	BL
Dilution Factor	1.0	-3/ -	524	0.12	03/04 17:49	03/04 17:49	BI,
Surrogate Recoveries:	-		524	π/e	03/04 17:49	03/04 17:49	ar
Dibromofluoromechane	150	¥	624	C2 46#	A. (a		
Toluene-D8	127	,	624	52-155	, 11:49	03/04 17:49	BL
4-Bromofluorobenzene	93.0	E	624	47-154	.,	03/04 17:49	BL.
	,0	•	0.25	36-138	03/04 17:49	03/04 17:49	BL
Total Toxic Organics (Semivo	(latiles)						
N-Nitrosodimethylamine	บ	ug/1	6.25	1.2	37/04 00 00		
Phenol	U	ug/1	5.35	5.2	03/04 08:00	03/05 09:26	LN
Bis(2-Chloroethyl) Ether	Ü	ua/1	625	0.75	03/04 08:00	03/05 09:26	ΞN
2-Chlorophenol	ŭ	uq/1	605	4.7	03/04 08:00	03/05 09:26	LD
1,3-Dichlorobenzene	บ	ug/l	62:5	9.67	03/04 08:00	03/05 09:26	LN
1,4-Dichlorobenzene	บ	ug/1	625	0.73	93/04 08:00	03/05 09:26	LN
1,2-Dichlorobenzene	ប	ນໆ/1	625	· · ·	03/04 09:00	03/05 09:26	LN
Bis(2-Chloroisopropyl) Ethe	Ü	ug/1	575	0.52	03/04 08:00	03/05 09:26	1.17
N-Nitrosodi-n-propylamine	U	ug/l	525	0.97	G3/04 08:05	03/05 09:26	LN
Hexachloroethane	บ	ug/1	625	0.79	03/04 08:00	03/05 09:26	LN
Nitrobenzene	Ü	ug/l	625	0.65	03/64 08:00	03/05 09:26	1.N
Isophorone	ម	na/1	- -	0.64	03/04 68:00	03/05 09:26	ΞN
2-Nitrophenol	บ	ug/1 ug/1	625	0.74	63/04 OB:00	03/05 09:26	LN
2.4-Dimetnylphenol	บ	•••	525	5.2	03/04 09:00	03/05 09:26	I.N
Bis(2-Chloroethoxy)methane	Ü	ug/1	625	5.4	03/04 02:00	03/05 09:26	LN
2.4-Dichlorophenol	ម	ug/1	625	0.75	03/04 08:00	03/05 09:26	LN
1,2,4-Trichlorobenzene	5	ug/l	625	5.7	03/04 08:00	03/05 09:26	LIR
Naphthalene	-	ug/l	€25	9.72	03/04 G8:00	03/05 09:26	TK
Hexachlorobut adiene	ũ	ug/1	625	9.75	03/04 08:00	03/05 09:26	LN
4-Chloro-3-Methylphenol	บ 	ug/1	625	0.73	03/04 08:00	03/05 69:26	LN
	ឋ	л д / <u>Г</u>	623	5.1	03/04 08:00	03/05 09:26	LN

70100 ON HED INFO TER OUTGINGIO

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, FL 34983

Wes Upham

Sample Description:

EFF-1 Westport Page: Page 2 of 3 Date: 03/07/2003 Log #: L73594-1

Analytical Report: 29710
Date Sampled: 02/27/03

Time Sampled: 10:05
Date Received: 02/28/03 11:25

Collected By: Client

Danama					Extr.	Analysis	
Parameter	Results	Units	Method	MDL	Date	Date	Analyst
Total Toxic Organics (Semi-	volatiles)	(continue	•d)				•
Hexachiorocyclopentadiene	U	uq/1	625	0.77	03/04 08:00		
2,4,6-Trichlorophenol	U	ug/1	625	4.8	03/04 08:00	03/05 09:26	LN
2-Chloronaphthalene	U	ug/I	€25	0.74	03/04 08:00	03/05 09:26	LN
Dimethylphthalate	ט	ug/1	625	0.86	03/04 08:00	03/05 09:26	LN
2.6-Dinitrotoluene	บ	ug/l	625	1.3	03/04 08:00	03/05 09:26	LN
Acenaphthylene	U	ug/l	625	0.80	03/04 09:00	03/05 09:26	LN
Acenaphthene	ช	ug/l	625	0.00	03/04 08:00	03/05 09:26	LN
2,4-Dinitrophenol	ນ	ug/1	625	6.2	03/04 08:00	03/05 09:26	LN
2, ¢-Dinitrotoluene	U	ug/l	625	1.3	03/04 08:00	03/05 09:26	iМ
(-Nitrophenol	U	ug/l	625	5.1	03/04 08:00	03/05 09:26	in
Diethylphthalate	υ	ug/i	625	1.1	03/04 08:00	03/05 09:26	N.I
Fluorene	נו	uq/1	525	0.97	03/04 09:00	03/05 09:26	LN
4-Chlorophenyl-phenylether	ប	ug/l	525	0.94	03/04 08:00	03/05 09:26	LN
4,6-Dinitro-2-Methylphenol	ซ	ug/1	525	4.3	03/04 08:00	03/05 09:26	LN
N-Nitrosodiphenylamine	U	ug/1	i 2 5	1.1	03/04 08:00	03/05 09:26	LN
4-Bromophenyl-phenylether	tī	ug/l	125	1.2	03/04 08:00	03/05 09:26	LN
Hexachlorobenzene	t	ug/1	125	1.4	03/04 08:00	03/05 09:26	I.N
Pentachlorophenol	ਹ	ug/l	625	8.5	03/04 08:00	03/05 09:26	LN
Anthracene	บ	ug/l	625	0.58	03/04 08:00	03/05 09:26	T.W
Phenanthrene	IJ	ug/1	425	1.0	03/04 08:00	03/05 09:26	LN
Di-N-Butylphthalate	U	ug/1	625	1.4	03/04 08:00	03/05 09:25	TN
Fluoranthene	ប	ug/1	625	1.1	03/04 08:00	03/05 09:26	EN
Pyrene	ប	ug/i	£ 25	0.37	03/04 08:00	03/05 09:26	LN
Butylbenzylphchalate	ប	ug/l	€ 25	1.6	03/04 08:00	03/05 09:26	īn
Benzo(a) anthracene	ប	ug/l	£ 25	1.3	03/04 08:00	03/05 09:26	LN
3,3'-Dichlorobenzidine	บ	ug/1	625	6.6	03/04 08:00	03/05 09:26	LN
Chrysene	ט	ug/1	€25	0.36	03/04 08:00	03/05 09:26	LN
Bis(2-Ethylhexyl)Phthalate	U	uq/1	625	2.5	03/04 08:00	03/05 09:25	LN
Di-N-Octylphthalate	U	ug/1	625	1.8	03/04 08:00	03/05 09:26	LN
Benzo(b)fluoranthene	υ	ug/1	625	1.2	03/04 08:00	03/05 09:26	LN
Benzo(k) fluoranthene	u	ug/l	625	1.2	03/04 08:00	63/05 09:26	LN
Benzo(a) pyrene	Ü	ug/1	625	1.4		03/05 09:25	ĹN
Indeno(1,2,3-cd)pyrene	υ	ug/1	£25	1.9	63/04 08:00	03/05 09:26	LN
Dibenzo (a, h) Anthracene	ซ	ug/1	625	2.1	63/04 08:00	03/05 09:26	LR
Benzo(g,h,i)perylene		ug/l	625	2.0	03/04 08:00	03/05 09:26	LN
Benzidine	ซ	ug/1	6 25 5 25	2.0	03/04 08:00	03/05 09⋅2€	LN
1,2-Diphenylhydrazine	ប	3g/l	5.25 6.25		03/04 08:00	03/05 09:26	LN
2,3.7,8-TCDD (Dioxin Scan)	Ü	ug/1	6.35	0.35	03/04 08:00	03/05 09:26	LN
Dilution Factor	1.5	48/ +		n/e	03/04 08:06	03/05 09:26	ĹN
.	• . •		6.15	n/e	03/04 09:00	03/05 09:26	LN

Address: City of Port St. Lucie

900 E. Ogden

Port St. Lucie, FL 34983

Wes Upham

Page: Page 3 of 3 Date: 03/07/2003

Log #: L73594-1

Sample Description:

EFF-1 Westport Analytical Report: 29710

Date Sampled: 02/27/03 Time Sampled: 10:05

Date Received: 02/28/03 11:25

Collected By: Client

Parameter	Results	Units	Method	MDL	Extr. Data	Analysis Date	Analyst
Total Toxic Organics (Semi-	olatiles)	(continue	a)				
Surrogate Recoveries:	-						
2-Fluorophenol	30.0	ę	625	10-115	03/04 D8:00	00/	
Phenol-d5	17.0	*	625	10-137	03/04 08:00	03/05 09:26	LN
Nitrobenzene-d5	40.0	*	625	28-128	03/04 08:00	03/05 09:26	LN
2-Fluorobiphenyl	58.0	ş	625	45-126	03/04 08:00	03/05 09:26	IN
2.4.6-Tribromophenol	70.0	*	625	51-134	03/04 08:00	03/05 09:26	LN
Terphenyl-d14	72.0	ŧ	525	30-146	03/04 08:00	03/05 09:26 03/05 09:26	ln Ln
Total Toxic Organics (Pest/	PCB)						
Aldrin	U	29/1	508	C.01Z	23 (07 24 45		
Dieldrin	II.	uq/1	508	0.012	93/03 31:45	03/06 10:02	ΑW
Dilution Factor	1.0	-3	508	n/e	03/03 11:45	03/05 10:02	AИ
Surrogate Recoveries:			330	11/6	03/03 11:45	03/06 15:02	WA
TCMX	66.0	왐	-50e	41-153	03/03 11:45	0.0 40.0	
Decachlorobiphenyl	68.0	ş-	508	31-170	03/03 11:45	03/06 10:02 03/06 10:02	aw aw
Inorganics/Other	·						
BOD	3.2	mg/L	495.1	2.0	02/28 16:00	03/05 16:00	ĸc
General Chemistry							
Ammonia as N	34	mg/1	355.1	0.040	03/05 12:38	03 (av. av. av.	
Chemical Oxygen Demand	50	mg/l	410.4	8.8	03/05 14:50	03/05 12:38	MG
Organic Nitrogen as N	2.0	n:g/1	(alc	0.50		G3/05 14:00	IG.
Total Phosphorus as P	0.37	mq/1	365.1	0.0081	03/07 16:00 03/05 16:30	03/07 16:00	нн
Total Kjeldahl Kitrogen as	36	mg/1	351.2	1.2	03/06 08:00	03/06 14:20 03/07 13:16	MA MA

All analyses were performed using BPA. ASTM, NIOSH, USGS, or Standard Methods and certified to meet NELAC requirements. Flags: ADL or U-below reporting limit: DL-diluted out; IL-meets internal lab limits; MI-matrix interference: NA-not appl. Flags: CFR-Pb/Cu rule; ND-non detect(RL estimated): NFL-no dree liquids; dw-dry wt; ww-wet wt; C(#)-see attached USB code FLDEP Flags: J(#)-estimated l:surr. fail 2:no known QC req 3:QC fail %R or %RPD; 4:matrix int. 5:improper fld. protocol FLDRP Flags: L-exceeds calibration, Q-holding time exceeded. T-value < MDL, V-present in blank FLDEP Flags: Y-improper preservation, B-colonies exceed range; I-result between MDL and PQL

QAP# 980126

DOH# E85240

NO CERTE 444

Respect@lly submitted,

SUB DOH# 86122,86105,E86048 ADEM IDm 40650 SC CERT# 95031601

TN CERT# C2985

IL CERT# 200020

USACE

GA CERT# 917

VA CERT# 00395

USDA Soil Permit# S-35240

LouAnn Jones Project Manager

Envirodyne Inc.

RECEIVED

AUG 0 7 2003

4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

ARCADIS.

CERTIFICATE OF ANALYSIS

ARCADIS 712 U.S. Highway One Suite 200 North Palm Beach, FL 33408

July 30, 2003 Report: 2003/07543

Sample No: 2003/07543- 1

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

Collected on: 07/28/03 SAMPLE ID: MW-1 Lower Zone Collected by: Dagoberto Penate Received on: 07/28/03

PARAMETER RESULT METHOD DLUNITS DATE ANALYST Fecal Coliform Bacteria <1 SM9222D 1 cfu/100 ml 07/28/03 **JGT** Fecal Coliform Date & Time Sampled: 07/28/03 14:02 Fecal Coliform Date & Time Analyzed: 07/28/03 16:42 pH (Field) 7.5 150.1 pH Units 07/28/03 DP **Total Coliform Bacteria** <1 SM9222B 1 cfu/100 ml 07/28/03 **JGT** Total Coliform Date & Time Sampled: 07/28/03 14:02 Total Coliform Date & Time Analyzed: 07/28/03 16:50 °C Temperature 30.8 170.1 07/28/03 DP

Envirodyne Inc.

4805 N.W. 2nd Avenue Boca Raton, FL 33431 561-989-5225

CERTIFICATE OF ANALYSIS

ARCADIS

712 U.S. Highway One Suite 200 North Palm Beach, FL 33408 July 30, 2003

Report: 2003/07543 Sample No: 2003/07543- 2

Attention: Michael J. Waldron, P.G.

Project: PF001153.0003 RMA Westport WWTP

Port St. Lucie, FL

SAMPLE ID: MW-1 Upper Zone

Collected by: Dagoberto Penate

Collected on: 07/28/03 Received on: 07/28/03

DP

PARAMETER	RESULT	METHOD	DL	UNITS	DATE	ANALYST
Fecal Coliform Bacteria	<1	SM9222D	1 cfu	/100 ml	07/28/03	JGT
Fecal Coliform Date & Time Samp Fecal Coliform Date & Time Analy	led: 07/28 zed: 07/28	3/03 14:10 3/03 16:42				
pH (Field)	7.8	150.1	р	H Units	07/28/03	DP
Total Coliform Bacteria	<1	SM9222B	1 cfu	/100 ml	07/28/03	JGT
Total Coliform Date & Time Sample Total Coliform Date & Time Analyz						

170.1

cfu = Colony forming units

Temperature

Analysis contained herein conform to EPA, Standard Methods and DEP approved methods. Subcontracted analyses are denoted by certification number in the analyst column. All relevant quality assurance samples were within specified control limits unless otherwise stated. Uncertainties for test results are available upon request. Envirodyne certifies that its test results meet all requirements of the NELAC standards, where applicable. For questions, please call the project manager at the number listed above.

30.0

This is the last page of the report. See bottom of page for total pages.

Project Manager

Quality Assurance Officer

°C

07/28/03

Envirodyne Inc.

CHAIN OF CUSTODY RECORD

ANALYSIS REQUEST

4805 NW 2nd Avenue • Boca Raton, FL 33431 (800) 713-7737 • Fax (561) 989-5204

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ARCADIS

Appendix I

Fluid-Compatibility Evaluation

FLUIDS REVIEW

Chemical Characterization of the Water Samples

Table 1 presents constituent concentrations in a typical sample of secondarily-treated domestic effluent (wastewater) as provided by Harbor Branch Environmental Laboratory. Table 2 presents constituent concentrations in a typical sample of injection zone receiving water from North Martin County IW1. These tables present the concentrations in the form used in the simulations. This data was used to predict the compatibility of these waste streams with the injection zone fluids and minerals in the injection and confining zones.

The data presented in these tables presents composited results from multiple analyses. The original analytical data was generated to satisfy Underground Injection Control (UIC) regulatory requirements rather than defining the macro-constituents typically needed for satisfactory modeling (such as the PHREEQC program).

Model Simulations and Results

Table 3 presents a summary of the parameters used and a subset of the pertinent results from the several simulations performed. The US Geological Survey program, PHREEQC, was used in performing these simulations. These several simulations represent the mixing of the waste stream and its equilibration with atmospheric pressure carbon dioxide, equilibration with carbon dioxide at down-well pressures, interaction with dolomite and limestone, and mixing with the injection zone water. Examination of simulation 1, the ambient pressure equilibration of carbon dioxide with the irrigation re-use waste streams, shows results similar to what has been found in past work. This waste stream may be expected to desorb carbon dioxide. This shifts the basic equilibriums, leading to a more basic pH, additional carbonate mineral forms at the expense of the more soluble bicarbonates, and a tendency to precipitate dolomite and calcite. The significance of this conclusion will depend upon how much interaction exists between this waste streams and air.

Pumping the mixed stream down to the injection zone increases the pressure and, therefore, the partial pressure of carbon dioxide. This reverses much of the trends observed in the first simulations. This situation is examined in simulation 2 where the increased $P_{\rm CO_2}$ (partial pressure of carbon dioxide) results in adsorption. The fundamental equilibriums again shift leading to a slightly acidic pH, the transition from carbonates to the more soluble bicarbonates, and a definite tendency to keep dolomite and calcite in solution. Since the calcite and dolomite saturation indices are now negative, the dissolution of these minerals by injection is possible.

This last point is explored further in simulations 3 and 4 where the wastewater is equilibrated with calcite and dolomite, respectively. When using the program PHREEQC to perform such equilibration calculations, it expects that the equilibrium phase saturation index (SI) be defined. The values used will certainly impact the results.

Positive values of saturation index indicate a tendency to precipitation while negative values predict dissolution. A saturation index of 0 indicates equilibrium between dissolution and precipitation mechanisms; resulting in a net transfer between phases of 0. It is, therefore, logical to examine simulations with the equilibrium phase set to an SI of 0. Previous work with modeling of similar streams has shown that using an SI of 0 leads to an "unnatural" situation in which significant changes in pH and "moles transferred" occur to establish what is supposed to be an equilibrium state.

An alternative approach is to base the equilibrium phases upon the SIs calculated in model 2. This approach is used in simulations 3 and 4 and is intended to see if a situation of little interaction between the injected waste stream and the solid minerals can be attained.

Simulations 3 and 4 demonstrate that this is the most likely state. Any changes in pH are unlikely to be observed on any field grade instrument. Additionally, there is very little movement of calcite and dolomite between phases despite the negative values used for saturation indices in the equilibrium phases. This is seen in the "mole transfer" column in which minor quantities, on the order of micrmoles, of calcite and dolomite are predicted to prepcipitate.

Finally, the interaction between the injected mixed waste stream and the receiving groundwater must be examined. This is found in a comparison between simulations 5 and 6. Simulation 5 examines the receiving water in the presence of the increased P_{CO2} found downwell. As with the injected waste stream, simulation 2, carbon dioxide is adsorbed with the natural water's pH remaining basic. This simulation indicates that calcite and dolomite precipitate from this receiving water even in the absence of external influences. Finally, simulation 6 mixes the injected waste stream with the receiving water in a ratio of 1 to 2. This mixing has little impact. The pH remains basic. The predicted saturation indices for calcite and dolomite are essentially unchanged.

The conclusions reached from this study predict that this waste stream may be safely disposed of by injection. This process has little to no impact upon the receiving water and the underlying geology.

Table 1. Summary of Model Parameter Values for Domestic Wastewater

Parameter	Concentration/Value	Units
pН	7.02	pH units
Temperature	25	Degrees Celsius
Ca	110	mg/L
Mg	100	mg/L
Na	136	mg/L
Ba	0.008	mg/L
SO ₄	91.1	mg/L
F	1.4	mg/L
Ç1	231	mg/L
Alkalinity	40 as CaCO ₃	mg/L

[&]quot;mg/L" denotes concentration reported in units of milligrams per liter.

Table 2. Summary of Model Parameter Values for Receiving Water (Groundwater)

Parameter	Concentration/Value	Units
pН	8.3	pH units
Temperature (°C)	25.0	Degrees Celsius
Ca	1,056	mg/L
Mg	658	mg/L
Na	10,800	mg/L
SO ₄	2,530	mg/L
K	295	mg/L
Fe	16.1	mg/L
Cl	18,800	mg/L
HCO ₃	7,247	mg/L

[&]quot;mg/L" denotes concentration reported in units of milligrams per liter.

Table 3. Simulation Conditions and Selected Results from USGS PHREEQC

Model	Mix ¹	Water ²	Equilibrium Phases								
			logP _{CO2}	Saturation Index ³		Saturation Index		Calculated	Mole transfer (millimoles)		
				Calcite	Dolomite	Calcite	Dolomite	рН	CO ₂	Calcite	Dolomite
1		IR	-3.5			0.24	0.79	8.114	-0.156		
2		IR	-1.5			-1.7	-3.09	6.144	1.089		
3		IR	-1.5	-1.7			-3.09	6.143	1.088	-0.0009	
4		IR	-1.5		-3.1	-1.7		6.141	1.086		-0.0013
5		RW	-1.5			2.74	5.69	8.14	3.809		0.0015
6	7:10::3:5					2.57	5.34	8.177			

- 1. The terminology "k:#x::1:#y" means k parts of model x plus l parts of model y
- 2. IR is the Domestic Effluent (Wastewater) described in Table 1
- RW is the "receiving water," the groundwater present prior to injection described in Table 2

 3. The use of equilibrium phases in the USGS model PHREEQC requires that the saturation index be specified. The values used in models 3 and 4 are based upon the results obtained with model 2.