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~~
189145-001-UC

PREPARED FOR

City of Port St. Lucie

ARCADIS

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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Date: 8/25/03

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Operational Testing Request

Westport Class I Injection-Well
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Permit No. 189145-001-UC

8-29-03

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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.

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*".

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 (750-2030 feet bpl)
Avon Park Formation (1260–2520 feet bpl)	Upper to Middle Eocene (1260–2520 feet bpl)	Middle and Lower Floridan Confining Units (2030-2900 feet bpl)
Oldsmar Formation (2520->3450 feet bpl)	Lower Eocene (2520->3450 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 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 Packer™). The annular space was filled with a one percent solution of a commercially-available corrosion inhibitor (Baracor-100™) 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 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 lower zone tubing) and was relatively steady, varying from 4.67 to 4.82 psi during pre-injection 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 pre-injection, 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 Hermit™ 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 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 Hermit™ 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 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:

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 re-submitted 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 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.

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 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.

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.

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/ft^2 (or 2.6 x 10^{-4} centimeters per second [cm/sec]) from Straddle-Packer Test PT-3 and 129 gpd/ft^2 (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/ft^2 (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/ft^2 (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.

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	4.04E-08	2.91E-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		2890.0 - 2,903.0	2,892.7-2,896.7	2.89E-07	1.50E-07

"cm/sec" denotes centimeters per second.
*" * " 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).*

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 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 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.

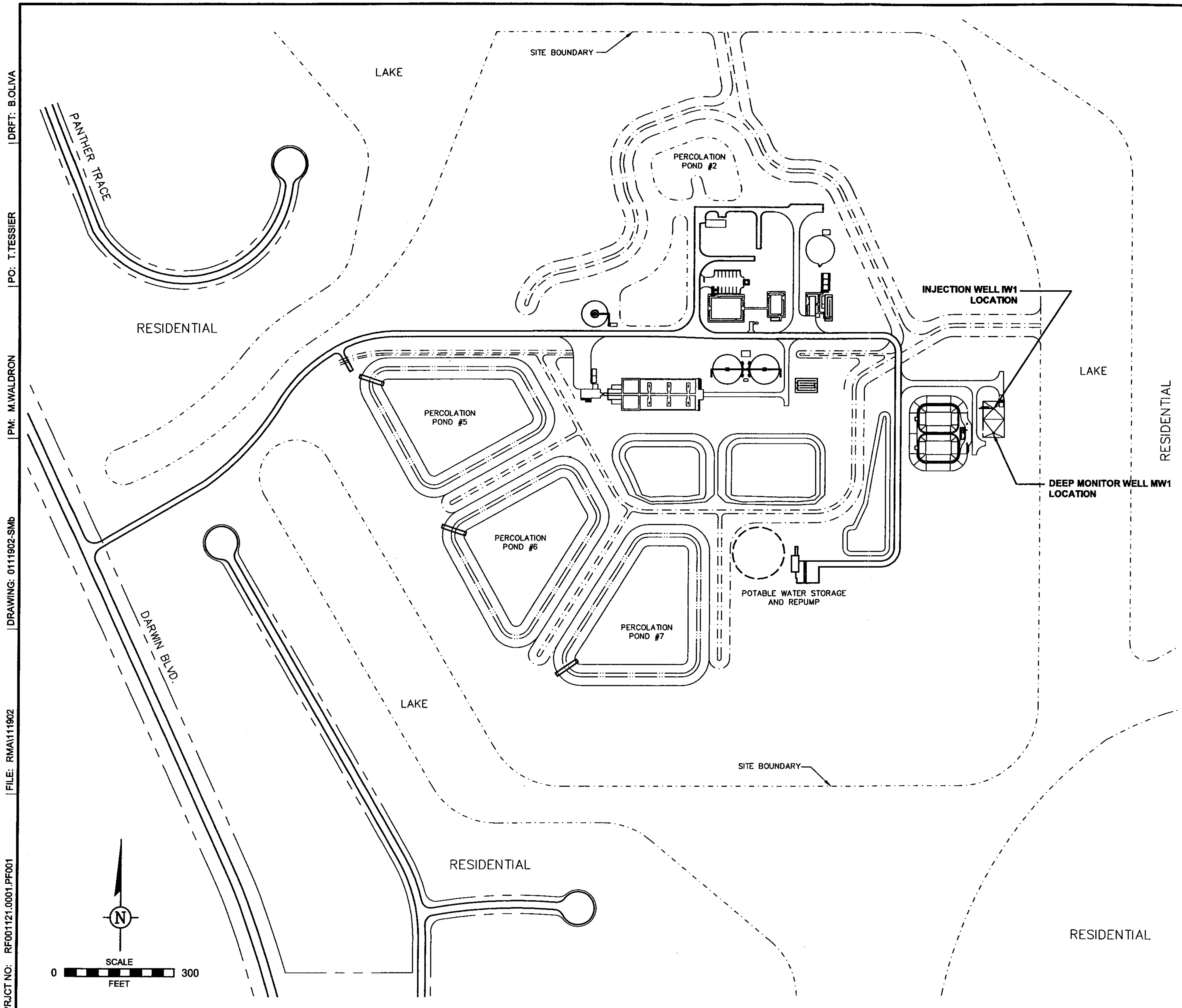
As referenced above, prior to beginning the injection test, the source water was sampled. A state-certified analytical laboratory collected a water sample from the onsite lake. Analyses of the lake-water supply for the test previously were submitted as Appendix D of the ARCADIS *Injection Test Request*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

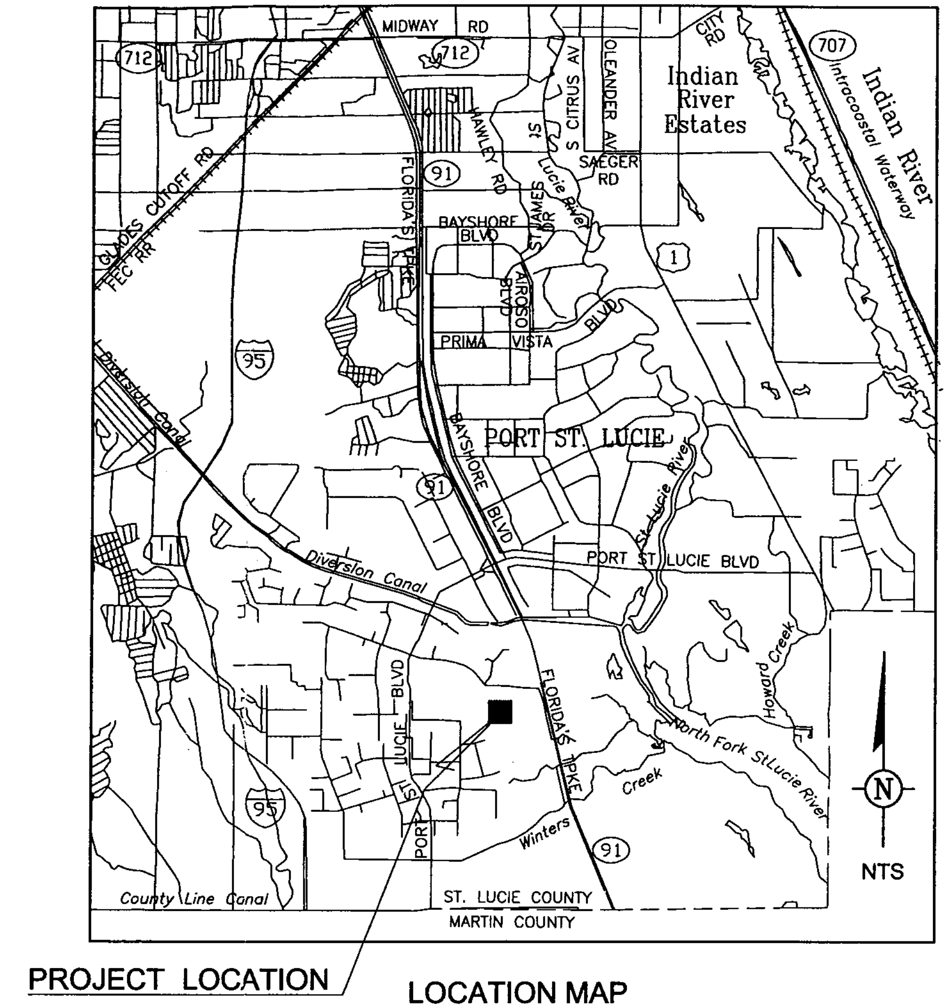
Westport WWTP secondarily-treated effluent, including constituents listed as Primary and Secondary Drinking Water Standards and municipal minimum-criteria parameters, also are included in Appendix H.

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 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.





LOCATION MAP

SOURCE: Reese, Macon & Associates, Inc.

DRFT: B.OLIVA | PO: T.TESSIER | PM: M.WALDRON | DRAWING: 0111902-SMb | FILE: RMA111902 | PRJCT NO: RF001121.0001.PF001 | DATE: 25AUG0303

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712 U.S. HIGHWAY ONE, SUITE 200
NORTH PALM BEACH, FLORIDA 33408
Tel: 561.881.0077 Fax: 561.881.0012

NO.	DATE	REVISION DESCRIPTION	CHKD.

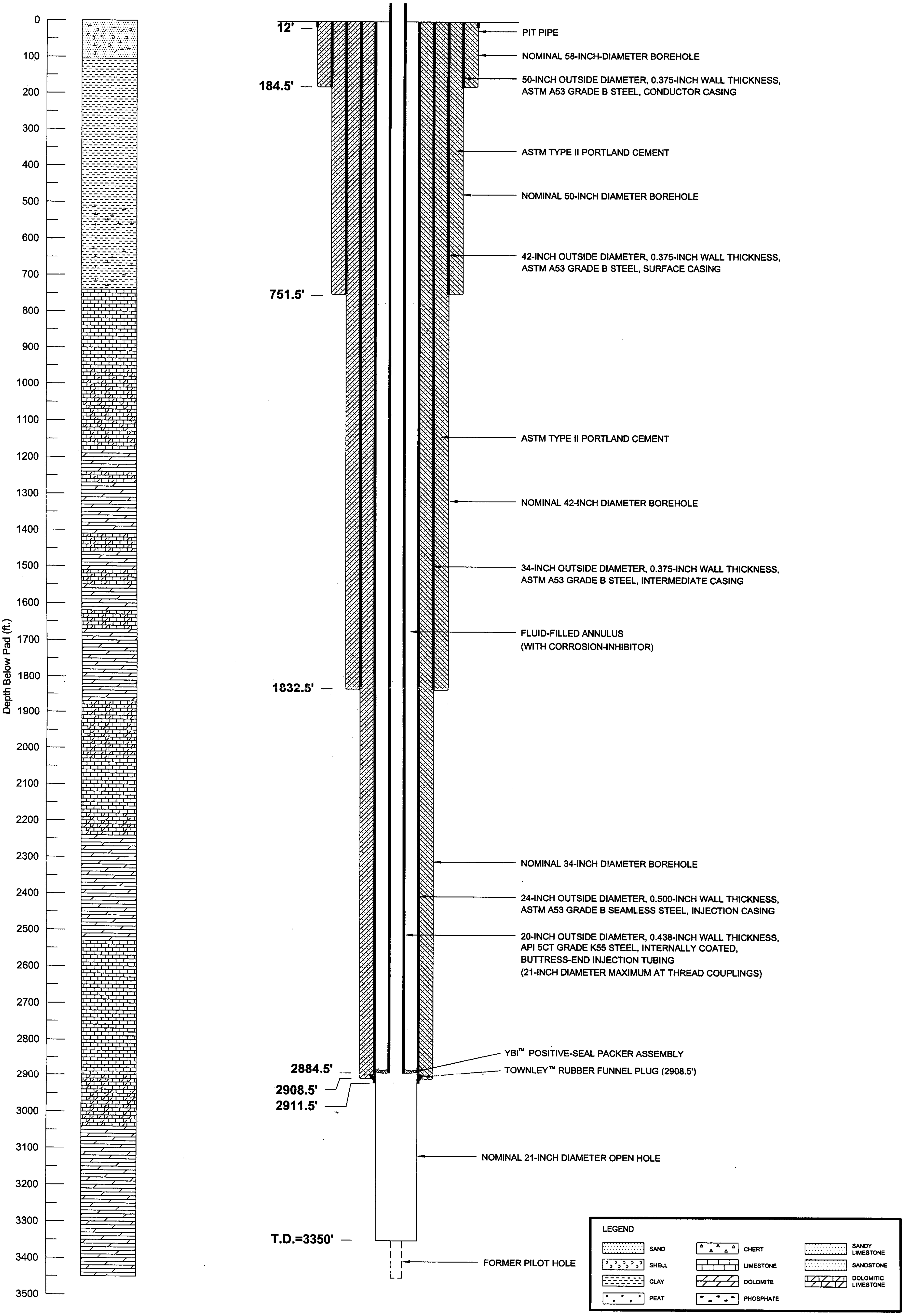
SITE LAYOUT SHOWING INJECTION WELL IW1 AND DEEP MONITOR WELL LOCATIONS

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

FIGURE

1

DATE: 30JUL03 | PRJCT NO: PF001153.0003 | FILE: RMA\111902 | DRAWING: 0111902-IW1 | PM: M.WALDRON | PO: T.TESSIER | DRFT: B.OLIVA



Drawing not to scale

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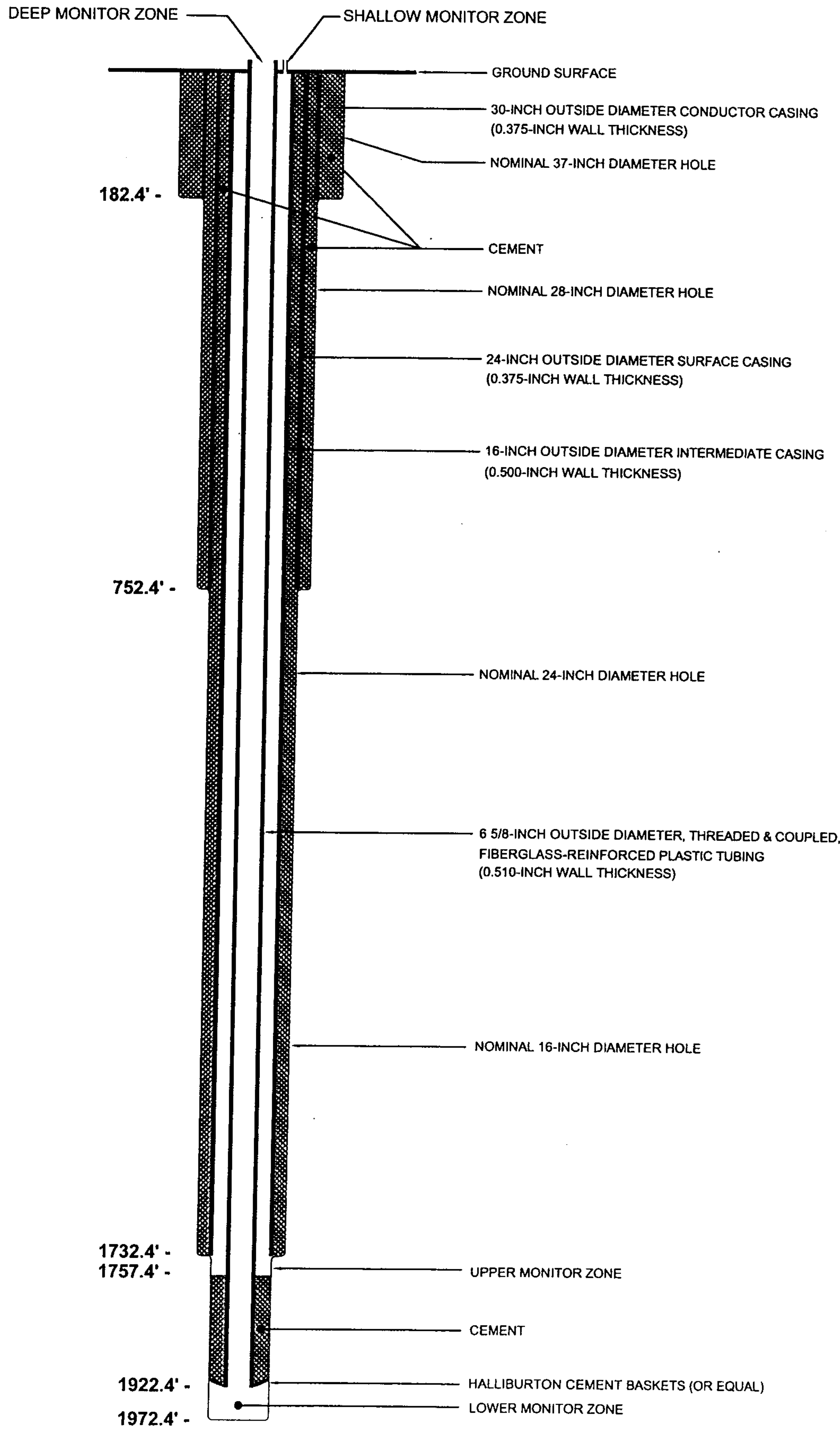
INJECTION WELL IW1
CONSTRUCTION DETAIL

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

FIGURE
2



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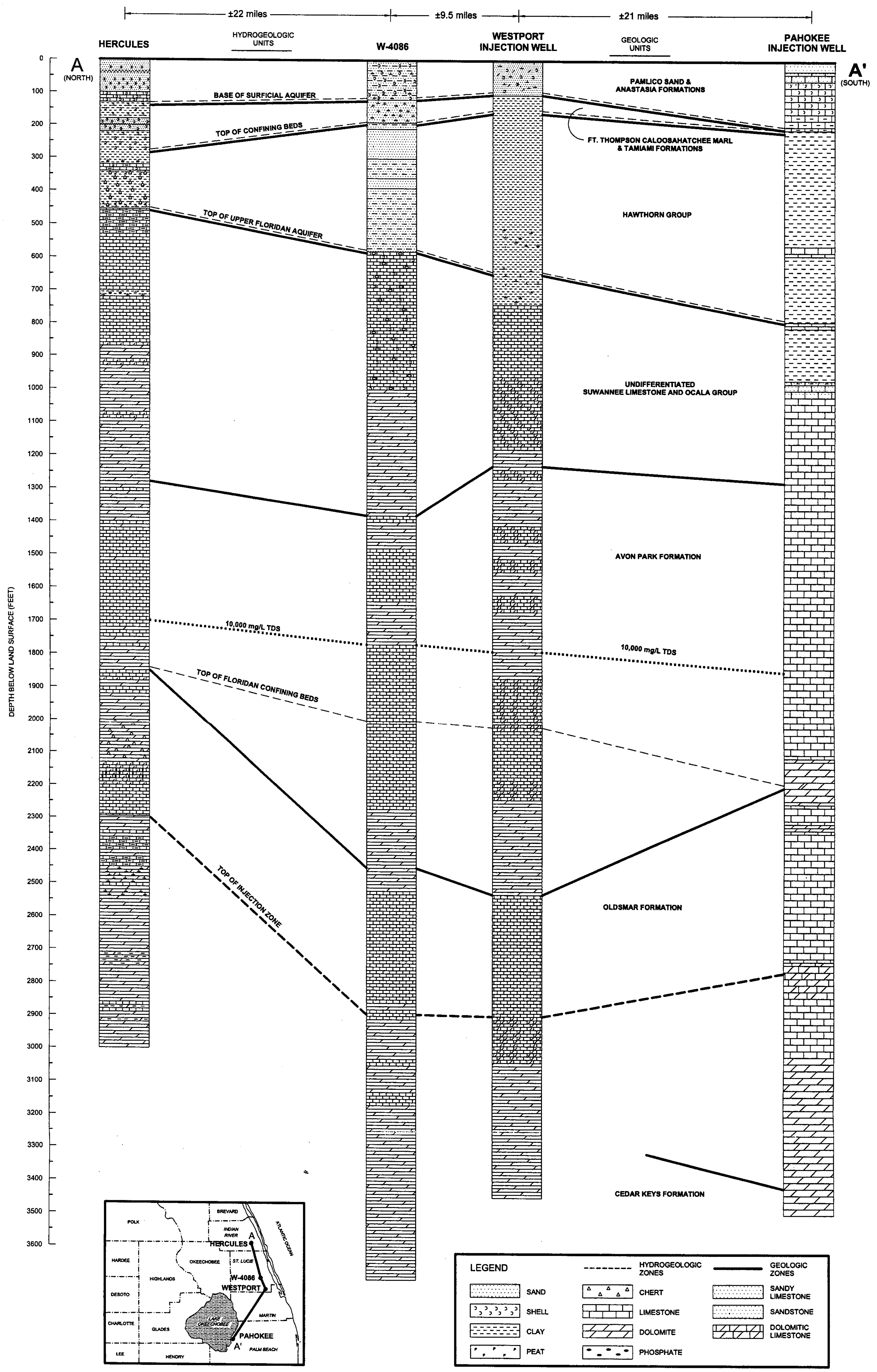
DEEP MONITOR WELL MW1
CONSTRUCTION DETAIL

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

FIGURE
3

DRFT: B.OLIVA | PO: T.TESSIER | PM: M.WALDRON | DRAWING: 0111902-DMW | FILE: RMA\111902 | PRJCT NO: RF001121.0001.PF001 | DATE: 30JUL03



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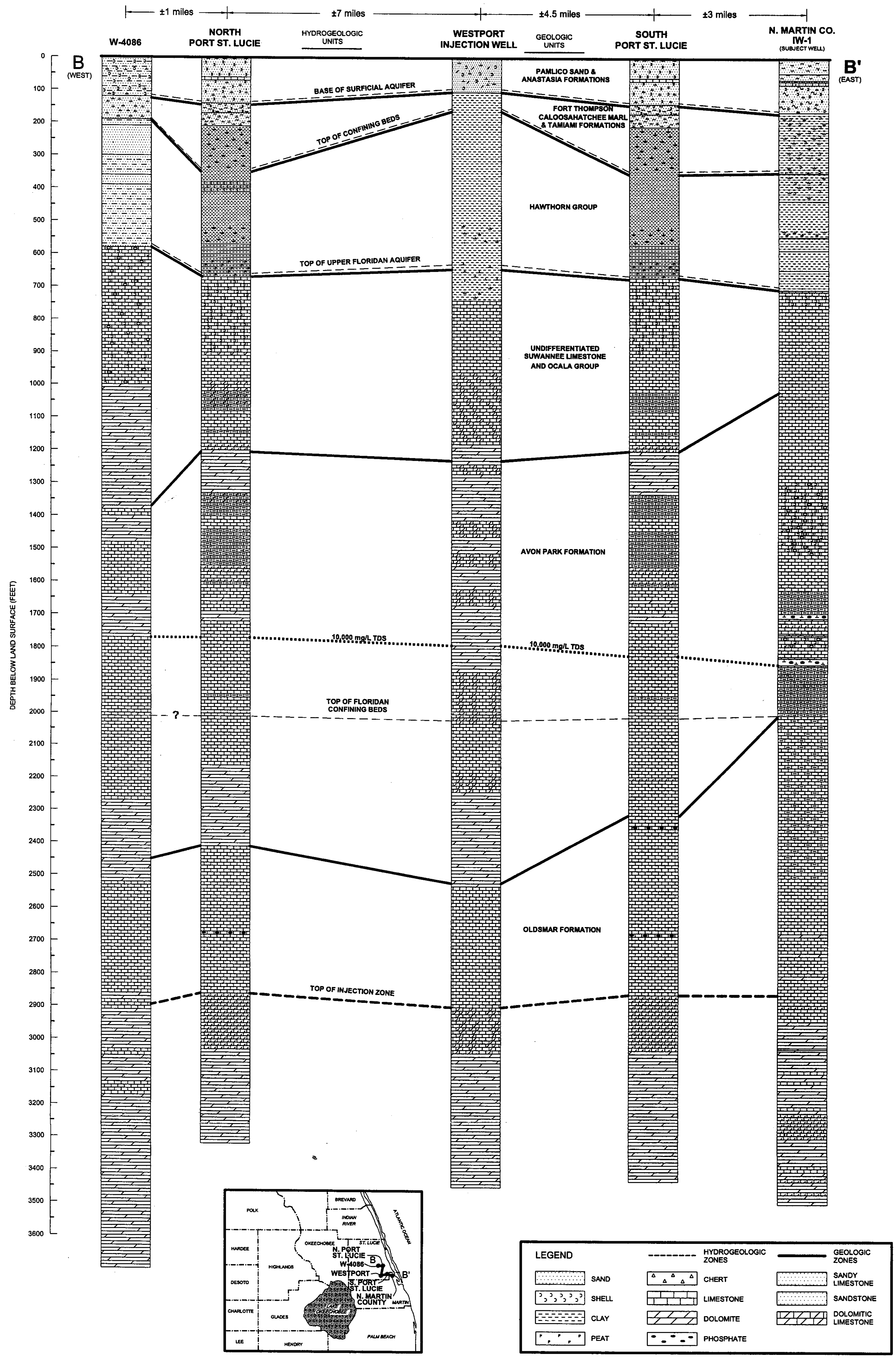
NO.	DATE	REVISION DESCRIPTION	CHKD.

NORTH-SOUTH HYDRO-STRATIGRAPHIC CROSS SECTION

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

FIGURE 4

DATE: 28JUL03 | PRJCT NO: RF001121.0001.PF001 | FILE: RMA\111902 | DRAWING: 0111902-NSWE Cross Sections | PM: M.WALDRON | PO: T.TESSIER | DRFT: B.OLIVA



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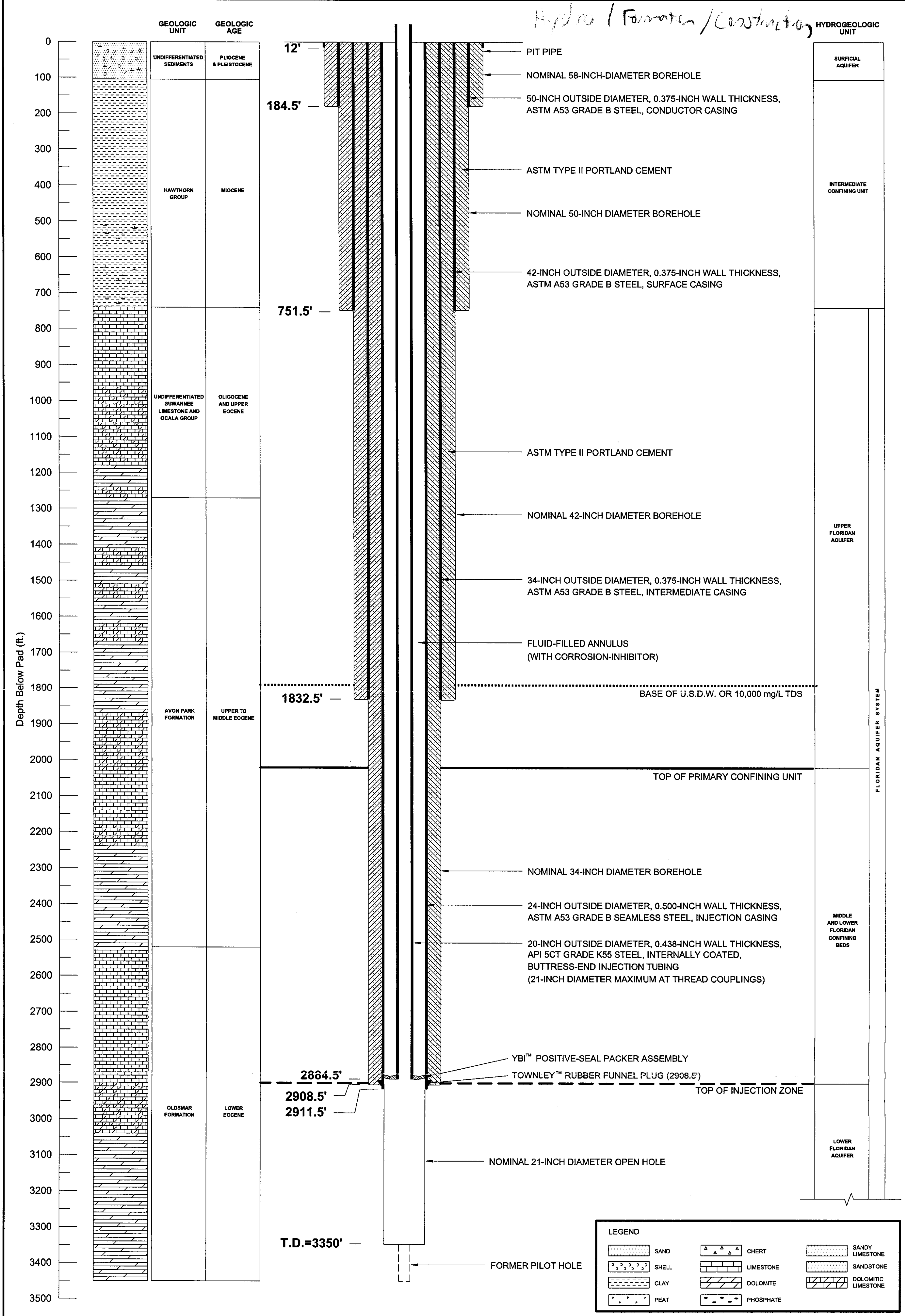
WEST-EAST HYDRO-STRATIGRAPHIC CROSS SECTION

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

FIGURE
5

DATE: 29AUG03 | PRJCT NO: RF001121.0001.PF001 | FILE: RMA\111902 | DRAWING: 0111902-IW1 | PM: M.WALDRON | PO: T.TESSIER | DRFT: B.OLIVA

Hydro / Formation / Construction



Drawing not to scale

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NO.	DATE	REVISION DESCRIPTION	CHKD.

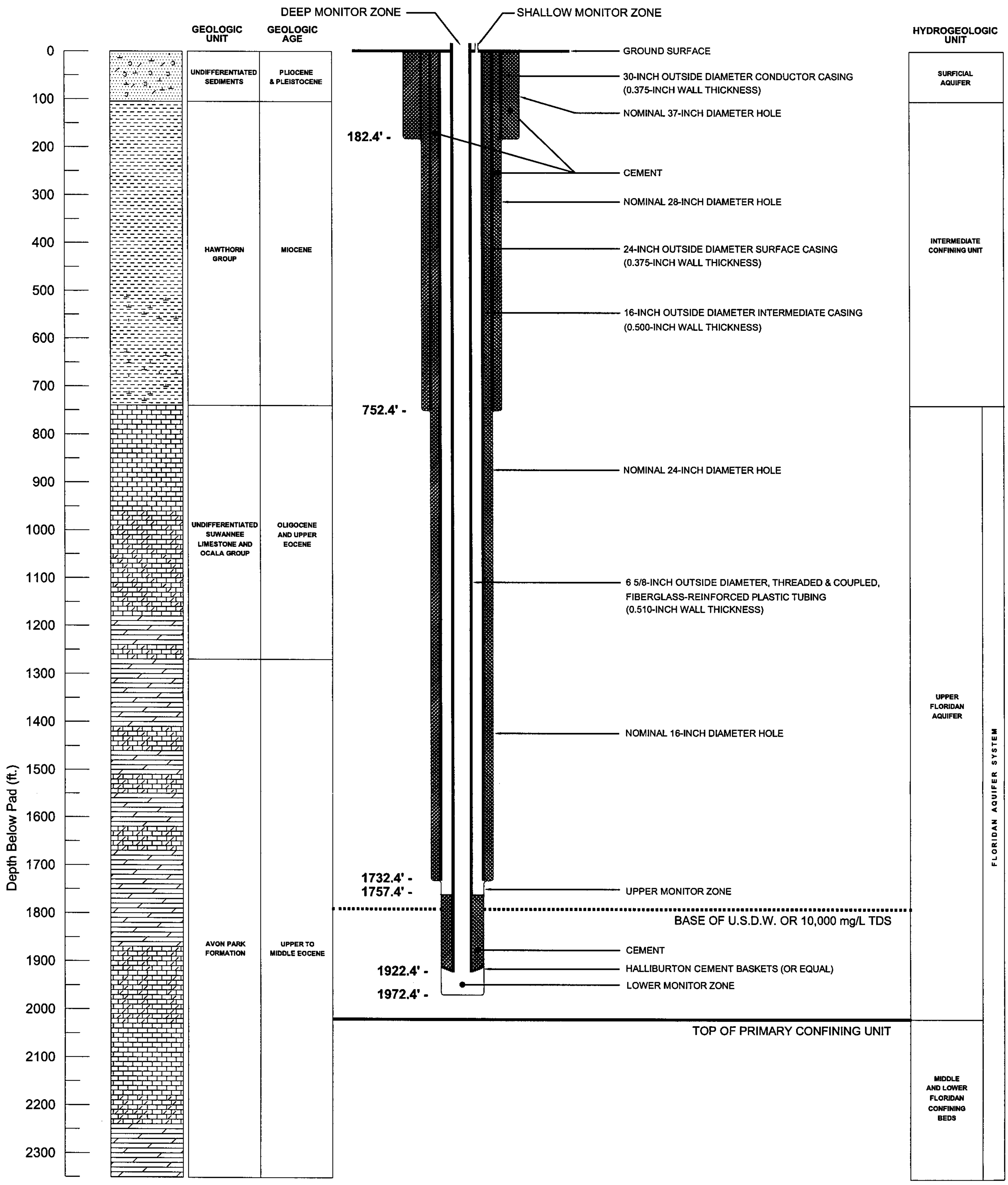
INJECTION WELL DIAGRAM WITH GEOLOGIC AND HYDROGEOLOGIC COLUMNS

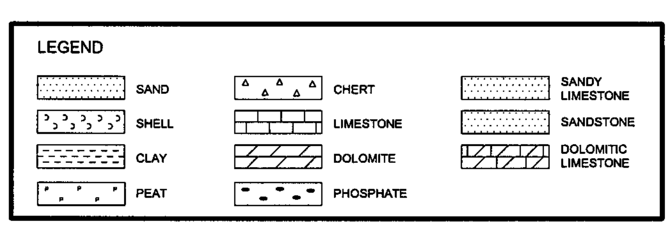
CITY OF PORT ST. LUCIE
WESTPORT WASTEWATER TREATMENT PLANT
ST. LUCIE COUNTY, FLORIDA

FIGURE 6

DATE: 29AUG03 | PRJCT NO: RF001121.0001.PF001 | FILE: RMA\111902 | DRAWING: 0111902-DMW | PM: M.WALDRON | PO: T.TESSIER | DRFT: B.OLIVA

Construction





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NO.	DATE	REVISION DESCRIPTION	CHKD.

DEEP MONITOR WELL DIAGRAM WITH GEOLOGIC AND HYDROGEOLOGIC COLUMNS

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

FIGURE

7

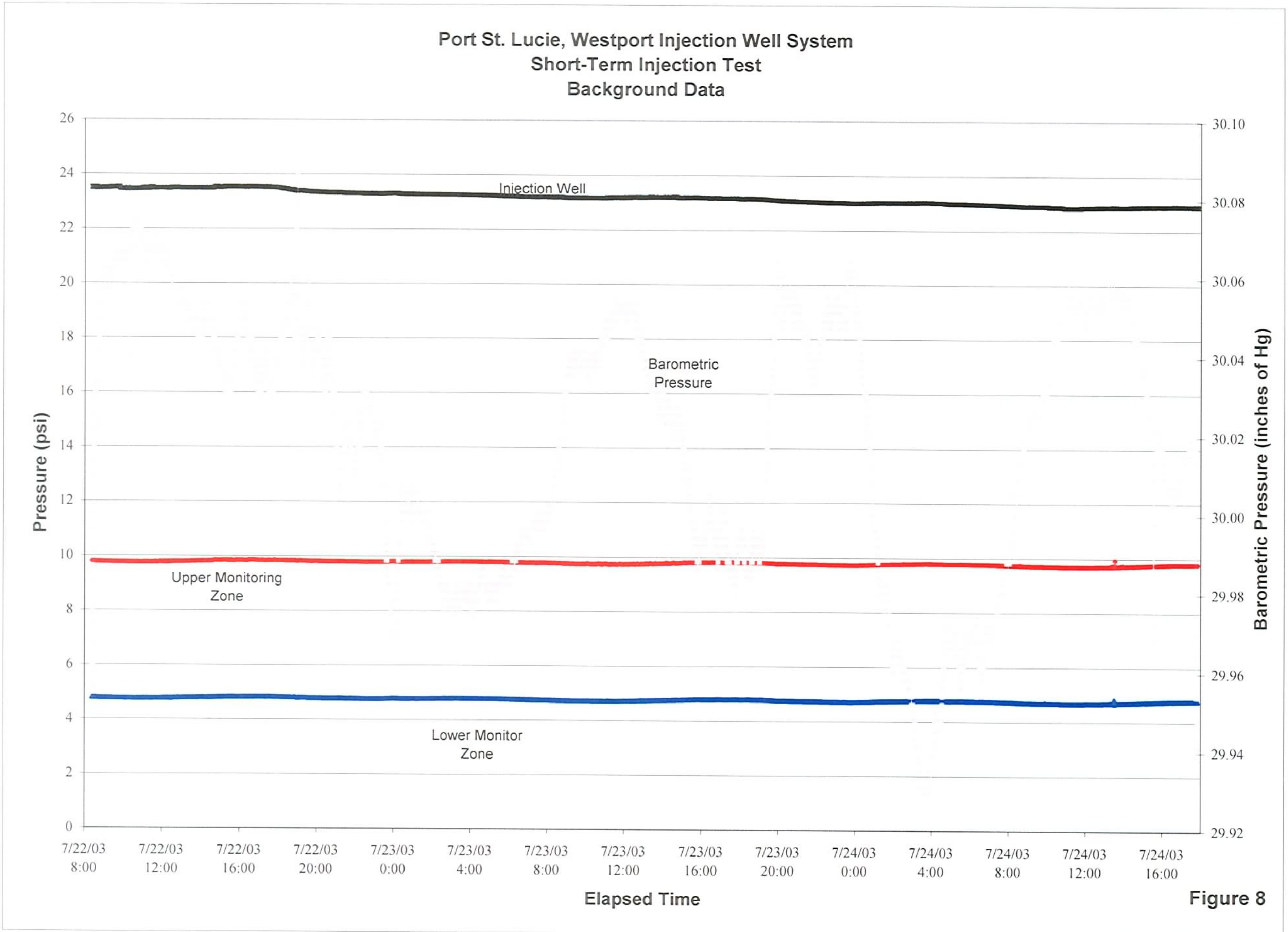


Figure 8

g:\aproject\rma\pf001153.0003\optesting request\figures 8-12 Injtest\Revised Injection Data.xls\Background Chart (8)

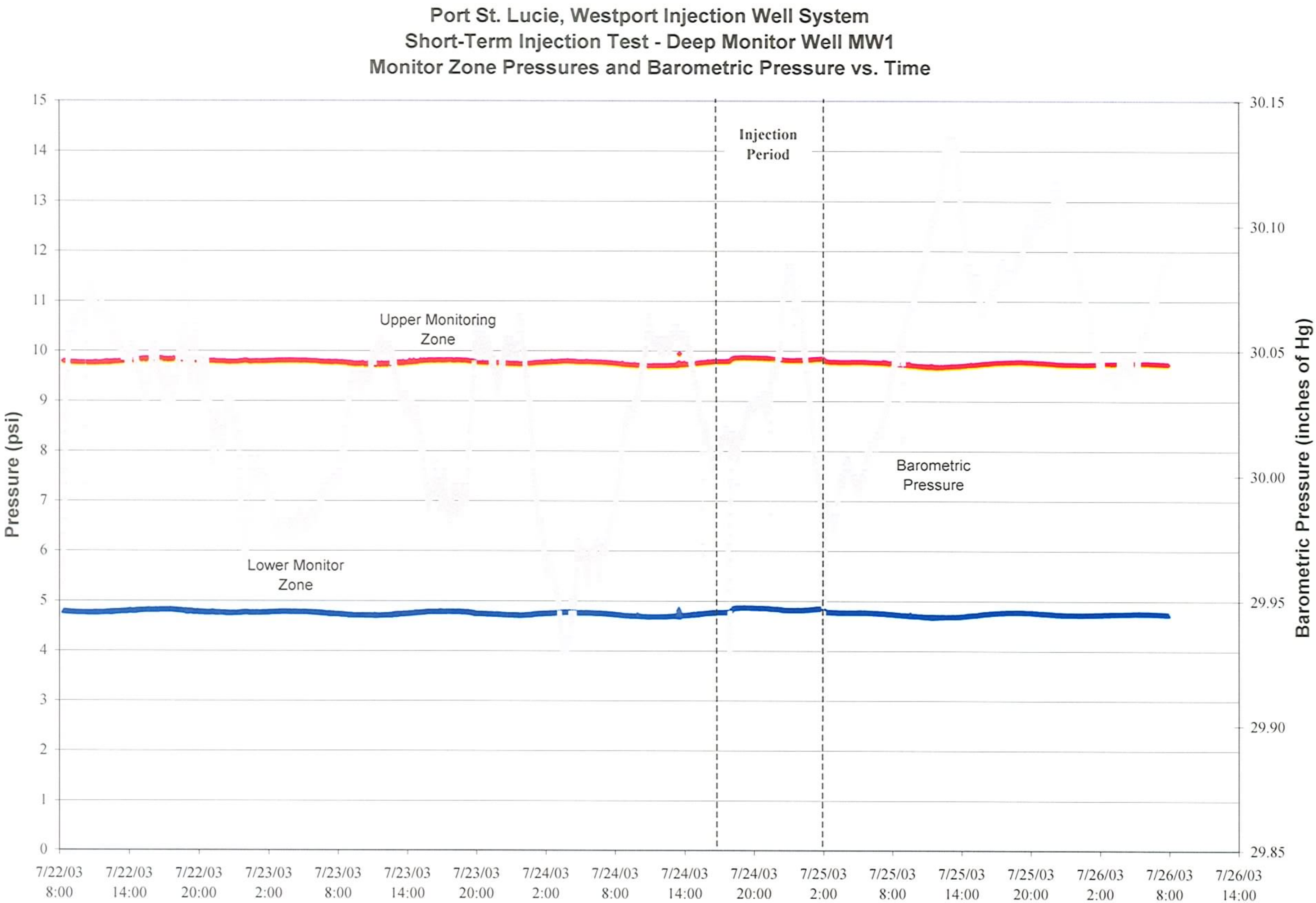


Figure 9

g:\aproject\rma\pf001153.0003\optesting request\figures 8-12 injtest\Revised Injection Data.xls\Bar. & MW Chart (9)

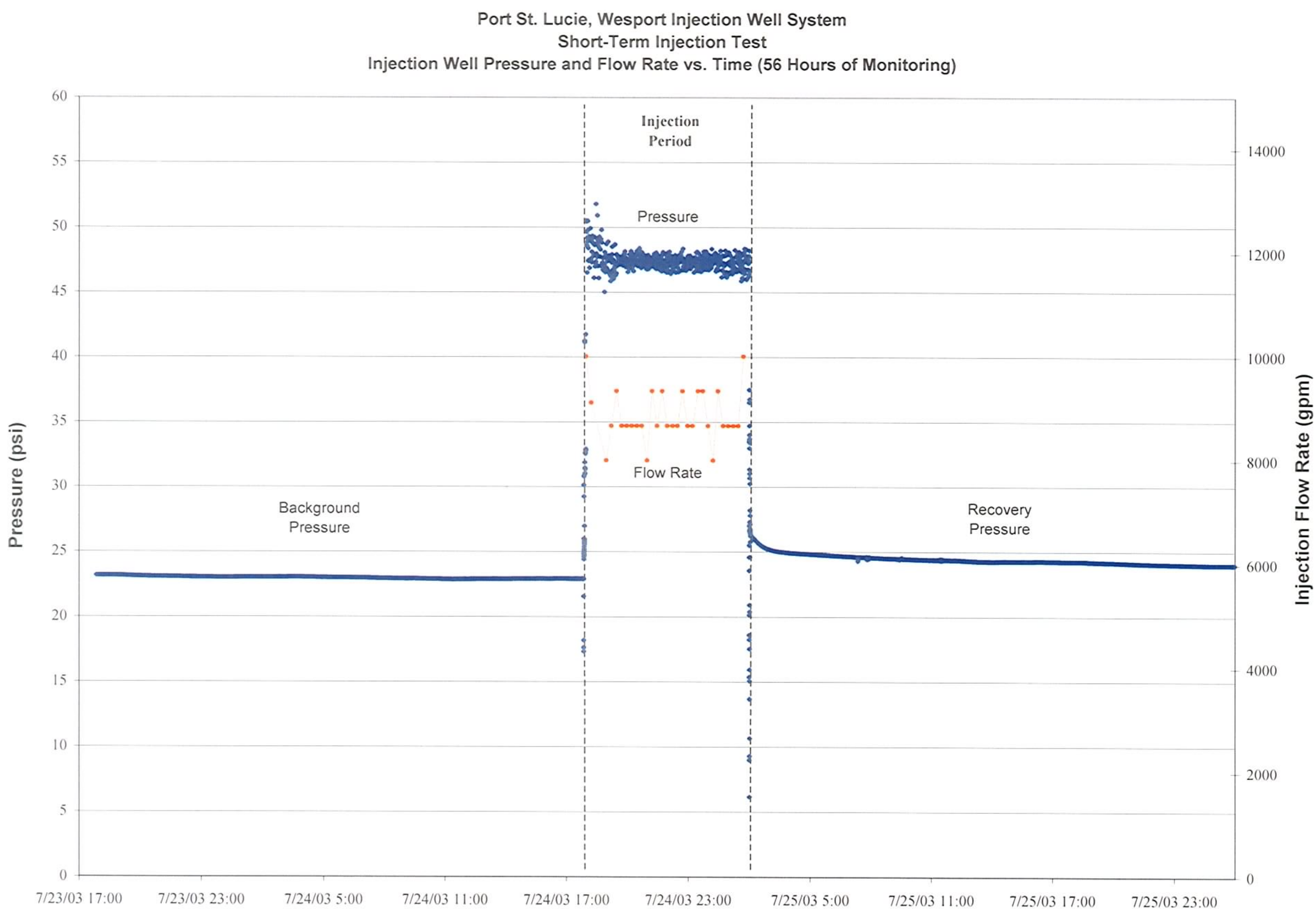
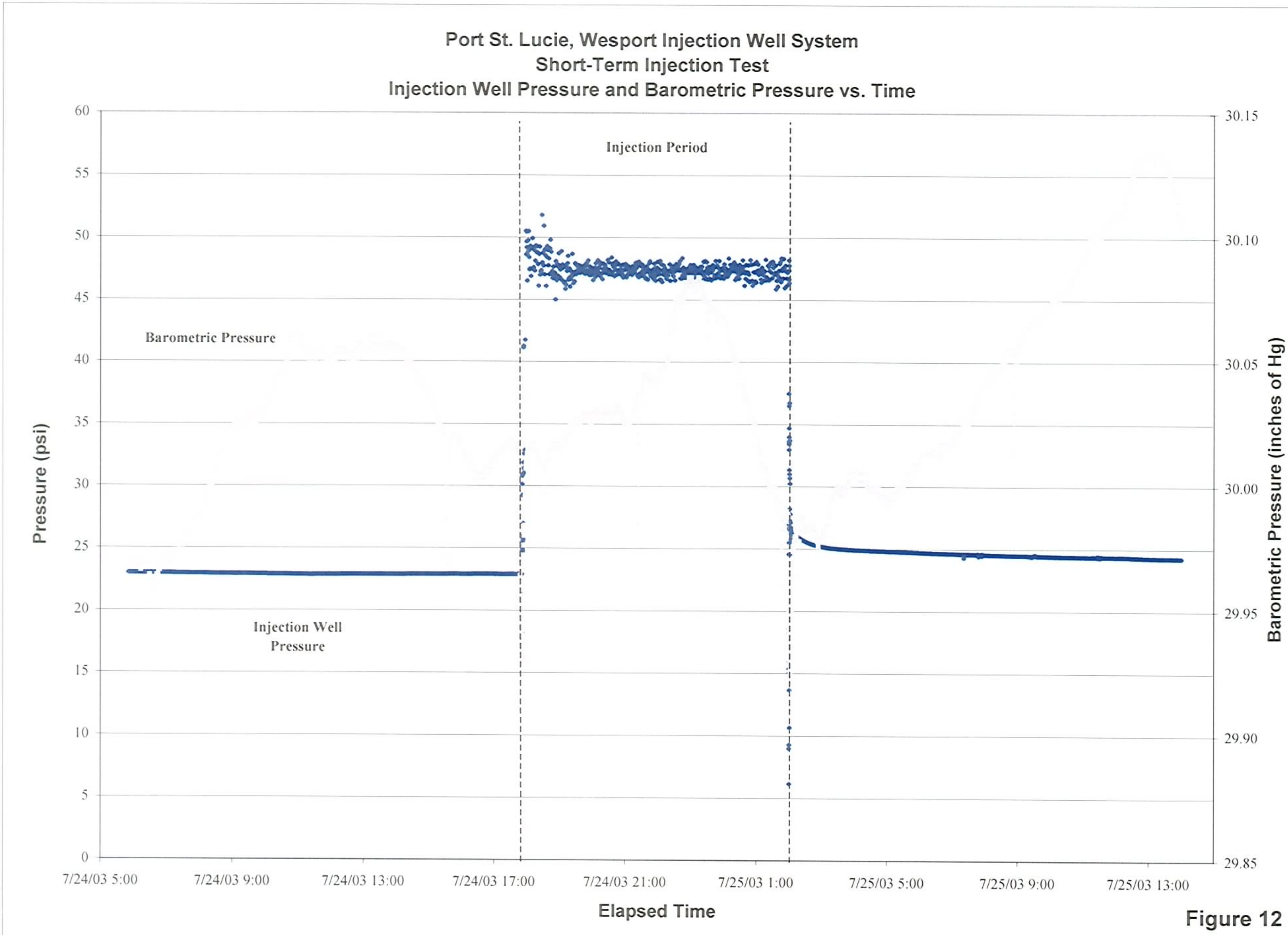

Port St. Lucie, Wesport Injection Well System
Short-Term Injection Test
Injection Well Pressure and Flow Rate vs. Time (56 Hours of Monitoring)
60
55
50
45
40
35
30
25
20
15
10
5
0
Pressure (psi)
Injection Period
Pressure
Flow Rate
Background Pressure
Recovery Pressure
14000
12000
10000
8000
6000
4000
2000
0
Injection Flow Rate (gpm)
7/23/03 17:00
7/23/03 23:00
7/24/03 5:00
7/24/03 11:00
7/24/03 17:00
7/24/03 23:00
7/25/03 5:00
7/25/03 11:00
7/25/03 17:00
7/25/03 23:00
Elapsed Time

Figure 10

Figure 11

g:\aproject\rma\pf001153.0003\optestingrequest\figures 8-12 injtest\Revised Injection Data.xls\IW Chart (11)



Port St. Lucie, Wesport Injection Well System
Short-Term Injection Test
Injection Well Pressure and Barometric Pressure vs. Time
Injection Period
Barometric Pressure
Injection Well Pressure
Pressure (psi)
Barometric Pressure (inches of Hg)
Elapsed Time
0
5
10
15
20
25
30
35
40
45
50
55
60
29.85
29.90
29.95
30.00
30.05
30.10
30.15
7/24/03 5:00
7/24/03 9:00
7/24/03 13:00
7/24/03 17:00
7/24/03 21:00
7/25/03 1:00
7/25/03 5:00
7/25/03 9:00
7/25/03 13:00

Figure 12

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

Date: Data input by: N. Maska — July 24. 2003

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

DRAWDOWN

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
Start: 18:00	0.0	0.0	25.0	8.60	7.20E+06	86 F	0	Pump ON - Test Started
18:01	1.0	8500.0	42.0	8.60	na	86 F	2.4	
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	Readjust Pumping Rate
19:45	105.0	8500.0	49.0	8.90	8.15E+06	86 F	25.0	
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	86 F	25.0	
20:30	150.0	8500.0	49.0	9.00	8.54E+06	86 F	25.0	
20:45	165.0	8500.0	48.0	9.10	8.67E+06	86 F	25.0	
21:00	180.0	8500.0	48.0	9.20	8.80E+06	86 F	25.0	
21:15	195.0	8500.0	49.0	9.20	8.92E+06	86 F	25.0	
21:30	210.0	8500.0	49.0	9.30	9.06E+06	86 F	25.0	
21:45	225.0	8500.0	49.0	9.30	9.19E+02	86 F	24.0	
22:00	240.0	8500.0	48.0	9.20	9.33E+06	85 F	24.0	
22:15	255.0	8500.0	49.0	9.20	9.46E+06	85 F	24.0	
22:30	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	
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	18.0	
0:00	360.0	8500.0	49.0	9.60	1.040 E+07	84 F	18.0	
0:15	375.0	8500.0	49.0	9.60	1.053 E+07	84 F	16.0	Heavy Rain

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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

Date: Data input by: N. Maska **July 24. 2003**	**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	

DRAWDOWN

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	Stop Raining
1:30	450.0	8500.0	49.0	9.70	1.118 E+07	83 F	10.0	
1:45	465.0	8500.0	49.0	9.70	1.131 E+07	83 F	9.0	
END: 2:00	480.0	8500.0	49.0	9.70	1.146 E+07	83 F	8.0	Pump OFF - Start Recovery
				RECOVERY				
Start: 2:00	0.0	0.0	49.0	9.70	1.146 E+07	83 F	8.0	
2:00:30	0.5	0.0	20.0	9.70	1.146 E+07	83 F	3.0	
2:01	1.0	0.0	30.0	9.70	1.146 E+07	83 F	2.0	
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	1.5	
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	1.0	
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	9.70	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	28.0	9.70	1.146 E+07	83 F	1.0	
2:18	18.0	0.0	28.0	9.70	1.146 E+07	83 F	1.0	
2:20	20.0	0.0	28.0	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	Stop Data Collection

"Lake Temp." refers to temperature of lake water (measured using a meter and probe in the lake) in degrees Fahrenheit.
"gpm" denotes injection rate in "gallons per minute".
"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	Video 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 (feet below pad level)	Ammonia Nitrogen (mg/L)	Specific Conductance (umhos/cm)	Chloride (mg/L)	Total Phosphorus (mg/L)	Sulfate (mg/L)	Total Dissolved Solids (mg/L)	Total Kjeldahl Nitrogen (mg/L)	pH Field Result (pH units)	Temperature Field Result (°C)
PT-1	13-Jan-03	2,054 - 2,100	0.71	50000	20000	0.23	1600	34000	1.1	6.72	25.0
PT-2	14-Jan-03	1,922 - 1,968	1.00	44000	18000	0.23	1500	31000	1.2	6.85	25.3
PT-3	15-Jan-03	1,855 - 1,901	1.30	43000	16000	0.20	1100	26000	1.5	6.45	25.7
PT-4	17-Jan-03	1,750 - 1,796	1.20	16000	5000	0.03	530	8800	3.7	7.04	25.2
PT-5	17-Jan-03	1,650 - 1,696	0.49	7500	2500	0.25	390	4600	1.3	7.19	25.0
PT-6	26-Apr-03	2,880.0 - 2,897.7	0.52	47000	21000	0.73	3200	34000	0.58	7.44	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	27.7
PT-9	29-Apr-03	2,580.0 - 2,597.7	1.70*	7400*	2900*	0.77*	350*	4400*	1.20*	6.59	26.3
PT-10	2-May-03	2,217.0 - 2,234.7	0.73	36000	16000	0.52	1800	26000	0.68	6.88	26.8

"mg/L" denotes concentration in units of milligrams per liter.
"umhos/cm" denotes specific conductance in units of micromhos per centimeter.
Packer pumping-test depth intervals for straddle-packer intervals are measured from inflation-element centerlines.
" * " Sample collected from Test Interval #9 was not representative because formation did not yield enough water to purge one work-pipe storage volume.
Packer pumping tests #1 through 5 were conducted on the Deep Monitor Well MW1 pilot hole.

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)	Deep Monitor Well MW1
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)	
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)	
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)	
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)	Injection Well IW1
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)	
9	29-Apr-03	2,580.0 - 2,597.7	17.7	2.0	3.14	0.18	0.000008	Cooper-Jacob (1946)	
10	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/ft" denotes transmissivity in units of "gallons per day per foot", and is estimated using a method by Jacob and Turcan.
"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.

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Appendix A

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

ARCADIS REESE MACON & ASSOCIATES

Infrastructure, buildings, environment, communications

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

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

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

Date:
August 27, 2003

Contact
James T. Macon, P.E.

Phone:
(561) 433-3226

Email:
jmacon@arcadis-us.com

Our ref:
RF001121.0001

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

Florida Department of Environmental Protection

Twin Towers Office Bldg., 2600 Blair Stone Road,
Tallahassee, Florida 32399-2400

DEP Form No:	62-528.900(10)
Form Title:	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:

Diameter 5.43 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 Well Completion
Effective Date:	
DEP Application No.:	(Filled in by DEP)

Deviations from the application and plans approved by the 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, 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

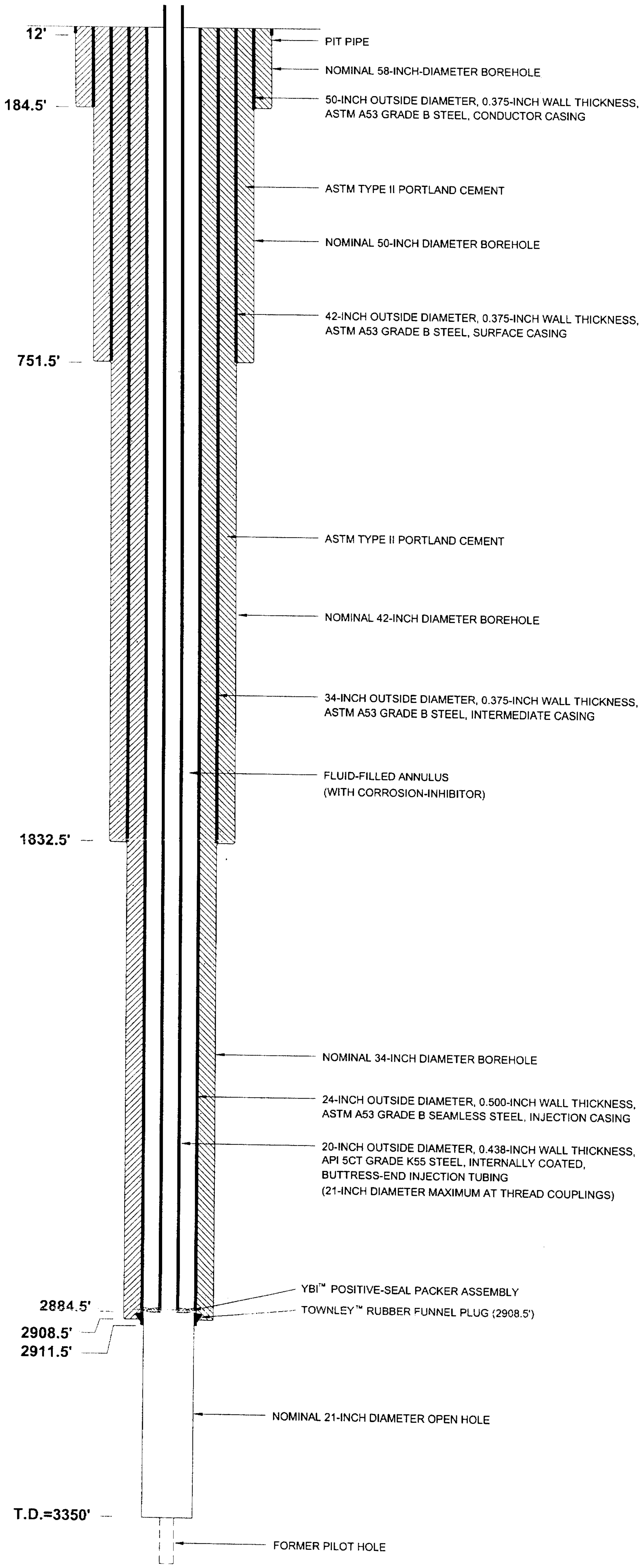
Lake Worth	FL	33463-
City	State	Zip

Telephone No. (561) 433-3226

James T. Macon, P.E.
Florida Reg. No. 34308
8/27/03

(Affix Seal)

DATE: 18AUG03 | PRJCT NO. PF001153.0003 | FILE: RMA\111902 | DRAWING: 0111902-IW1 | PM: M.WALDRON | PO: T.TESSIER | DRFT: B.OLIVA



Drawing not to scale

ARCADIS
712 U.S. HIGHWAY ONE, SUITE 200
NORTH PALM BEACH, FLORIDA 33408
Tel: 561.881.0077 Fax: 561.881.0012

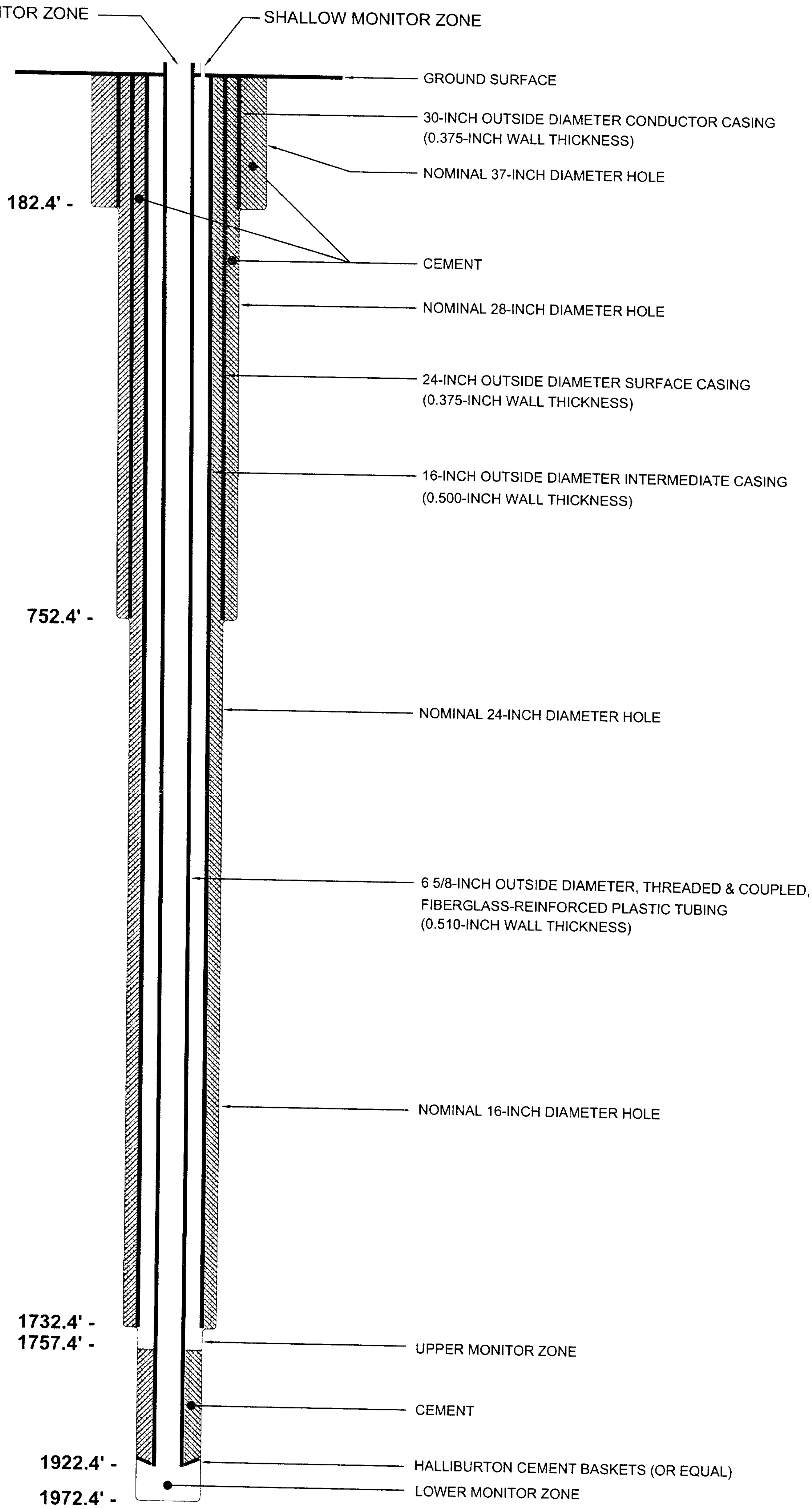
NO.	DATE	REVISION DESCRIPTION	CHKD.

INJECTION WELL IW1
CONSTRUCTION DETAIL

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

FIGURE

DATE: 18AUG03 PRJCT NO: RF001121.0001.PF001 FILE: RMA\111902 DRAWING: 0111902-DMW PM: M.WALDRON PO: T.TESSIER DRFT: B.OLIVA



DRAWING NOT TO SCALE

ARCADIS
712 U.S. HIGHWAY ONE, SUITE 200
NORTH PALM BEACH, FLORIDA 33408
Tel: 561.881.0077 Fax: 561.881.0012

NO.	DATE	REVISION DESCRIPTION	CHKD.

DEEP MONITOR WELL MW1
CONSTRUCTION DETAIL

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

FIGURE

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

Appendix B

Permox Coating Data

IW1 Mill Certificates

MW1 Mill Certificates and FRP Product Cut Sheets

◆ O. E. M. SYSTEMS
◆ SPECIALTY FINISHES
◆ MAINTENANCE COATINGS
◆ HIGH PERFORMANCE COATINGS

permite ASSURED QUALITY

YOUNGQUIST BROTHERS, INC.
Has Reviewed this Shop Drawing/Submittal
YBI/Section No. # LTC-11360-8
Transmittal No. # 042 Date: 6/24/02
Signature MF
WP-11365-28-A

PERMOX PIPE GLAZE PCS-9043 TYPE II GLASS FLAKE EPOXY 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 film 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.	.8 lbs per gallon
Color:	White, Black, & Standard Colors
Gloss:	80+ (60° Gloss Meter)
Suggested Film Thickness:	12 to 60 mils DFT depending on service
No. coats to achieve required film thickness:	One to three coats
Volume Solids:	92% +/- 2%
Theoretical Coverage:	1475 sq. ft. per gallon

Engineered Chemical Coatings Since 1921

Manufacturing and Executive Offices:
5239 BRER RABBIT ROAD • (404) 292-4842 • STONE MOUNTAIN (ATLANTA), GEORGIA 30083
Mail Address:
P. O. BOX 33127 • DECATUR, GEORGIA 30033 FAX: (404) 296-4825

No. of Components:	Two
Bond Strength:	
Sandblasted Steel:	2000 psi (Elcometer test)
Concrete:	Stronger than concrete
Mixing Ratio:	4 to 1 by volume
pH Tolerance:	2 to 13
Pot Life:	3 hrs at 77°F when reduced to spray, 1 hr when not reduced. (Shorter at higher temperatures)
Application Temperature:	20-140°F dry; 35-120°F wet
Dry Time:	
To Touch:	2 hrs @ 77°F
To Recoat:	2 hrs minimum - 6 months maximum
Full Cure:	7 days @ 77°F
For Immersion:	5 days @ 77°F
Service Temperature:	300°F dry; 208°F submerged (see "Chemical Resistance" chart for elevated temperature immersion service.)
Reducer & Clean-Up:	#76 Reducer
Packaging:	5-gallon kits
Shelf Life:	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.

Immersion: Solvent clean per SSPC-SP1 to remove all oil, grease, and loosely-adhering deposits. Abrasive blast per SSPC-SP10 near-white conditions per SSPC-VIS 1-89.

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

CONCRETE PIPE: Brush blast to remove surface contaminants and roughen surface. Bug holes opened in the blasting process should be filled before coating.

Primer: None required.

DUCTILE IRON: Abrasive blast to remove all loosely-adherent oxides and foreign materials which 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.

Primer: None required.

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 Spray

Pump-Graco Mogul (8:1) or equal
Pressures-Material—30 to 55 psi
Atomization - 50 to 90 psi
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

Airless Spray

Pump-Graco Bulldog (30:1) 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.

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%	Hydrogen Peroxide, 5%
Aliphatic Hydrocarbons	Phosphoric Acid, 10%
Calcium Chloride	Potassium Alum
Citric Acid, 20%	Sodium Carbonate
Distilled Water	Sour Crude Oil
Gasoline	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:

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.

TNEMEC®

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 DC74 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 yellowing 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 Surface preparation recommendations will vary depending on substrate and exposure conditions. Contact your Tnemec representative or Tnemec Technical Services.

PAINTED SURFACES Test patch is recommended. **Note:** Contact Tnemec 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 (125 microns)	18 hours	24 hours

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

VOLATILE ORGANIC COMPOUNDS*

Unthinned	Thinned 15% (No. 19 Thinner)	Thinned 15% (No. 18 Thinner)
1.16 lbs/gallon (139 grams/litre)	1.92 lbs/gallon (230 grams/litre)	2.06 lbs/gallon (247 grams/litre)

THEORETICAL COVERAGE* 1,347 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

PACKAGING Five-Gallon 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 ± .11 kg) (mixed)
135-1243: 11.52 ± 0.25 lbs (5.23 ± .11 kg) (mixed)

STORAGE TEMPERATURE Minimum 20°F (-7°C) Maximum 120°F (49°C)

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

SHELF LIFE 24 months at recommended storage temperature.

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 (m^2/Gal)**	**Dry Mils (Microns)**	**Wet Mils (Microns)**	**Sq Ft/Gal (m^2/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 ¾ pint to 1¼ pints (380 to 570 mL) per gallon with No. 19 Thinner. For brush or roller, thin 10% to 15% or ¾ pint to 1¼ 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 Tnemec representative.

APPLICATION EQUIPMENT

Air Spray

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure	Pot Pressure
DeVilbiss MBC or JGA	E	765 or 78	5/16" or 3/8" (7.9 or 9.5 mm)	3/8" or 1/2" (9.5 or 12.7 mm)	70-90 psi (4.8-6.2 bar)	20-30 psi (1.4-2.1 bar)

Low temperatures or longer hoses require higher pot pressure.

Airless Spray

Tip Orifice	Atomizing Pressure	Mat'l Hose ID	Manifold Filter
0.015"-0.021" (380-535 microns)	2800-4200 psi (193-290 bar)	1/4" or 3/8" (6.4 or 9.5 mm)	60 mesh (250 microns)

Use appropriate tip/atomizing pressure for equipment, applicator technique and weather conditions.
Note: Series 135-1213 must be applied by brush or roller to achieve aluminum appearance. For spray application, contact your Tnemec 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.

Hi-Build Epoxoline SERIES 66

TNEMEC®

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-H_2O, 161, 530 **Galvanized Steel and Non-Ferrous Metal:** Self-priming **Concrete:** Self-priming, 54-660, 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 & NON-FERROUS METAL	Surface preparation recommendations will vary depending on substrate and exposure conditions. Contact your Tnemec representative or Tnemec Technical Services.
CAST/DUCTILE IRON	Contact your Tnemec representative or Tnemec 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.
CMU	Allow mortar to cure for 28 days. Level protrusions and mortar spatter.
PAINTED SURFACES	**Non-Immersion Service:** Ask your Tnemec 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
75°F (24°C)	2 hours	10 hours	12 hours	7 days

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

VOLATILE ORGANIC COMPOUNDS*

Unthinned	Thinned 5%	Thinned 10%
3.04 lbs/gallon (364 grams/litre)	3.22 lbs/gallon (385 grams/litre)	3.39 lbs/gallon (406 grams/litre)

THEORETICAL COVERAGE* 898 mil sq ft/gal (22.4 m²/L at 25 microns). See APPLICATION for coverage 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 GALLON* 12.50 ± 0.25 lbs (5.67 ± .11 kg) (mixed)

STORAGE TEMPERATURE Minimum 20°F (-7°C) Maximum 110°F (43°C)

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 (m^2/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 77°F (25°C) 4 hours at 100°F (38°C)

THINNING — Use No. 4 Thinner. For air spray, thin up to 10% or ¾ 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) Maximum 135°F (57°C) The surface should be dry and at 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 MBC or JGA	E	765 or 78	5/16" or 3/8" (7.9 or 9.5 mm)	3/8" or 1/2" (9.5 or 12.7 mm)	75-100 psi (5.2-6.9 bar)	10-20 psi (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" (380-485 microns)	1800-3000 psi (124-207 bar)	1/4" or 3/8" (6.4 or 9.5 mm)	60 mesh (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.

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

*Values may vary with color.

Endura-Shield® SERIES 73

TNEMEC®

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	Series 73 meets the requirements of SSPC-36 Paint Standard.
PERFORMANCE CRITERIA	Extensive test data available. Contact your Tnemec representative for specific test results.

COATING SYSTEM

PRIMERS	**Steel:** Series 20, 37H, 66, N69, 90-97, 91-H_2O, 104, 135, N140, 161 **Galvanized Steel and Non-Ferrous Metal:** Series 66, N69 **Concrete:** 54-660, 66, N69, 104 **CMU:** 54-660 **Note:** Series 104 or 135 exterior exposed more than two months, or Series N69 or N140 exterior exposed more than three months must first be scarified or reprimed with themselves. Brush blasting with fine abrasive is the preferred method of scarification.
TOPCOAT	Series 76, optional when extended weatherability is desired.

SURFACE PREPARATION

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

TECHNICAL DATA

VOLUME SOLIDS* — 58.0 ± 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 Accelerator; see separate product data sheet.

VOLATILE ORGANIC COMPOUNDS*

Unthinned	Thinned 10% (No. 39 Thinner)	Thinned 10% (No. 42 Thinner)
3.16 lbs/gallon (378 grams/litre)	3.44 lbs/gallon (412 grams/litre)	3.48 lbs/gallon (417 grams/litre)

THEORETICAL COVERAGE*	930 mil sq ft/gal (22.8 m^2/L at 25 microns).	
NUMBER OF COMPONENTS	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 ± .11 kg)	
STORAGE TEMPERATURE	Minimum 20°F (-7°C)	Maximum 110°F (43°C)
TEMPERATURE RESISTANCE	(Dry) Continuous 250°F (121°C)	Intermittent 275°F (135°C)
SHELF LIFE	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 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.**	

Published technical data and instructions are subject to change without notice. The online catalog at www.tnemec.com should be referenced for the most current technical data and instructions or you may contact your Tnemec representative for current technical data and instructions.

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 (inches)	Nominal I.D. (inches)	Minimum Drift Dia (inches)	Nominal O.D. (inches)	Nominal Wall (inches)	Pin Upset O.D. (inches)	Max Box OD(inches) IJ Conn.*	Max Box OD(inches) TC Conn.*	Nominal Weight		Connection Type API 5B, Table 14*, 7**, 6*** Fourteenth Edition August 96
								(lbs/ft)	(lbs/jt)	
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

*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-Wt 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 2-3/8 - 10-3/4	VALUE 11-3/4 - 13-3/8	TEST METHOD
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	$Btu/hr/ft^2/in/degF$	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

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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, CO_2, 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

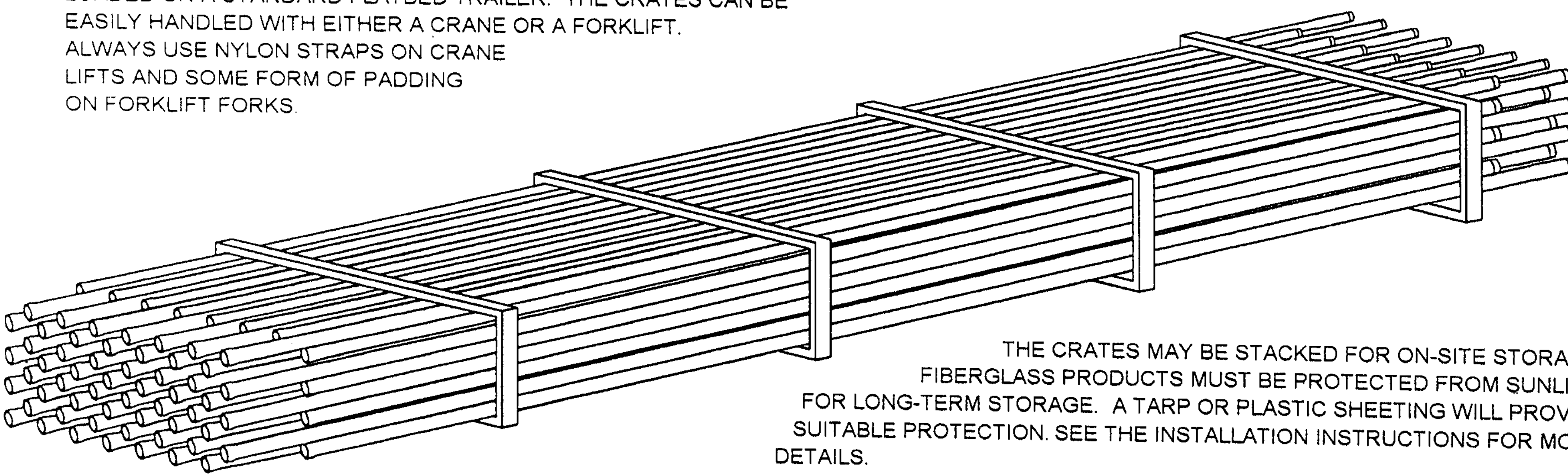
RED BOX casing and tubing products are connected with the reliable, time proven integral joint API 8 round external upset end (EUE) long threaded connections, or casing long threaded connections. Pin ends are lathe cut while box ends are filament-wound as integral part of the tubing body.

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.

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



THE CRATES MAY BE STACKED FOR ON-SITE STORAGE. FIBERGLASS PRODUCTS MUST BE PROTECTED FROM SUNLIGHT FOR LONG-TERM STORAGE. A TARP OR PLASTIC SHEETING WILL PROVIDE SUITABLE PROTECTION. SEE THE INSTALLATION INSTRUCTIONS FOR MORE DETAILS.

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

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

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

CRATE FRAME

CATALOGUE INSERT

DRWG NO:	DATE:	SCALE:	FILE NAME:	FONT:	APP:
12580	8/15/01	NONE	"CRATING"		

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

Joints/Feet per Truckload

PIPE SIZE	PRESSURE RATING - RED BOX TUBING & CASING										
	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	700.41	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	467.68	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	250.05	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								

Joints/Feet per Container

PIPE SIZE	PRESSURE RATING - RED BOX TUBING & CASING										
	1000	1250	1500	1750	2000	2250	2500	2750	3000	3250	3500
2-3/8"	825	825	825	825	825	825	825	784	705	649	591
	24,750	24,750	24,750	24,750	24,750	24,750	24,750	23,520	21,150	19,470	17,730
2-7/8"	623	623	623	623	623	623	577	525	474	431	357
	18,690	18,690	18,690	18,690	18,690	18,690	17,310	15,750	14,220	12,930	10,710
3-1/2"	405	405	405	405	405	405	389	351	317	290	
	12,150	12,150	12,150	12,150	12,150	12,150	11,670	10,530	9,510	8,700	
4-1/2"	255	255	255	255	255	251	225	188	172		
	7,650	7,650	7,650	7,650	7,650	7,530	6,750	5,640	5,160		
5-1/2"	173	173	173	173	173	173	173	159	143		
	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						
	1,230	1,230	1,230	1,230	1,230						
*13-3/8"	30	30	30								
	900	900	900								

* 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.

ARCADIS

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 No.	Casing Length (feet)	Cumulative Length (feet)	Heat Number	Section No.	Casing Length (feet)	Cumulative Length (feet)	Heat 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	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.

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.	
DI05807 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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED ✓ O.D.: 24.000(609.600) in (mm) WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN: 42000 MAX: 65000		MIN: 70000 MAX: 110000	MAX:	MIN: 30.0	MIN: MAX: 99.0	1580	5
B45661 2L3050	STRIP/T/B	AR	1.500	45800	.50	75500	0.60	41.0	B 82.7	1580	5

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.* MAX .43
B45661	HEAT		19	106	010	009	24	01	04	07	02	038		001			001					.38
B45661 2L3050	PROD		20	110	008	011	22	01	04	07	02	036		001			001					.40
B45661 2L3050	PROD		20	111	009	012	22	01	04	07	02	039		001			001					.41

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

APR. 30. 2003 8:?4AM VASS. PIPE NO. 3130 P. 24

UNITED STATES STEEL

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

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DI05807 01			

MATERIAL COND: AS ROLLED	O.D.: 24.000(609.600) in (mm)	WALL 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	2	3	AVG	% SHEAR 1	2	3	AVG
							DEG F										
845661 2L3050	OK				T	B	+ 32	FULL	AR	87	91	89	89	40	60	60	53

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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 11/25/02

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

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.
DI05807 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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % IN 2"	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN: 42000 MAX: 65000		MIN: 70000 MAX: 110000	MAX:	MIN: 30.0	MIN: MAX: 99.0	1580	5
845660 2L3048	STRIP/T/B	AR	1.500	44700	.50	76500	0.58	46.0	B 83.3	1580	5
		**	END OF DATA THIS		SHEET	**					

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	C.E.* MAX .43
B45660	HEAT	19	105	007	005	24	01	02	06	01	030		001			001		.38
B45660 2L3048	PROD	20	109	006	008	22	02	02	06	01	030		001			001		.40
B45660 2L3048	PROD	20	110	006	008	22	01	02	06	01	030		001			001		.40

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

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

UNITED STATES STEEL

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DI05807 01			

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) In (mm) | WALL: 0.500 (12.700) In (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
B45660 2L3048	OK				T	B	+ 32	FULL	AR	94	97	92	94	50	50	50	50

(CHARPY V-NOTCH IMPACT TESTING)

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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 11/21/02

UNITED STATES STEEL

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

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

MILL ORDER/ITEM 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

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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN: 42000 MAX: 65000		MIN: 70000 MAX: 110000	MAX:	MIN: 30.0	MIN: MAX: 100.0	1580	5
A43198 2G3068	STRIP/T/B	AR	1.500	51000	.50	76000	0.67	40.0	B 83.1	1580	5

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	C.E.* MAX .43
A43198	HEAT	18	105	008	006	24	01	03	06	02	034		001			001		.38
A43198 2G3068	PROD	18	105	006	010	23	01	03	06	02	032		001			001		.38
A43198 2G3068	PROD	18	106	007	008	23	01	03	06	02	031		001			001		.38

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

UNITED STATES STEEL

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

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER
DI05781 01		

MATERIAL COND: AS ROLLED

O.D.: 24.000(609.600) in (mm) WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
A43198 2G3068	OK				T	B	+ 32	FULL	AR	82	89	88	86	50	50	50	50

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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 07/25/02

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

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

MILL ORDER/ITEM 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

SPECIFICATION AND GRADE

PIPE CARBON SMLS STD PIPE API 5L-X42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-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

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

TENSILE

PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN: 42000 MAX: 65000		MIN: 70000 MAX: 110000	MAX:	MIN: 30.0	MIN: MAX: 100.0	1580	5
A43196 2G3066	STRIP/T/B	AR	1.500	44700	.50	76000	0.59	43.0	B 83.7	1580	5

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.* MAX .43
A43196	HEAT		19	106	009	003	24	02	02	04	01	027		001			001					.38
A43196 2G3066	PROD		18	107	007	005	23	02	02	04	01	025		001			001					.38
A43196 2G3066	PROD		19	105	007	005	22	02	02	04	01	026		001			001					.38

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): $CE=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15$

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

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
(TYPE 3 - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049)

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DI05781 01			

MATERIAL COND:	O.D.: in (mm)	WALL: in (mm)
AS ROLLED	24.000(609.600)	0.500 (12.700)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC.	TEMP DEG F	SIZE	TEST COND	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
A43196 2G3066	OK				T	B	+ 32	FULL	AR	99	89	96	94	60	50	60	56

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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

UNITED STATES STEEL

DATE: 11/21/02
TIME: 13:11:34

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.
DI05807 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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE HRB	MIN HYDRO PSI	DWELL (SEC)
			IN	MIN: 42000 MAX: 65000		MIN: 70000 MAX: 110000	MAX:	MIN: 30.0	MIN: MAX: 99.0	1580	5
B45662 2L3047	STRIP/T/B	AR	1.500	47600	.50	77500	0.61	42.0	B 83.0	1580	5

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	C.E.* MAX .43
B45662	HEAT	19	104	009	009	22	01	03	07	02	031		001			001		.39
B45662 2L3047	PROD	17	107	007	008	21	01	03	07	02	029		001			001		.37
B45662 2L3047	PROD	20	100	006	006	21	02	03	09	03	029		001			001		.39

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

DATE: 11/21/02
TIME: 13:11:34

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER
DI05807 01		

MATERIAL COND: AS ROLLED

O.D.: 24.000(609.600) in (mm)

WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
845682 2L3047	OK				T	B	+ 32	FULL	AR	73	75	70	72	30	30	30	30

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ___ L X L/T ___ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ___ OD/ID ___ L ___ L/T ___
END AREA INSPECTION (PLAIN END)		MPI ___ UT ___
SPECIAL END AREA (SEA) INSP		MPI ___ UT ___
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 11/21/02

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

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

MILL ORDER/ITEM 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

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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN: 42000 MAX: 65000		MIN: 70000 MAX: 110000	MAX:	MIN: 30.0	MIN: MAX: 100.0	1580	5
A43195 2G3069	STRIP/T/B	AR	1.500	45600	.50	74500	0.61	44.0	B 83.5	1580	5
		**	END OF DATA THIS SHEET **								

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.* MAX .43
A43195	HEAT		19	109	005	003	24	02	02	.04	01	032		002			001					.39
A43195 2G3069	PROD		19	104	004	003	22	02	02	04	01	031		001			001					.38
A43195 2G3069	PROD		20	104	004	003	23	02	02	04	01	031		001			001					.39
				** END OF DATA THIS SHEET **																		

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

UNITED STATES STEEL

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

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER
DI05781 01		

MATERIAL COND:	O.D.: in (mm)	WALL: in (mm)
AS ROLLED	24.000(609.600)	0.500 (12.700)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
A43195 2G3069	OK				T	B	+ 32	FULL	AR	113	92	102	102	80	40	50	57

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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 07/27/02

UNITED STATES STEEL

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

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

MILL ORDER/ITEM 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

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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED | O.D.: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE: HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN: 42000		MIN: 70000	MAX:	MIN: 30.0	MIN:	1580	5
				MAX: 65000		MAX: 110000			MAX: 100.0		
A42358 2G3067	STRIP/T/B	AR	1.500	45400	.50	72500	0.63	44.0	B 85.2	1580	5
		**	END OF	DATA THIS	SHEET	**					

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
																						MAX .43
A42358	HEAT		18	107	008	008	24	03	02	04	01	040		001			001					.38
A42358 2G3067	PROD		18	105	007	009	23	03	02	04	01	034		001			001					.37
A42358 2G3067	PROD		18	106	007	010	24	03	02	05	01	032		001			001					.38
				** END	OF	DATA	THIS	SHEET	**													

*C.E. IS BASED ON THE FOLLOWING EQUATION(S): CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

2 of 7

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DI05781 01			

MATERIAL COND:	O.D.: in (mm)	WALL: in (mm)
AS ROLLED	24.000(609.600)	0.500 (12.700)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING												
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
A42358 2G3067	OK				T	B	+ 32	FULL	AR	97	96	100	97	60	60	60	60

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
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

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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

TIME: 14:10:59

MILL ORDER/ITEM NO	SHIPPERS NO	P.O. NUMBER	VEHICLE I.D.
0I05807 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-×99 GRADE B QUAD STENCIL ASME SA53-×2001 EDITION ASME SA106-×2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 ×2000

MATERIAL COND: AS ROLLED | OD: 24.000(609.600) in (mm) | WALL: 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE/ ORIENTATION	TEST COND	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN 42000 MAX 65000		MIN 70000 MAX 110000	MAX	MIN 30.0	MIN MAX 99.0	1580	5
A24375 2L3052	STRIP/T/B	AR	1.500	45100	.50	75000	0.60	43.0	B 82.0	1580	5

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	CE* MAX .43
A24375	HEAT	18	105	009	007	23	04	02	05	01	035		004			001		.38
A24375 2L3052	PROD	19	107	006	009	21	04	02	06	01	035		001			001		.38
A24375 2L3052	PROD	19	109	007	010	22	04	02	06	01	037		001			001		.39

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S) CE=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15

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

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT
[TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049]

TIME: 14:10:59

MILL ORDER/ITEM NO.	SHIPPERS NO	PO NUMBER	
DI05807 01			

MATERIAL COND: AS ROLLED

O.D. 24.000(609.600) in (mm) WALL 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
A24375 2L3052	OK				T	B	+ 32	FULL	AR	83	94	87	88	50	60	50	53

** END OF DATA THIS SHEET **

LEGEND: L-LONGITUDINAL T-TRANSVERSE B-BODY W-WELD HAZ-HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ___ L X L/T ___ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ___ OD/ID ___ L ___ L/T ___
END AREA INSPECTION (PLAIN END)		MPI ___ UT ___
SPECIAL END AREA (SEA) INSP.		MPI ___ UT ___
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 11/22/02

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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

TIME: 14:10:59

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE ID
0105807 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-*99 GRADE B QUAD STENCIL ASME SA53-*2001 EDITION ASME SA106-*2001 EDITION GRADE B BLK REG MILL COAT PE BEV 30 DEG MEETING ALL THE APPLICABLE REQUIREMENTS OF NACE STANDARD MR-01-75 *2000

MATERIAL COND: AS ROLLED

OD: 24.000 (609.600) in (mm) WALL: 0.500 (12.700) in (mm)

TENSILE

PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % IN 2"	HARDNESS SCALE HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN 42000 MAX: 65000		MIN 70000 MAX 110000	MAX	MIN 30.0	MIN MAX 99.0	1580	5
A41440 2L30S1	STRIP/T/B	AR	1.500	44400	.50	74000	0.60	45.0	B 83.7	1580	5

** END OF DATA THIS SHEET **

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.* MAX .43
A41440	HEAT		18	106	008	007	23	04	03	05	01	032		001								.38
A41440 2L30S1	PROD		21	109	007	012	22	04	02	05	02	031		001			001					.41
A41440 2L30S1	PROD		21	108	007	011	21	04	02	05	02	030		001			001					.40
																	001					

** END OF DATA THIS SHEET **

*CE IS BASED ON THE FOLLOWING EQUATION(S) CE=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15

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

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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

TIME: 14:10:59

MILL ORDER/ITEM NO.	SHIPPERS NO	PO NUMBER	
DI05807 01			

MATERIAL COND: AS ROLLED

O.D. 24.000(609.600) in (mm) WALL 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC.	TEMP	SIZE	TEST COND	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG F										
A41440 2L3051	OK				T	B	+ 32	FULL	AR	100	95	96	97	60	50	50	53

** END OF DATA THIS SHEET **

LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP		MPI ____ UT ____
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 11/22/02

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

[TYPE B - IN ACCORDANCE WITH ISO 10474/EN10204/DIN50049]

TIME: 09:02:42

MILL ORDER/ITEM NO	SHIPPERS NO	PO NUMBER	VEHICLE I.D.
DI05807 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-X42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-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

MATERIAL COND: AS ROLLED

O.D. 24.000(609.600) in (mm) WALL 0.500 (12.700) in (mm)

TENSILE

PRODUCT IDENTIFICATION	TEST TYPE/ ORIENTATION	TEST COND	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T MAX	ELONG % IN 2" MIN	HARDNESS SCALE HRB	MIN HYDRO PSI	DWELL (SEC)
				MIN 42000 MAX 65000		MIN. 70000 MAX 110000			MIN MAX 99.0		
A45276 2L3049	STRIP/T/B	AR	1.500	48900	.50	78500	0.62	30.0 42.0	B 82.0	1500 1500	5 5
		**	END OF DATA THIS	SHEET	**						

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				CE*
																						MAX
A45276	HEAT		19	108	010	006	23	02	05	09	02	033		001			001					.43
A45276 2L3049	PROD		19	111	009	010	22	02	05	09	02	034		002			001					.35
A45276 2L3049	PROD		20	112	009	008	22	02	05	09	02	034		002			001					.41
				** END	OF	DATA	THIS	SHEET	**													.41

*C.E. IS BASED ON THE FOLLOWING EQUATION(S) $CE=C+(MN/6)+(CR+MO+V)/5+(NI+CU)/15$

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

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

TIME: 09:02:42

MILL ORDER/ITEM NO	SHIPPERS NO	PO NUMBER
DI05807 01		

MATERIAL COND: AS ROLLED

O.D. 24.000(609.600) in (mm) WALL 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC	TEMP DEG F	SIZE	TEST COND	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
A45276 2L3049	OK				T	B	+ 32	FULL	AR	106	116	113	111	60	70	70	66

** END OF DATA THIS SHEET **

LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ___ L X L/T ___ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ___ OD/ID ___ L ___ L/T ___
END AREA INSPECTION (PLAIN END)		MPI ___ UT ___
SPECIAL END AREA (SEA) INSP		MPI ___ UT ___
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. AMADELL - MANAGER, Q.A.

DATE 11/25/02

UNITED STATES STEEL

TUBULAR PRODUCTS
CERTIFIED TEST REPORT

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

TIME: 08:19:19

MILL ORDER/ITEM NO.	SHIPPERS NO	P.O. NUMBER	VEHICLE ID
0I05824 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-X42ND EDITION DATED 1/00 PSL-2 GRADE B AND GRADE X42 ASTM A53-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 X2002

MATERIAL COND. AS ROLLED

OD 24.000(609.600) in (mm) WALL 0.500 (12.700) in (mm)

TENSILE

PRODUCT IDENTIFICATION	TEST TYPE-ORIENTATION	TEST COND	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T MAX	ELONG % IN 2" MIN	HARDNESS SCALE HRB	MIN HYDRO PSI	DWELL(SEC)
				MIN 42000 MAX. 65000		MIN 70000 MAX 110000			MIN- MAX 99.0	1580	
A46076 A271AA	STRIP/T/B	AR	1.500	45200	.50	75000	0.60	30.0 45.0	B 84.0	1580	5 5

** END OF DATA THIS SHEET **

LEGEND L - LONGITUDINAL U - UPSET T - TRANSVERSE N - NORMALIZED QT - QUENCHED & TEMPERED SR - STRESS RELIEVED AR - AS ROLLED B - BODY W - WELD

PRODUCT IDENTIFICATION	TYPE	C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO	CE* MAX .43
A46076	HEAT	18	107	011	005	24	02	03	05	01	034		001			001		.37
A46076 A271AA	PROD	18	104	009	006	21	02	03	06	01	034		002			001		.37
A46076 A271AA	PROD	18	104	009	006	21	02	03	06	01	034		002			001		.37

** END OF DATA THIS SHEET **

*C.E. IS BASED ON THE FOLLOWING EQUATION(S) CE=C+(MN/6)+(CR+MO+V)/5+ (NI+CU)/15

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

UNITED STATES STEEL

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

TIME: 08:19:19

MILL ORDER/ITEM NO.	SHIPPERS NO	PO NUMBER
0I05824 01		

MATERIAL COND: AS ROLLED

OD: 24.000(609.600) in (mm) WALL 0.500 (12.700) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	LAW COLLAPSE	DIR	TEST LOC	TEMP DEG F	SIZE	TEST COND	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
A46076 A271AA	OK				T	B	+ 32	FULL	AR	89	96	82	89	60	70	60	63

** END OF DATA THIS SHEET **

(CHARPY V-NOTCH IMPACT TESTING)

LEGEND L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS - COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ___ L X L/T ___ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ___ OD/ID ___ L ___ L/T ___
END AREA INSPECTION (PLAIN END)		MPI ___ UT ___
SPECIAL END AREA (SEA) INSP.		MPI ___ UT ___
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 03/20/03

NO. 3136 P. 13/28

ARCADIS

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 No.	Tag No.	Section Length (ft)	Cumulative Length (ft)	Heat Number
stainless shoe	[redacted]	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

ARCADIS

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

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.

UNITED STATES STEEL

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

TIME: 05:56:46

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.
DR14736 01	R47458		LT8234

SOLD TO ADDRESS	MAIL TO ADDRESS	VENDOR
		USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055

SPECIFICATION AND GRADE

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

MATERIAL COND: AS ROLLED | O.D.: 20.000(508.000) In (mm) | WALL: 0.430 (11.125) In (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE / ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE:	MIN HYDRO PSI	DWELL (SEC)
				MIN: 56000 MAX 80000		MIN: 95000 MAX	MAX:	MIN: 19.0	MIN: MAX	1900	5
A21636	STRIP/L/B	AR	1.500	64500	.50	105000	0.62	29.0		1900	5
A21637	STRIP/L/B	AR	1.500	66500	.50	104000	0.64	31.0		1900	5
		**	END OF DATA THIS		SHEET	**					

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, AQ - AS QUENCHED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
A21636	HEAT		.35	1.33	010	010	.24	.03	.05	.07	.08	027										
A21636	PROD		.32	1.33	009	011	.22	.03	.05	.08	.08	029										
A21636	PROD		.33	1.36	009	012	.23	.03	.05	.08	.08	020										
A21637	HEAT		.34	1.31	011	007	.23	.04	.04	.09	.08	028										
A21637	PROD		.35	1.36	010	010	.22	.04	.04	.10	.08	031										
A21637	PROD		.34	1.35	010	009	.22	.04	.04	.10	.08	029										
				** END	OF	DATA	THIS	SHEET	**													

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

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

UNITED STATES STEEL

TUBULAR PRODUCTS CERTIFIED TEST REPORT

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER
DR14736 01	R47458	0021175

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) In (mm) WALL: 0.438 (11.125) In (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING													
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS				% SHEAR			
										1	2	3	AVG	1	2	3	AVG
							DEG										

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ____ L X L/T ____ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ____ OD/ID ____ L ____ L/T ____
END AREA INSPECTION (PLAIN END)		MPI ____ UT ____
SPECIAL END AREA (SEA) INSP.		MPI ____ UT ____
FULL LENGTH DRIFT	X	DRIFT MANDREL SIZE: LENGTH: 12 DIAMETER: 18.9365

ADDITIONAL NOTES/COMMENTS

ALL MELTING AND MANUFACTURING TOOK PLACE 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.

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 MGR. MET. & Q.A. USS TUBULAR PRODUCTS

DATE 08/28/01

UNITED STATES STEEL

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

TIME: 05:06:05

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.
DR17374 01	R51375		LT8030

SOLD TO ADDRESS	MAIL TO ADDRESS	VENDOR
		USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055

SPECIFICATION AND GRADE

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

MATERIAL COND: AS ROLLED ✓

OD: 20.000(508.000) in (mm)

WALL: 0.439 (11.125) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE / ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE:	MIN HYDRO PSI	DWELL (SEC)
				MIN: 56000		MIN: 95000	MAX:	MIN:	MIN:	1900	5
				MAX 80000		MAX		19.0	MAX		
A41974	STRIP/L/B	AR	1.500	67500	.50	106000	0.64	31.0		1900	5
A41975	STRIP/L/B	AR	1.500	63500	.50	104000	0.61	30.0		1900	5
		**	END OF DATA THIS	SHEET	**						

LEGEND: L - LONGITUDINAL; U - UPSET; T - TRANSVERSE; N - NORMALIZED; QT - QUENCHED & TEMPERED; SR - STRESS RELIEVED; AR - AS ROLLED; AQ - AS QUENCHED; B - BODY; W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
A41974 ✓	HEAT		.35	1.34	009	008	.22	.02	.02	.08	.10	027										
A41974	PROD		.33	1.39	008	010	.20	.02	.02	.08	.10	024										
A41974	PROD		.34	1.40	008	014	.20	.02	.02	.08	.10	023										
A41975	HEAT		.34	1.34	008	008	.23	.04	.03	.07	.09	025										
A41975	PROD		.31	1.34	008	009	.21	.04	.03	.08	.08	022										
A41975	PROD		.32	1.34	008	009	.21	.04	.03	.08	.08	022										
				** END	OF D	ATA	THIS	SHEET	**													

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

DECIMAL POSITIONS FOR ELEMENTS ARE INDICATED BY [illegible]

UNITED STATES STEEL

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

TIME: 05:06:05

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DR17374 01	R51375		0014856

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) In (mm) WALL: 0.430 (11.125) In (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	2	3	AVG	% SHEAR 1	2	3	AVG
							DEG										

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ___ L X L/T ___ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ___ OD/ID ___ L ___ L/T ___
END AREA INSPECTION (PLAIN END)		MPI ___ UT ___
SPECIAL END AREA (SEA) INSP.		MPI ___ UT ___
FULL LENGTH DRIFT	X	DRIFT MANDREL SIZE: LENGTH: 12 DIAMETER: 18.9365

ADDITIONAL NOTES/COMMENTS

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.

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 06/28/02

UNITED STATES STEEL

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

TIME: 05:05:08

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	VEHICLE I.D.
DR17374 01	R51181		LT8307

SOLD TO ADDRESS	MAIL TO ADDRESS	VENDOR
		USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055

SPECIFICATION AND GRADE

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

MATERIAL COND: AS ROLLED ✓ OD: 20.000(508.000) in (mm) WALL: 0.438 (11.125) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE / ORIENTATION	TEST COND.	GAUGE WIDTH	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE:	MIN HYDRO PSI	DWELL (SEC)
			IN	MIN: 56000 MAX 80000		MIN: 95000 MAX	MAX:	MIN: 19.0	MIN: MAX	1900	5
A41975	STRIP/L/B	AR	1.500	63500	.50	104000	0.61	30.0		1900	5
		**	END OF	DATA THIS	SHEET	**					

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, AQ - AS QUENCHED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
A41975	HEAT		.34	1.34	008	008	.23	.04	.03	.07	.09	025										
A41975	PROD		.31	1.34	008	009	.21	.04	.03	.08	.08	022										
A41975	PROD		.32	1.34	008	009	.21	.04	.03	.08	.08	022										
				**	END	OF	DATA	THIS	SHEET	**												

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

UNITED STATES STEEL

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

TIME: 05:05:08

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DR17374 01	R51181		0014421

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) In (mm) WALL: 0.438 (11.125) In (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING: DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS 1	FT-LBS 2	FT-LBS 3	FT-LBS AVG	% SHEAR 1	% SHEAR 2	% SHEAR 3	% SHEAR AVG
							DEG										

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID L X L/T 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD OD/ID L L/T
END AREA INSPECTION (PLAIN END)		MPI UT
SPECIAL END AREA (SEA) INSP.		MPI UT
FULL LENGTH DRIFT	X	DRIFT MANDREL SIZE: LENGTH: 12 DIAMETER: 18.9365

ADDITIONAL NOTES/COMMENTS

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.

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 06/14/02

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

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O NUMBER	VEHICLE I.D.
DR17374 01	R51375		LT0030

SOLD TO ADDRESS	MAIL TO ADDRESS	VENDOR
		USS TUBULAR PRODUCTS 2199 EAST 28TH ST. LORAIN, OH 44055

SPECIFICATION AND GRADE

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

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) in (mm) WALL: 0.438 (11.125) in (mm)

PRODUCT IDENTIFICATION	TENSILE TEST TYPE / ORIENTATION	TEST COND.	GAUGE WIDTH IN	YIELD PSI	EXT % .50	TENSILE PSI	Y/T	ELONG % (IN 2")	HARDNESS SCALE:	MIN HYDRO PSI	DWELL (SEC)
				MIN: 56000 MAX 80000		MIN: 95000 MAX	MAX:	MIN: 19.0	MIN: MAX	1900	5
A41977	STRIP/L/B	AR	1.500	68500	.50	107000	0.64	31.0		1900	5
		**	END OF	DATA THIS	SHEET	**					

LEGEND: L - LONGITUDINAL, U - UPSET, T - TRANSVERSE, N - NORMALIZED, QT - QUENCHED & TEMPERED, SR - STRESS RELIEVED, AR - AS ROLLED, AQ - AS QUENCHED, B - BODY, W - WELD

PRODUCT IDENTIFICATION	TYPE		C	MN	P	S	SI	CU	NI	CR	MO	AL	N	V	B	TI	CB	CO				C.E.*
A41977	HEAT		34	136	010	006	25	01	01	06	09	028										
A41977	PROD		32	137	009	008	23	01	01	07	09	024										
A41977	PROD		31	135	009	009	22	01	01	08	09	022										
				** END	OF D	ATA	THIS	SHEET	**													

*C.E. IS BASED ON THE FOLLOWING EQUATION(S):

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

UNITED STATES STEEL

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

TIME: 05:06:05

MILL ORDER/ITEM NO.	SHIPPERS NO.	P.O. NUMBER	
DR17374 01	R51375		0014856

MATERIAL COND: AS ROLLED

O.D.: 20.000(508.000) in (mm) WALL: 0.438 (11.125) in (mm)

PRODUCT IDENTIFICATION	FLAT	BEND	GRAIN SIZE	MIN COLLAPSE	CHARPY V-NOTCH IMPACT TESTING													
					DIR	TEST LOC.	TEMP	SIZE	TEST COND.	FT-LBS				% SHEAR			
										1	2	3	AVG	1	2	3	AVG
							DEG										

LEGEND: L - LONGITUDINAL T - TRANSVERSE B - BODY W - WELD HAZ - HEAT AFFECTED ZONE

TESTING / INSPECTION INFORMATION

TEST / INSPECTION	YES	RESULTS / COMMENTS
FULL LENGTH VISUAL	X	
FULL LENGTH EMI	X	OD X OD/ID ___ L X L/T ___ 10.0% NOTCH
FULL LENGTH MPI		
FULL LENGTH UT		OD ___ OD/ID ___ L ___ L/T ___
END AREA INSPECTION (PLAIN END)		MPI ___ UT ___
SPECIAL END AREA (SEA) INSP.		MPI ___ UT ___
FULL LENGTH DRIFT	X	DRIFT MANDREL SIZE: LENGTH: 12 DIAMETER: 18.9365

ADDITIONAL NOTES/COMMENTS

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.

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. AMADELL - MANAGER, Q.A.

DATE 06/28/02

CASING TALLY FORM

Date: 01/31/03

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

Section No.	Casing Length (feet)	Cumulative Length (feet)	Heat 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, and 1608 feet above bottom 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.

MILL INSPECTION CERTIFICATE

Purchaser :

Commodity : ERW PIPE MANUFACTURED IN ACCORDANCE WITH

Specification : API 5L 42nd Ed 2000,Grd BX42PSL1, ASTM A53B,ASME SA53

Certificate No : HL MPC1 12742

Date : 03/02/30

Purchase Order No : PP-18139

Certification : EN10204 3 1B

HL Job No : 305075 Item : 130

HALL LONGMORE
a division of D&H Piping Systems (Pty) Limited
Co Reg No 01/0794207
PO Box X024 WADEVILLE 1422
TEL (011) 824-1940
FAX (011) 824-2870

HALL LONGMORE

Dimensions	Quantity: Number of pieces	Quantity: Total Length Feet	Quantity: Mass Ton	Visual & Dimension	Hydro Test 2230 PSI	0° Flat Test	90° Flat Test	Ductility	Bend Test at Through
16 inch O / D x 6.9 inch Wall x 42 Feet Long	76	3192.000	119.824	ACCEPT.	ACCEPT.	ACCEPT.	ACCEPT.	GOOD	NR

Heat No & Coil No		C X100	Si X100	Mn X100	P X1000	S X1000	Cu X1000	Ni X1000	Cr X1000	Mo X1000	V X1000	Al X1000	N	N.D.E. UT		Tensile Test YS PSI(k)	Tensile Test UTS PSI(k)	Tensile Test Elong'n GL 2 inch	Hardness HB	Remarks
Spec	Min													ACCEPT.		42	60	27		
	Max	28		130	30	30														PILIST NO: 1124
K105647		16.2	23.4	107.7	18	7						44		H	TW		79.75			
4803GR		15	17	108	12	1	20	10	50	0	0	37.1		P	TS	43.355	71.93	37.4		
F112517		15.6	21.4	113.5	14	10						43		H	TW		72.935			
4280QK		13	21	108	6	4	10	10	30	0	0	36.0		P	TS	43.79	71.92	39.3		
F112977		16.5	19.4	102.1	17	9						44		H	TW		74.965			
4202LQ		14	20	96	5	2	10	10	30	0	0	41.0		P	TS	46.536	68.585	38.4		
F112986		16.1	20.9	110.1	10	6	10	10	31	7	6	39		H	TW		79.01			
4102PF		14	20	111	12	3	10	10	30	0	0	34.1		P	TS	45.24	69.165	38		
F112957		16.4	18.2	110	20	6						39		H	TW		73.66			
4280LQ		13	18	106	21	6	10	10	30	0	0	42.5		P	TS	46.11	69.185	38.7		
F112619		16.9	20.3	113.6	18	4						37		H	TW		79.46			
4181PD		15	21	106	8	7	10	20	30	0	0	34.4		P	TS	51.765	74.365	38.6		
Y105648		16.7	17.3	107	10	4						26		H	TW		79.01			
4880LD		15	17	106	9	5	20	10	40	0	0	21.6		P	TS	44.07	68.745	38		
K105649		15.9	21	110	10	6						46		H	TW		76.107			
4805KT		14	21	115	9	4	10	10	30	0	0	30.1		P	TS	51.198	69.165	38.4		
																	0			
																0	0			
																	0			
																0	0			
																	0			
																0	0			
																	0			
																0	0			

QUALITY MANAGER

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

We hereby certify that the material herein has been made and tested in accordance with the above mentioned Specification and Purchase Order

MILL INSPECTION CERTIFICATE

Purchaser :

Commodity : ERW PIPE MANUFACTURED IN ACCORDANCE WITH

Specification : API 5L Grd B/X42ASTM A53B,ASME SA53

Certificate No : HL MPCI 12742
Date : 03/02/30
Purchase Order No : PP-10139
Certification : EN10204 3.1B
HL Job No : 306075 Item : 130

HALL LONGMORE
a division of D&H Piping Systems (Pty) Limited
Co Reg No 01/07794207
PO Box X024 WADEVILLE 1422
TEL (011) 824-1840
FAX (011) 824-2070

HALL LONGMORE

Dimensions	Quantity: Number of pieces	Quantity: Total Length Feet	Quantity: Mass Ton	Visual & Dimension	Hydro Test 2250 PSI	0° Flat Test	90° Flat Test	Ductility	Bend Test id through
16 inch O/D x 0.5 inch Wall x 42 Feet Long	76	3192.000	119.624	ACCEPT.	ACCEPT.	ACCEPT	ACCEPT.	GOOD	NA

Heat No & Coil No		C X100	Si X100	Mn X100	P X1000	S X1000	Cu X1000	Ni X1000	Cr X1000	Mo X1000	V X1000	Al X1000	CE	N.D.E. UT		YS PSI (k)	UTS PSI (k)	Elong'n 2 inch	Hardness HB	Remarks
Spec	Min													ACCEPT.		42	60	27		PIUST NO. 1124
	Max	28		130	30	30								[redacted]						
K108947		16.2	23.4	107.7	18	7						44		H	TW		79.75			
4803GR		15	19	108	12	1	20	10	50	0	0	37.1		P	TS	43.355	71.91	37.6		
F112517		16.8	21.4	113.5	14	10						43		H	TW		72.935			
4280GK		13	22	108	6	4	10	10	30	0	0	36.0		P	TS	40.79	71.22	39.3		
F112877		16.8	18.4	100.1	17	9						44		H	TW	-	74.065			
4208LQ		14	20	98	5	2	10	10	30	0	0	41.6		P	TS	46.855	68.585	38.4		
F112886		16.1	20.9	110.1	10	0	10	10	32	7	0	28		H	TW		76.01			
4102PF		14	20	111	12	3	10	10	30	0	0	38.1		P	TS	45.24	69.165	38		
F112857		16.4	16.3	110	20	8						38		H	TW		73.60			
4280LQ		13	18	108	21	6	10	10	30	0	0	42.5		P	TS	46.11	69.165	38.7		
F112519		16.0	20.3	113.8	18	9						37		H	TW		76.40			
4101PQ		15	21	106	9	2	10	20	30	0	0	31.4		P	TS	51.765	74.305	38.6		
Y105648		16.7	17.3	107	10	8						28		H	TW		76.01			
4880LD		15	17	108	4	5	20	10	40	0	0	21.6		P	TS	44.37	69.745	38		
																	0			
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																	0			
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QUALITY MANAGER S. B[illegible]

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

We hereby certify that the material has been made and tested in accordance with the above mentioned Specification and Purchase Order

MILL INSPECTION CERTIFICATE

Purchaser :

Commodity : ERW PIPE MANUFACTURED IN ACCORDANCE WITH

Specification : API 5L Grd B/X42, ASTM A53B, ASME SA53

Certificate No : HL MPCI.12438
Date : 01/08/15
Purchase Order No :
Certification : EN10204 3.1B
HL Job No : 400111 Item : 10

HALL LONGMORE
a division of O&H Piping Systems (Pty) Limited
Co Reg No 01/07942/07
PO Box X024 WADEVILLE 1422
TEL (011) 824-1140
FAX (011) 824-2070

HALL LONGMORE

Dimensions	Quantity: Number of pieces	Quantity: Total Length Feet	Quantity: Mass Ton	Visual & Dimension	Hydro Test 2210 PSI	0° Flat Test	90° Flat Test	Ductility	Bend Test at through °
✓ 16 inch O.D. x 0.5 inch Wall x 42 Feet Long	10	420 000	15.786	ACCEPT.	ACCEPT.	ACCEPT.	ACCEPT.	ACCEPT.	N/A

Heat No & Coil No		Chemical Analysis: C X100	Si X100	Mn X100	P X1000	S X1000	Cu X1000	Ni X1000	Cr X1000	Mo X1000	V X1000	Al X1000	CE
Spec	Min												
	Max	28		130	30	30							
F102685		17	17.6	107.2	8	9						63	
4101LA		14	18	103	10	7	10	10	20	8	0	38.8	
F0113889		15.6	18.7	115	15	7						58	
4103DW		15	17	106	16	4	10	10	20	6	0	40.7	

Heat No & Coil No		N.D.E. UT		Tensile: YS PSI (k)	UTS PSI (k)	Elongth GL 2 inch	Hardness HB	Remarks
Spec	Min	ACCEPT.		42	60	% 27		PL/LIST NO:1091
	Max	[redacted]						
F102685		H	TW		77.72		158	
4101LA		P	TS	50.46	73.08	37.7		
F0113889		H	TW		78.75		158	
4103DW		P	TS	49.445	69.165	38.2		

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

We herby certify that the material herin has been made and tested in accordance with the above mentioned Specification and Purchase Order

QUALITY MANAGER [signature]

MILL INSPECTION CERTIFICATE

Purchaser :

Commodity : ERW PIPE MANUFACTURED IN ACCORDANCE WITH

Specification : API 5L 42nd Ed. 2000,Grd BX42PSL1, ASTM A53B,ASME SA53,

Certificate No : HL MPCI:12848
Date : 09/05/02
Purchase Order No : PP-17936
Certification : ERT0204 3.1B
HL Job No : 306075 Item : 139

HALL LONGMORE
a division of D&H Piping Systems (Pty) Limited
Co Reg No 01/07942/07
PO Box X024 WADEVILLE 1422
TEL (011) 824-1940
FAX (011) 824-2876

HALL LONGMORE

8-29-03; 9:23AM

Aug-29-03 10:50A

Dimensions	Quantity: Number of pieces	Quantity: Total Length Feet	Quantity: Mass Ton	Visual & Dimension	Hydro Test 2550 PSI	0° Flat Test	90° Flat Test	Ductility	Bend Test ... through
16 inch O/D x 0.5 inch Wall x 42 Feet Long	84	3528 000	132.437	ACCEPT.	ACCEPT.	ACCEPT	ACCEPT.	[illegible]	[illegible]

Heat No & Coil No		C X100	Si X100	Mn X100	P X1000	S X1000	Cu X1000	Ni X1000	Cr X1000	Mo X1000	V X1000	Al X1000	N	N.D.E. UT		Tensile Test YS PSI (N)	UTS PSI (N)	Elong'n GL 2 inch	Hardness	Remarks
Spec	Min																		N/A	
Spec	Max	25		130	30	30								ACCEPT.		42	[illegible]	27		
✓ K105617		16.2	23.4	107.7	18	7								[illegible]						P/LIST NO:1
4803GR		15	19	108	12	1						44		H	TW		79.771			
F112517		15.8	21.4	113.5	14	10	20	10	50	0	0	37.1		P	TS	43.366	71.38	37.8		
4280QK		13	22	105	6	4						43		H	TW		72.954			
F112977		16.5	19.4	102.1	17	9	10	10	30	0	0	39.9		P	TS	43.601	71.939	39.3		
4202LQ		14	20	95	5	2						44		H	TW		74.985			
F112988		16.1	20.9	116.1	10	6	10	10	30	0	0	41.8		P	TS	46.947	68.603	38.4		
4102PF		14	20	111	12	3	10	10	32	7	6	39		H	TW		78.03			
F112957		16.4	18.2	110	20	6	10	10	30	0	0	38.1		P	TS	45.252	69.163	38		
4260LQ		13	18	108	21	6						39		H	TW		73.679			
✓ F112197		15.9	20.3	113.6	18	8	10	10	30	0	0	42.5		P	TS	46.122	69.183	38.7		
4101PQ		15	21	105	8	2						37		H	TW		78.481			
Y105648		16.7	17.3	107	10	8	10	20	30	0	0	31.4		P	TS	51.779	74.404	38.6		
4880LD		15	17	106	9	5						28		H	TW		78.03			
							20	10	40	0	0	21.6		P	TS	44.392	69.763	30		
																	0			
																0	0			
																	0			
																0	0			
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																0	0			
																	0			
																0	0			
																	0			
																0	0			

QUALITY MANAGER

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

We hereby certify that the material herein has been made and tested in accordance with the above mentioned Specification and Purchase Order.

LONE STAR STEEL COMPANY
P.O. BOX 1000, HWY. 259 S. LONE STAR, TX 75668

ISO 9001 REGISTERED QUALITY SYSTEM

MATERIAL TEST REPORT

Print Date: 05/04/2000
Serial #: 200005122

[illegible] This report not to be reproduced except in full without written approval of the Director, Quality.

✓

LSO: 0109013
Item: 2
Heat: 33422 ✓
Lot: 80

Product: 16" 82.77 X56
.500" Wall
PE-BEV RG 3(35'-44' 9") BR
Specification: API 5L X56,X52,X46,X42,GR B,ASTM A53-99 GR B & ASME SA53 GR B. ERW. MANUFACTURED IN THE USA.

Customer Order: TBR4831
Customer Resource:
Customer Specification:

Sold to

Ship to

MTR Copies
Sold To: 1.
Ship To: 0

CHEMICAL ANALYSIS, %

	C	Mn	P	S	Si	Cu	Ni	Cr	Mo	Sn	Al	V	B	Cb	Ti	Ca	N	O	CEQ	DI	PCM
Heat	.17	1.14	.014	.003	.24	.01	.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	.16	1.10	.010	.004	.21	.02	.01	.008	.004	.002	.037	.069	.0001	.031	.003	.0029					

[illegible]

MECHANICAL PROPERTIES

Test	Dir	Loc	Notch	Yield KSI	Tensile KSI	Elong % in 2"	Area Red	Fracture Location	Y/T Ratio
1	T	B	N	56.5	77.5	40.0			.729
2	T	W	N	.0	78.7	.0		IW	.000
3									
4									

Grain size		RR-1
Martensite %		
Collapse, PSI		RR-2
Hydrotest, PSI	2980	
Flattening	P	RR-3

Impact Tests

Test	Dir	Loc	Size	Temp	Energy	% Shear	Lat Exp
1							
2							
3							
4							

Hardness

Scale	O.D.	M.W.	I.D.	Var	Body	Weld	HAZ	Surf

Remarks

Inspections Performed

VISUAL
ULTRASONIC WELDLINE

Tests are performed in accordance with one or more of the following tests methods: [illegible]

From the Office of:

A. T. Hanson, Jr.

Director of Quality

This is to certify that the product described herein was manufactured, sampled, tested, and/or inspected in accordance with the specification/order, and fulfills the requirements in such respects.

ARCADIS

Appendix C

Injection-Test Flowmeter and Transducer Calibration Sheets and Electronic Data

WATER SPECIALTIES

METER TEST RECORD

841404
SERIAL NUMBER
6/3/03
DATE

SOLD TO YOUNGQUIST BROTHERS, INC

SHIP TO SAME

FINAL TOTALIZER READING 6610000 GALLONS

WE CERTIFY THAT THE TEST RESULTS SHOWN IN THIS REPORT ARE CORRECT TO THE BEST OF OUR KNOWLEDGE AND BELIEF. OUR TEST FACILITY IS CERTIFIED REGULARLY TO AN ACCURACY OF 0.2% AND IS TRACEABLE TO THE NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY.

WATER SPECIALTIES CORPORATION

BY: Don [signature]

FLOW RATE G.P.M.	TESTED ACCURACY % ACCURACY	TESTED ACCURACY GEARS	TESTED ACCURACY INDEX	FLOW RATE G.P.M	NEW ACCURACY % ACCURACY	NEW ACCURACY GEARS	NEW ACCURACY INDEX
10050	100.5	20/42	2.1221				
4985	98.3	"	"				
2000	98.0	"	"				

TESTED AVERAGE ________ . . ________ TESTED INDEX

DESIRED AVERAGE ________ . . ________ NEW INDEX

STANDARD PIPE I.D. ________ STD. PIPE I.D.² ________ ________ STD. INDEX

SPECIAL PIPE I.D. ________ SPECIAL PIPE I.D.² ________ ________ NEW INDEX

CUSTOMER PIPE SIZE ________ O.D. ________ I.D. ________ % AS GEARED

	SPECIFICATION	INDEX
METER SIZE/MODEL NO.	20" MODEL ML-I1-HV	
TOTALIZER DIAL	10000 GALONS	
INDICATOR DIAL TOTALIZER GEARING	10000 GPM	

METER CHANGE GEARS
A/B = SEE ABOVE
GEAR RATIO

PROP. SIZE ________ TYPE ________ BEARINGS ________

ACCESSORIES ________

BUILT BY ________ DATE BUILT ________

WATER SPECIALTIES

FLOW METER MANUFACTURING RECORD

841404
SERIAL NUMBER

6/3/03
DATE

SOLD TO YOUNGQUIST BROTHERS, INC.

SHIP TO SAME

MARK BOX

PREPARED BY:

BUILT BY		DATE BUILT	
INV. #		INV. DATE	

METER ACCURACY PERCENTAGE CHANGE

TESTED ACCURACY			ESTABLISHED INDEX
DESIRED ACCURACY			NEW ADJUSTED INDEX

PIPE DIFFERENTIAL & CALIBRATION DATA

CUSTOMER PIPE SIZE		O.D.		I.D.	
STANDARD PIPE I.D.	19.220	STD I.D. AREA	290.133	2.1400	STD. INDEX
SPECIAL PIPE I.D.		SPECIAL I.D. AREA	=	2.1400	NEW INDEX

FLOW METER DETAIL

METER SIZE AND MODEL #	20" MODEL ML-04-HV
TOTALIZER PER COUNT	10000 GALLONS
ROFI SCALE / TOT GEARS	10000 GPM 15+/45F
REGISTER INDEX / TEST TIME	4.4562 (60.0 SEC.) HORIZONTAL

METER CHANGE GEARS

A/B= 20 / 42

GEAR RATIO .4762

ACTUAL METER INDEX 2.1221

% AS GEARED 99.2

CUSTOMER SPECIFICATIONS

MRP

ACCESSORIES

Transducer

In-Situ Inc.

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**

Calibration Date:	2003-05-30
Model:	PXD-261
Full Scale Pressure Range:	1723.7 kPa (250 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	7305

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
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)

Calibration Coefficients:

Linearity	1.7999
Scale	245.5637
Offset	-0.2085

PASS/FAIL Criteria:

	Applied Pressure	Current mA	
Zero Response	0.0207 kPa (0.0030 PSI)	4.014	PASSED
Full Scale Response	1723.7099 kPa (250.0030 PSI)	20.183	PASSED

	Minimum	Maximum	
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

In-Situ Inc.

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
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)

Calibration Coefficients:

Linearity	0.1320
Scale	19.8171
Offset	-0.0651

PASS/FAIL Criteria:

	Applied Pressure	Current mA	
Zero Response	0.0000 kPa (0.0000 PSI)	4.053	**PASSED**
Full Scale Response	137.8972 kPa (20.0003 PSI)	20.092	**PASSED**

	Minimum	Maximum	
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:

Document Version 1.00

Transducer

In-Situ Inc.

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:

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
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 (-0.0006 PSI)	3.974	**PASSED**
Full Scale Response	137.8958 kPa (20.0001 PSI)	20.096	**PASSED**

	Minimum	Maximum	
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:

Document Version 1.00

Transducer

In-Situ Inc.

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**

Calibration Date:	2003-03-31
Model:	PXD-261
Full Scale Pressure Range:	137.9 kPa (20 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	5610

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
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)

Calibration Coefficients:

Linearity	0.1208
Scale	19.8017
Offset	-0.0096

PASS/FAIL Criteria:

	Applied Pressure	Current mA	
Zero Response	-0.0007 kPa (-0.0001 PSI)	4.008	**PASSED**
Full Scale Response	137.8972 kPa (20.0003 PSI)	20.069	**PASSED**

	Minimum	Maximum	
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:

Transducer

In-Situ Inc.

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**

Calibration Date:	2003-04-09
Model:	PXD-261
Full Scale Pressure Range:	1723.7 kPa (250 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	8072

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
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)

Calibration Coefficients:

Linearity	1.7250
Scale	247.5363
Offset	-0.1575

PASS/FAIL Criteria:

	Applied Pressure	Current mA	
Zero Response	0.1172 kPa (0.0170 PSI)	4.011	PASSED
Full Scale Response	1723.7030 kPa (250.0020 PSI)	20.057	PASSED

	Minimum	Maximum	
Temperature Stability (%FS)	-0.061	0.106	PASSED
Repeatability at 15 C (%FS)	-0.003	0.002	PASSED

Hysteresis (%FS)	0.002	PASSED
Thermal Hysteresis (%FS)	0.006	PASSED

Test Performed By: LEH Test Verified By:

Document Version 1.00

Transducer Calibration Report

In-Situ Inc.

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
Model:	PXD-261
Full Scale Pressure Range:	689.5 kPa (100 PSI) Gauge
Manufacturer:	In-Situ
Serial Number:	7830

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
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 (-0.0150 PSI)	3.967	**PASSED**
Full Scale Response	689.4757 kPa (100.0000 PSI)	19.854	**PASSED**

	Minimum	Maximum	
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:

Document Version 1.00

Transducer

In-Situ Inc.

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

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
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)

Calibration Coefficients:

Linearity	0.1126
Scale	19.7741
Offset	-0.1684

PASS/FAIL Criteria:

	Applied Pressure	Current mA	
Zero Response	-0.0041 kPa (-0.0006 PSI)	4.136	**PASSED**
Full Scale Response	137.8965 kPa (20.0002 PSI)	20.226	**PASSED**

	Minimum	Maximum	
Temperature Stability (%FS)	-0.087	-0.017	**PASSED**
Repeatability at 15 C (%FS)	-0.007	0.008	**PASSED**

Hysteresis (%FS)	0.008	**PASSED**
Thermal Hysteresis (%FS)	0.002	**PASSED**

Test Performed By: LEH Test Verified By:

Document Version 1.00

Transducer

In-Situ Inc.

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**

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

Calibration Coefficients:

Linearity	0.1430
Scale	99.9804
Offset	-0.1895

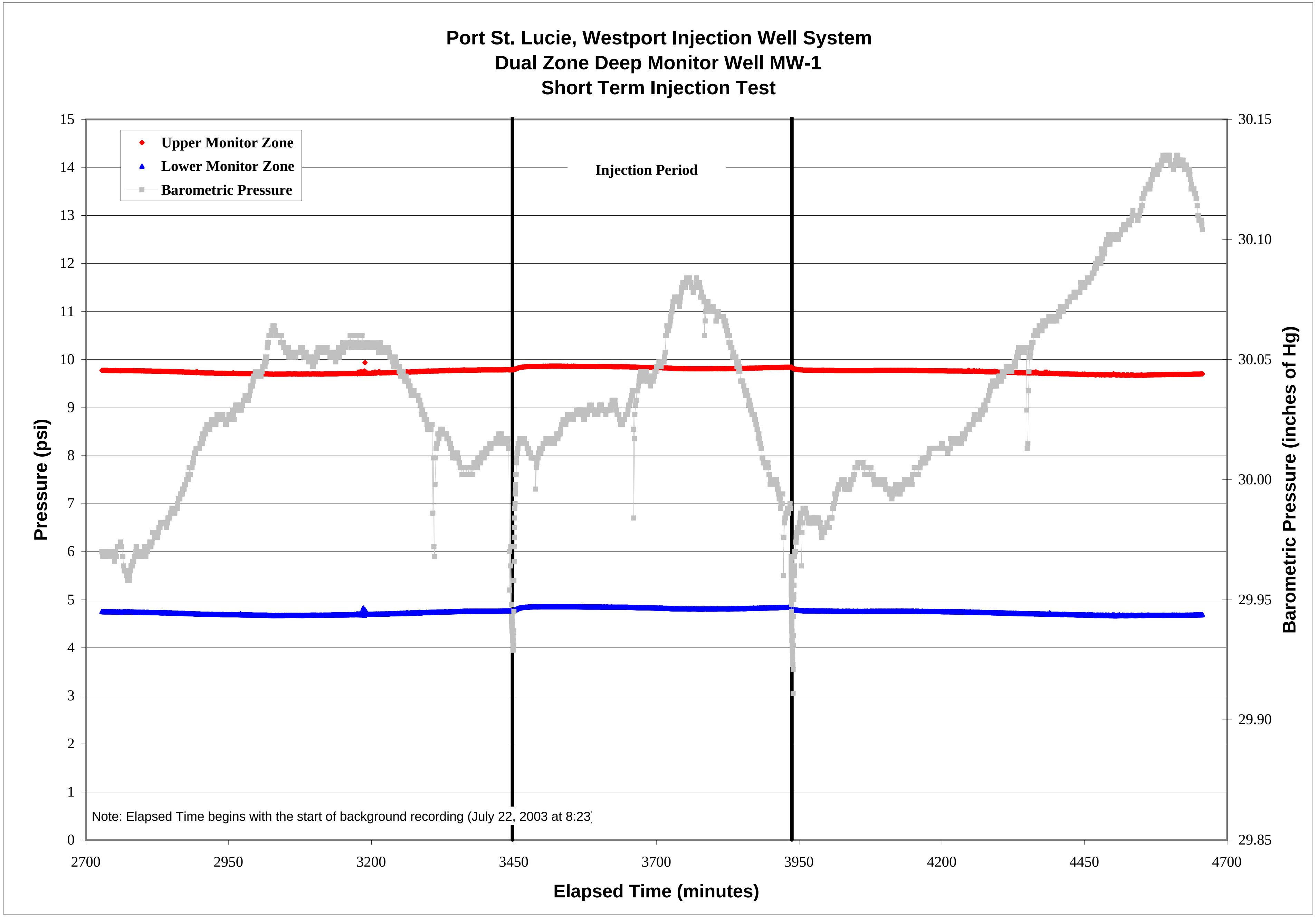
PASS/FAIL Criteria:

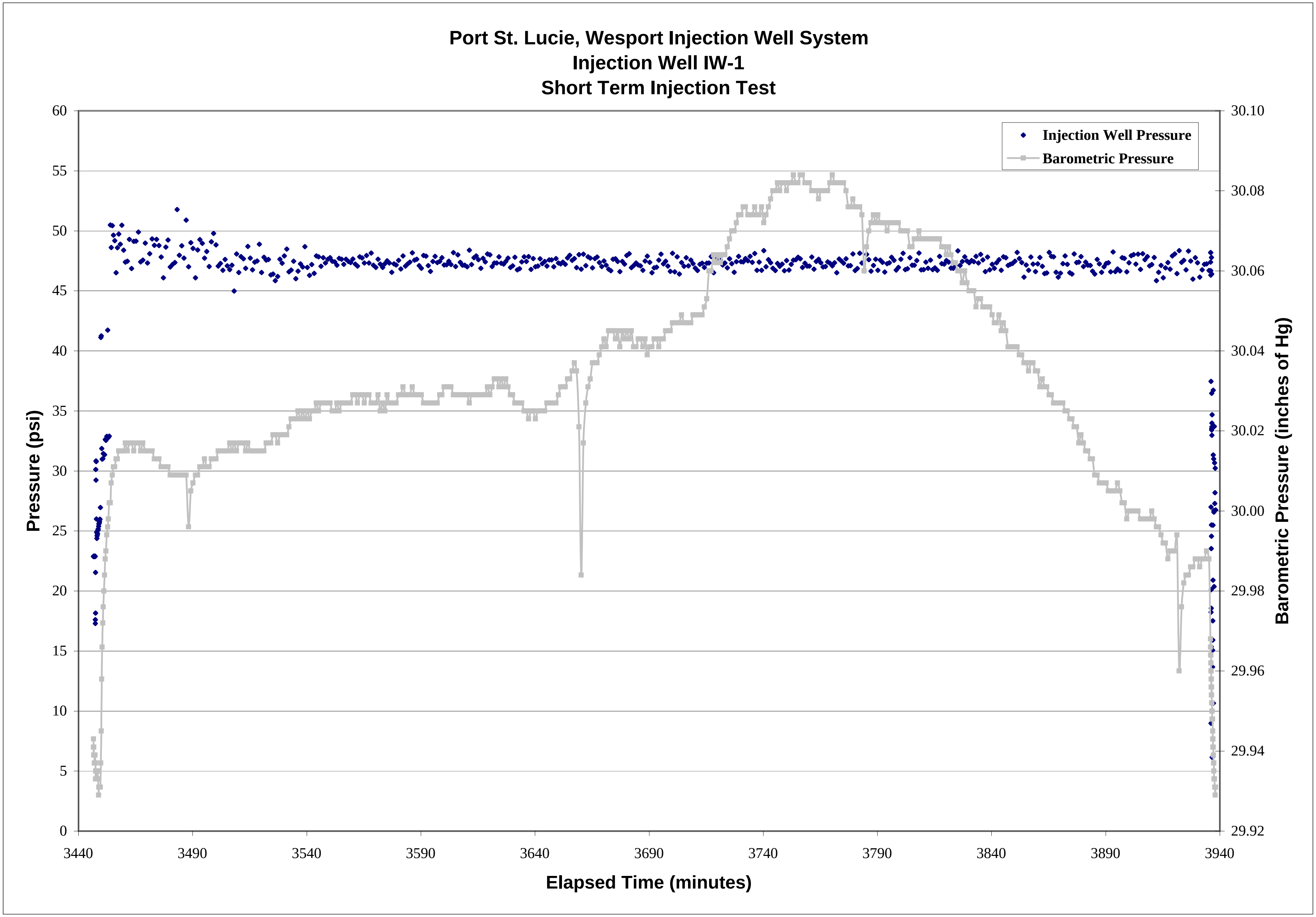
	Applied Pressure	Current mA	
Zero Response	-0.1034 kPa (-0.0150 PSI)	4.030	PASSED
Full Scale Response	689.4826 kPa (100.0010 PSI)	20.010	PASSED

	Minimum	Maximum	
Temperature Stability (%FS)	-0.093	0.115	PASSED
Repeatability at 15 C (%FS)	-0.003	0.013	PASSED

Hysteresis (%FS)	0.005	PASSED
Thermal Hysteresis (%FS)	0.011	PASSED

Test Performed By: LEH Test Verified By:


Port St. Lucie, Westport Injection Well System
Dual Zone Deep Monitor Well MW-1
Short Term Injection Test
Upper Monitor Zone
Lower Monitor Zone
Barometric Pressure
Injection Period
Pressure (psi)
Barometric Pressure (inches of Hg)
Elapsed Time (minutes)
Note: Elapsed Time begins with the start of background recording (July 22, 2003 at 8:23)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
29.85
29.90
29.95
30.00
30.05
30.10
30.15
2700
2950
3200
3450
3700
3950
4200
4450
4700



Port St. Lucie, Wesport Injection Well System
Injection Well IW-1
Short Term Injection Test
Injection Well Pressure
Barometric Pressure
Pressure (psi)
Barometric Pressure (inches of Hg)
Elapsed Time (minutes)
0
5
10
15
20
25
30
35
40
45
50
55
60
29.92
29.94
29.96
29.98
30.00
30.02
30.04
30.06
30.08
30.10
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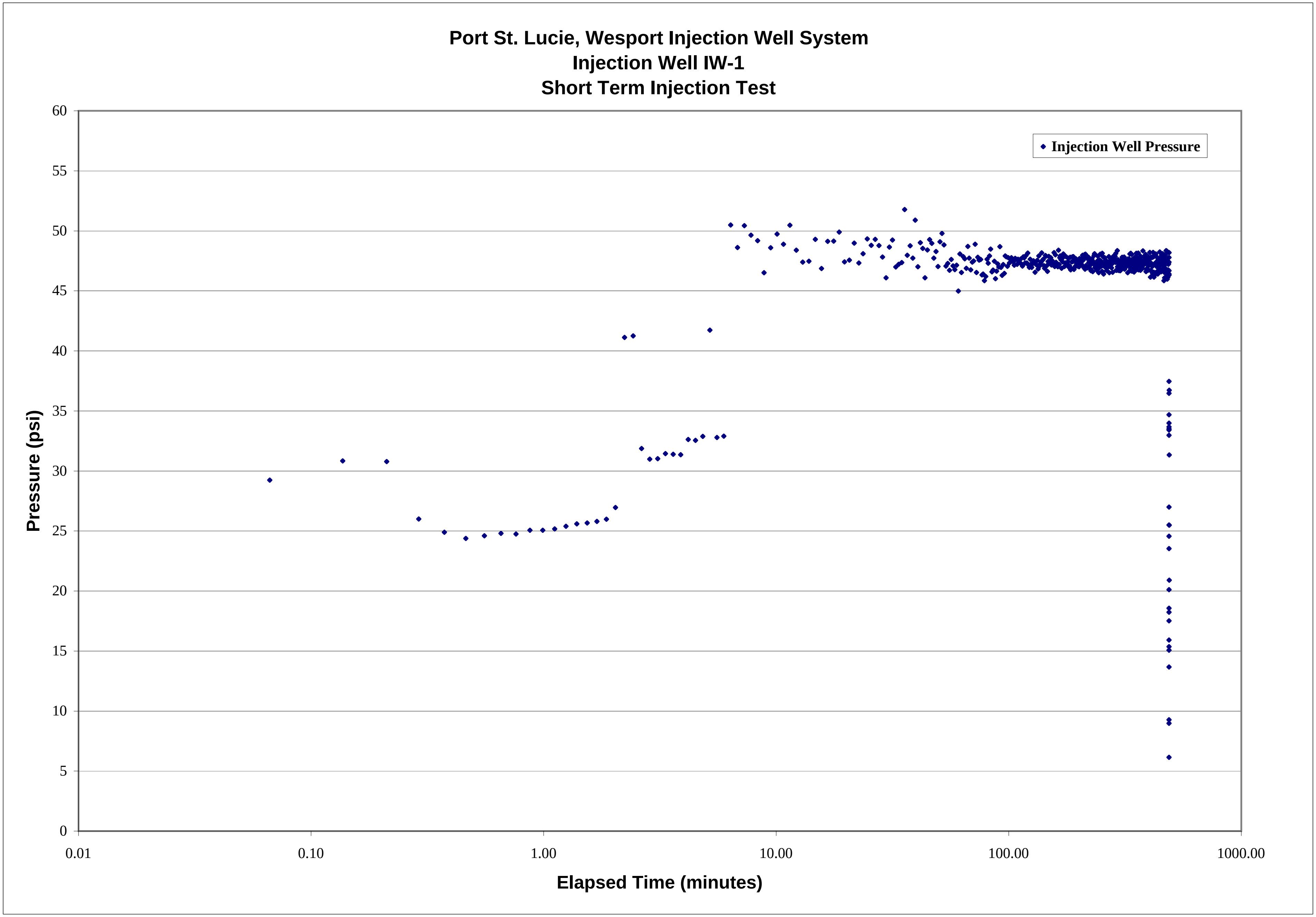
3790
3840
3890
3940


Port St. Lucie, Wesport Injection Well System
Injection Well IW-1
Short Term Injection Test
Injection Well Pressure
Pressure (psi)
Elapsed Time (minutes)
0
5
10
15
20
25
30
35
40
45
50
55
60
0.01
0.10
1.00
10.00
100.00
1000.00

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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

ARCADIS

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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 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, 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, sub-rounded; 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

ARCADIS

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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.	RPM: 20-24, WOB: 6K	70-90	20
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.	RPM: 20-24, WOB: 6K	90-110	20
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.	RPM: 20-24, WOB: 6- 8K	110-130	20
LIMESTONE WITH SHELL AND LITTLE SAND- Limestone, 70%, medium light gray (N6), intramicrite wackestone, slightly phosphatic, fine grained, soft to moderately hard, moderately- well cemented, numerous shell intraclasts; Shell, 20%, 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.	RPM: 20-26, WOB: 6- 8K	130-170	40

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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, sub-rounded 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 gray (5Y 4/1) to grayish yellow 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 grained, sub-rounded to angular.	RPM: 45-46 WOB: 3-4K	530 - 560	30
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 calcareous, very fine to fine grained.	RPM: 45-46 WOB: 3-4K	560 -570	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: 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

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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 COMMENTS	DEPTH INTERVAL	THICKNESS
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, sub-rounded, 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), micritic, moderately hard.	RPM: 40-46 WOB: 8-14K	840-910	70
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

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GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
grained; 10% light gray (N7), fine crystalline, partly slightly dolomitic, poorly to moderately- well cemented, very soft to moderately hard, vuggy, microporous; 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, 70%, very pale orange (10YR 8/2) to yellowish gray (5Y 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.	RPM: 36, WOB: 10K	1050-1060	10
LIMESTONE AND VERY LITTLE DOLOMITE- 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.	RPM: 36, WOB: 10K	1060-1070	10
LIMESTONE AND LITTLE DOLOMITE – Limestone, 90%, very pale orange (10YR 8/2) to yellowish gray (5Y 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.	RPM: 36, WOB: 10K	1070-1080	10
LIMESTONE AND SOME DOLOMITE – Limestone, 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.	RPM: 36, WOB: 10K	1080-1100	20
DOLOMITE AND LIMESTONE- Dolomite, 60%, dark gray (N3) to medium gray (N5) and grayish orange (10YR 7/4), very- fine crystalline to micritic, hard, slightly vuggy; Limestone, 40%, very pale orange (10YR 8/2) to yellowish gray (5Y 8/1), biosparitic, with some	RPM: 36, WOB: 10K	1100-1110	10

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
foraminifera, partly dolomitic, fine grained, poorly cemented, very soft to soft, vuggy, porous.			
LIMESTONE AND VERY LITTLE DOLOMITE- 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, vuggy, porous; Dolomite, 5%, grayish orange (10YR 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, WOB: 10K	1110-1140	30
LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), biosparitic, with some foraminifera, partly dolomitic, fine grained, poorly cemented, very soft to soft, vuggy, porous; Dolomite, 50%, moderate yellowish brown (10YR 5/4) to dark gray (N3), very- fine crystalline to micritic, moderately- well cemented, hard, slightly vuggy.	RPM: 36-44, WOB: 10K	1140-1150	10
LIMESTONE AND SOME DOLOMITE – Limestone, 75%, very pale orange (10YR 8/2) to yellowish gray (5Y 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.	RPM: 36-44, WOB: 10K	1150-1160	10
LIMESTONE AND DOLOMITE – Limestone, 50%, very pale orange (10YR 8/2) to yellowish gray (5Y 7/2), 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.	RPM: 36-44, WOB: 10-12K	1160-1170	10
LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange (10YR 8/2) to yellowish gray (5Y 8/1), biosparitic, fossiliferous (foraminifera and crinoids), partly dolomitic, fine grained, poorly cemented, very soft to soft, vuggy, porous; Dolomite, 30%, 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.	RPM: 36-44, WOB: 10-12K	1170-1180	10
DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown (10YR 6/2), little	RPM: 36 WOB: 12K	1180-1190	10

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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 vugs; Limestone,	RPM: 36-44 WOB: 10-15K	1270-1330	60

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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 cemented., soft.	RPM: 40-48 WOB: 15K	1330-1370	40
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 very soft, non- plastic.	RPM: 36 WOB: 10-18K	1410-1420	10
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

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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 yellowish brown (10YR 6/2), dark yellowish	RPM: 36-44 WOB: 15K	1620-1650	30

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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 cemented, soft, slightly vuggy.	RPM: 36-44 WOB: 15K	1660-1670	10
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 yellowish brown (10YR 5/4) and some	RPM: 32-36 WOB: 15-20K	1720-1730	10

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GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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 cemented, slightly vuggy.	RPM: 36 WOB: 15-20K	1750-1760	10
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

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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 yellowish brown (10YR	RPM: 43 WOB: 15K	1950-1960	10

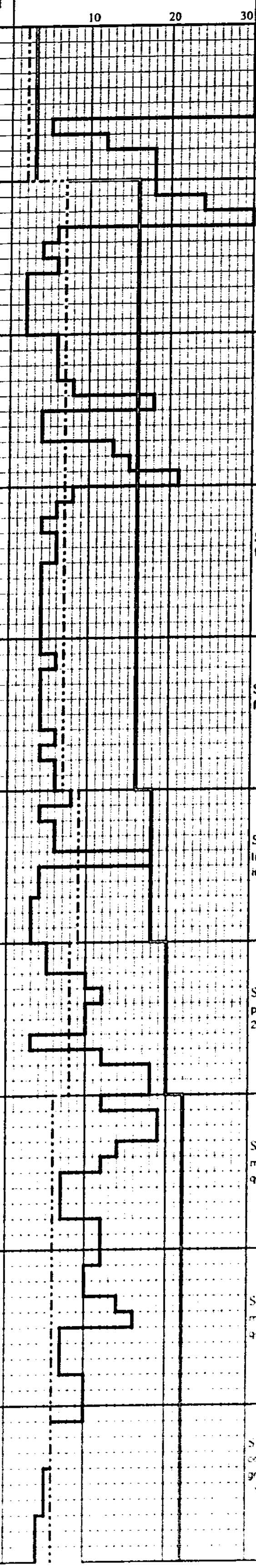
GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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, non-plastic; Lignite, trace, black (N2), micritic, soft.	RPM: 32 WOB: 15K	1980-1990	10
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

Injection Well No.1

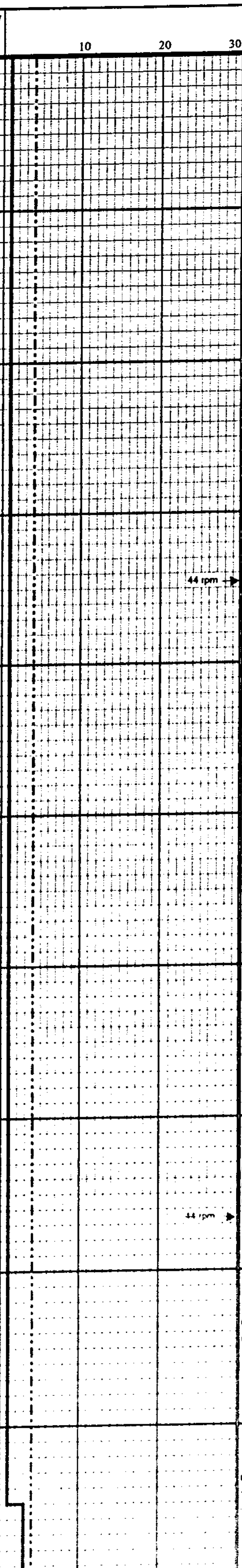
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
0-1	
1-2	LIMEROCK (compacted fill), SAND, ORGANIC MATTER.
2-3	
3-4	
4-5	
5-6	HARDPAN- Sand 70%, dark brown to black, cemented; Organic Matter, 30%, black, silty, decomposed.
6-7	
7-8	SANDY CLAY- Clay, 70%, light olive gray, silty, very soft, low plasticity; Sand, 30%, clear, quartz; Organic Matter, trace, brown, poorly decomposed.
8-9	
9-10	
10-11	
11-12	
12-13	
13-14	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.
14-15	
15-16	
16-17	
17-18	
18-19	
19-20	
20-21	
21-22	
22-23	
23-24	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.
24-25	
25-26	
26-27	
27-28	
28-29	
29-30	
30-31	
31-32	
32-33	
33-34	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.
34-35	
35-36	
36-37	
37-38	
38-39	
39-40	
40-41	
41-42	
42-43	
43-44	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.
44-45	
45-46	
46-47	
47-48	
48-49	
49-50	
50-51	
51-52	
52-53	
53-54	SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE– Shell, 50%, very pale orange to light brown, mostly shell fragments, some whole shells; Sand, 30%, clear, quartz, fine grained, Clay, 10%, medium gray, very soft, moderate plasticity, slightly phosphatic, Sandstone, 10%, light gray, quartz, fine grained, soft
54-55	
55-56	
56-57	
57-58	
58-59	
59-60	
60-61	
61-62	
62-63	
63-64	SANDSTONE WITH SAND AND SOME SHELL- Sandstone, 50%, medium gray, quartz, slightly phosphatic, fine to coarse grained, moderately hard. Sand, 30%, clear, quartz, fine to medium grained. Shell, 20%, very pale orange to light brown , fragments, some whole
64-65	
65-66	
66-67	
67-68	
68-69	
69-70	
70-71	
71-72	
72-73	
73-74	SHELL WITH SOME SAND AND SANDSTONE – Shell, 50%, very pale orange to light brown, mostly shell fragments to 0.4- inch, Sand, 25%, clear, quartz, fine grained. Sandstone, 25%, medium light gray, quartz with calcareous matrix, moderately hard
74-75	
75-76	
76-77	
77-78	
78-79	
79-80	
80-81	
81-82	
82-83	
83-84	SHELL WITH SOME SAND AND SANDSTONE – Shell, 50%, very pale orange to light brown, mostly shell fragments to 0.4- inch. Sand, 25%, clear, quartz, fine grained. Sandstone, 25%, medium light gray, quartz with calcareous matrix, moderately hard
84-85	
85-86	
86-87	
87-88	
88-89	
89-90	
90-91	
91-92	
92-93	SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND - Shell, 50%, very pale orange to light brown, mostly shell fragments to 0.4- inch. Limestone, 20%, medium light gray, intraclast (shells) grainstone, moderately hard. Sandstone, 15%, medium dark gray, quartz with calcareous matrix, moderately hard. Sand, 15%, clear to very light gray, mostly quartz
93-94	
94-95	
95-96	
96-97	
97-98	
98-99	
99-100	

Injection Well No.1

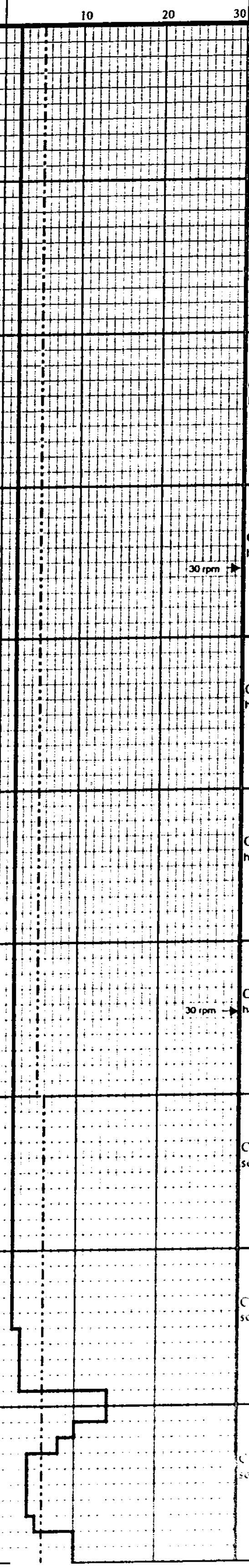
Penetration rate (min/ft): ——————
Weight On Bit (K lbs): - - - - - - - -
Rotary Speed (rpm): ══════



Depth Below Pad Level (ft)	Description
200-201	
201-202	
202-203	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 (more than 50%) amount of cement fragments in cuttings.
203-204	
204-205	
205-206	
206-207	
207-208	
208-209	
209-210	
210-211	
211-212	
212-213	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 (more than 50%) amount of cement fragments in cuttings.
213-214	
214-215	
215-216	
216-217	
217-218	
218-219	
219-220	
220-221	
221-222	
222-223	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 (more than 50%) amount of cement fragments in cuttings.
223-224	
224-225	
225-226	
226-227	
227-228	
228-229	
229-230	
230-231	
231-232	
232-233	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 (more than 50%) amount of cement fragments in cuttings.
233-234	
234-235	
235-236	
236-237	
237-238	
238-239	
239-240	
240-241	
241-242	
242-243	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 (more than 50%) amount of cement fragments in cuttings.
243-244	
244-245	
245-246	
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, 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
253-254	
254-255	
255-256	
256-257	
257-258	
258-259	
259-260	
260-261	
261-262	
262-263	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 (more than 50%) amount of cement fragments in cuttings
263-264	
264-265	
265-266	
266-267	
267-268	
268-269	
269-270	
270-271	
271-272	
272-273	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 (more than 50%) amount of cement fragments in cuttings
273-274	
274-275	
275-276	
276-277	
277-278	
278-279	
279-280	
280-281	
281-282	
282-283	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 (more than 50%) amount of cement fragments in cuttings
283-284	
284-285	
285-286	
286-287	
287-288	
288-289	
289-290	
290-291	
291-292	
292-293	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 (more than 50%) amount of cement fragments in cuttings
293-294	
294-295	
295-296	
296-297	
297-298	
298-299	
299-300	

Injection Well No.1

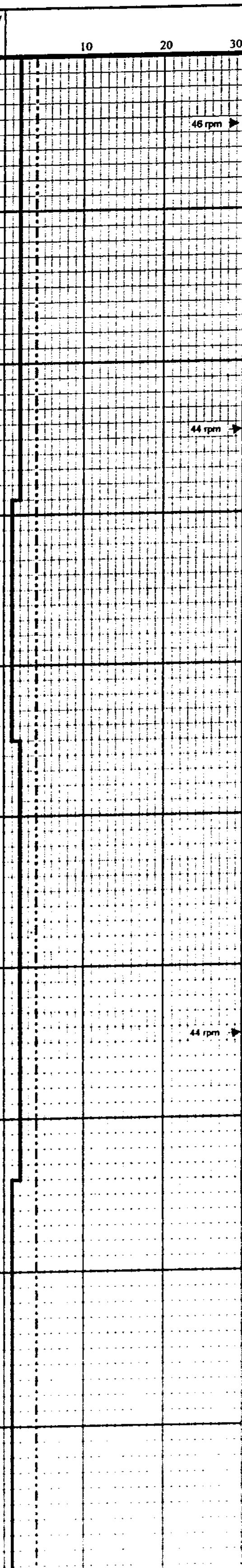
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
400-401	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, white to very pale orange.
401-402	
402-403	
403-404	
404-405	
405-406	
406-407	
407-408	
408-409	
409-410	
410-411	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, white to very pale orange.
411-412	
412-413	
413-414	
414-415	
415-416	
416-417	
417-418	
418-419	
419-420	
420-421	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, white to very pale orange.
421-422	
422-423	
423-424	
424-425	
425-426	
426-427	
427-428	
428-429	
429-430	
430-431	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, white to very pale orange.
431-432	
432-433	
433-434	
434-435	
435-436	
436-437	
437-438	
438-439	
439-440	
440-441	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, white to very pale orange.
441-442	
442-443	
443-444	
444-445	
445-446	
446-447	
447-448	
448-449	
449-450	
450-451	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, white to very pale orange.
451-452	
452-453	
453-454	
454-455	
455-456	
456-457	
457-458	
458-459	
459-460	
460-461	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, white to very pale orange
461-462	
462-463	
463-464	
464-465	
465-466	
466-467	
467-468	
468-469	
469-470	
470-471	CLAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
471-472	
472-473	
473-474	
474-475	
475-476	
476-477	
477-478	
478-479	
479-480	
480-481	CLAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
481-482	
482-483	
483-484	
484-485	
485-486	
486-487	
487-488	
488-489	
489-490	
490-491	CLAY WITH VERY LITTLE SAND - Clay, 95%, olive gray to grayish yellow green, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
491-492	
492-493	
493-494	
494-495	
495-496	
496-497	
497-498	
498-499	
499-500	

Injection Well No.1

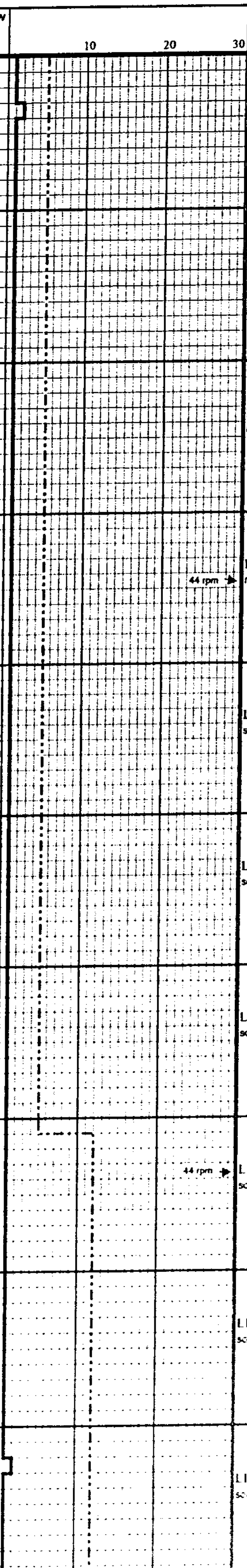
Penetration rate (min/ft): ————
Weight On Bit (K lbs): - - - - - - -
Rotary Speed (rpm): ════



Depth Below Pad Level (ft)	Description
600-601 601-602 602-603 603-604 604-605 605-606 606-607 607-608 608-609 609-610	CLAY – Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft, cohesive, non- plastic.
610-611 611-612 612-613 613-614 614-615 615-616 616-617 617-618 618-619 619-620	CLAY – Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft, cohesive, non- plastic.
620-621 621-622 622-623 623-624 624-625 625-626 626-627 627-628 628-629 629-630	CLAY – Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft, cohesive, non- plastic.
630-631 631-632 632-633 633-634 634-635 635-636 636-637 637-638 638-639 639-640	CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH LITTLE SAND – Clay, 70%, yellowish gray, calcareous, little silty, phosphatic, moderately soft to very soft, non-plastic, non-cohesive; Limestone, 20%, yellowish gray, soft to moderately hard; Sand, 10%, clear to light gray, mostly detritic.
640-641 641-642 642-643 643-644 644-645 645-646 646-647 647-648 648-649 649-650	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, poorly cemented; Shell, 5%, very pale orange to white.
650-651 651-652 652-653 653-654 654-655 655-656 656-657 657-658 658-659 659-660	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, poorly cemented; Shell, 5%, very pale orange to white
660-661 661-662 662-663 663-664 664-665 665-666 666-667 667-668 668-669 669-670	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, poorly cemented. Shell, 5%, very pale orange to white
670-671 671-672 672-673 673-674 674-675 675-676 676-677 677-678 678-679 679-680	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, poorly cemented. Shell, 5%, very pale orange to white
680-681 681-682 682-683 683-684 684-685 685-686 686-687 687-688 688-689 689-690	CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay, 70%, yellowish gray, calcareous, moderately soft to very soft, non-plastic, non-cohesive. Limestone, 25%, yellowish gray, soft to moderately hard, poorly cemented. Sand, 5%, clear to light gray,
690-691 691-692 692-693 693-694 694-695 695-696 696-697 697-698 698-699 699-700	CLAY WITH LITTLE LIMESTONE – Clay, 90%, mostly pale greenish yellow, mostly calcareous (marl), very soft to soft, highly cohesive, non-plastic to low plasticity, Limestone, 10%, grayish yellow green to white, soft, poorly cemented

Injection Well No.1

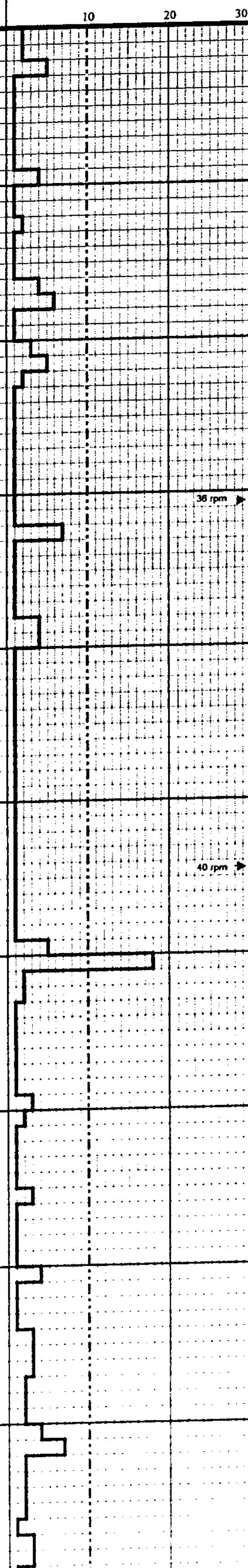
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
800-801	LIMESTONE – Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft, moderately well cemented.
801-802	
802-803	
803-804	
804-805	
805-806	
806-807	
807-808	
808-809	
809-810	
810-811	LIMESTONE – Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft, moderately well cemented.
811-812	
812-813	
813-814	
814-815	
815-816	
816-817	
817-818	
818-819	
819-820	
820-821	LIMESTONE – Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft, moderately well cemented.
821-822	
822-823	
823-824	
824-825	
825-826	
826-827	
827-828	
828-829	
829-830	
830-831	LIMESTONE – Limestone, 100%, yellowish gray, sparry grainstone, fine to medium grained, soft, moderately well cemented.
831-832	
832-833	
833-834	
834-835	
835-836	
836-837	
837-838	
838-839	
839-840	
840-841	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard.
841-842	
842-843	
843-844	
844-845	
845-846	
846-847	
847-848	
848-849	
849-850	
850-851	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard
851-852	
852-853	
853-854	
854-855	
855-856	
856-857	
857-858	
858-859	
859-860	
860-861	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard
861-862	
862-863	
863-864	
864-865	
865-866	
866-867	
867-868	
868-869	
869-870	
870-871	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard
871-872	
872-873	
873-874	
874-875	
875-876	
876-877	
877-878	
878-879	
879-880	
880-881	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard
881-882	
882-883	
883-884	
884-885	
885-886	
886-887	
887-888	
888-889	
889-890	
890-891	LIMESTONE – Limestone, 100%; yellowish gray, biosparitic, very soft to soft, poorly cemented, some light gray to medium light gray, microcrystalline, moderately hard
891-892	
892-893	
893-894	
894-895	
895-896	
896-897	
897-898	
898-899	
899-900	

Injection Well No.1

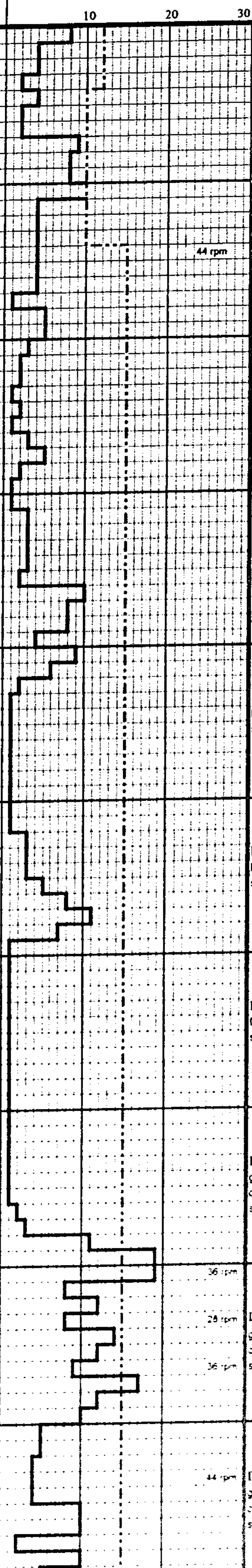
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
1000-1001	
1001-1002	
1002-1003	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, fossiliferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; Dolomite, 5%, grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1003-1004	
1004-1005	
1005-1006	
1006-1007	
1007-1008	
1008-1009	
1009-1010	
1010-1011	
1011-1012	
1012-1013	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, fossiliferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; Dolomite, 5%, grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1013-1014	
1014-1015	
1015-1016	
1016-1017	
1017-1018	
1018-1019	
1019-1020	
1020-1021	
1021-1022	
1022-1023	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, fossiliferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; Dolomite, 5%, grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1023-1024	
1024-1025	
1025-1026	
1026-1027	
1027-1028	
1028-1029	
1029-1030	
1030-1031	
1031-1032	
1032-1033	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, fossiliferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; Dolomite, 5%, grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1033-1034	
1034-1035	
1035-1036	
1036-1037	
1037-1038	
1038-1039	
1039-1040	
1040-1041	
1041-1042	
1042-1043	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, fossiliferous, little light gray, fine crystalline, partly slightly dolomitic, very soft to moderately hard; Dolomite, 5%, grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard, slightly vuggy.
1043-1044	
1044-1045	
1045-1046	
1046-1047	
1047-1048	
1048-1049	
1049-1050	
1050-1051	
1051-1052	
1052-1053	LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange to yellowish gray, biosparitic, very soft to soft. Dolomite, 30%, moderate olive brown, olive gray to medium gray, very fine to micro crystalline, hard, very well cemented
1053-1054	
1054-1055	
1055-1056	
1056-1057	
1057-1058	
1058-1059	
1059-1060	
1060-1061	
1061-1062	
1062-1063	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%; yellowish gray, biosparitic, very soft, poorly cemented, some very pale orange to light gray, dolomitic, very fine to microcrystalline, moderately hard. Dolomite, 5%, grayish orange to medium gray, finely crystalline to microcrystalline, moderately hard
1063-1064	
1064-1065	
1065-1066	
1066-1067	
1067-1068	
1068-1069	
1069-1070	
1070-1071	
1071-1072	
1072-1073	LIMESTONE AND LITTLE DOLOMITE – Limestone, 90%, very pale orange to yellowish gray, biosparitic, very soft to soft. Dolomite, 10%, dark gray to medium gray and grayish orange, very fine crystalline, hard, well cemented
1073-1074	
1074-1075	
1075-1076	
1076-1077	
1077-1078	
1078-1079	
1079-1080	
1080-1081	
1081-1082	
1082-1083	LIMESTONE AND SOME DOLOMITE – Limestone, 75%, very pale orange to yellowish gray, biosparitic, partly dolomitic, very soft to soft. Dolomite, 25%, moderate olive brown, olive gray to medium gray, very fine to microcrystalline, hard
1083-1084	
1084-1085	
1085-1086	
1086-1087	
1087-1088	
1088-1089	
1089-1090	
1090-1091	
1091-1092	
1092-1093	LIMESTONE AND SOME DOLOMITE – Limestone, 75%, very pale orange to yellowish gray, biosparitic, partly dolomitic, very soft to soft. Dolomite, 25%, moderate olive brown, olive gray to medium gray, very fine to microcrystalline, hard
1093-1094	
1094-1095	
1095-1096	
1096-1097	
1097-1098	
1098-1099	
1099-1100	

Injection Well No.1

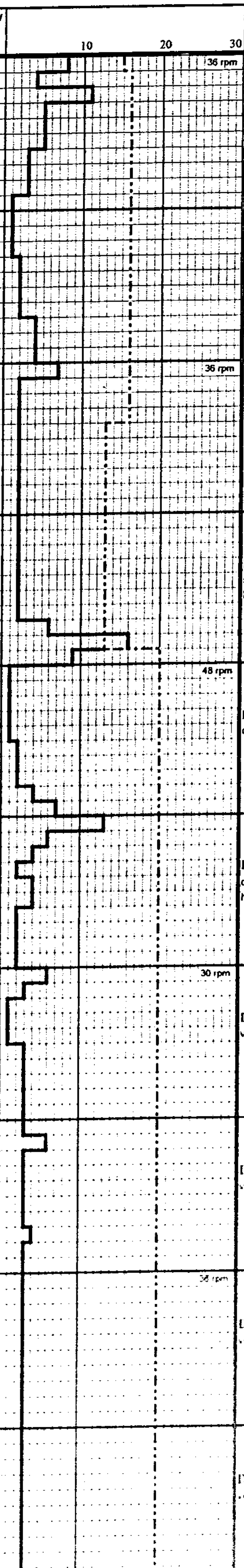
Penetration rate (min/ft): ———
Weight On Bit (K lbs): - - - - - -
Rotary Speed (rpm): ═══



Depth Below Pad Level (ft)	Description
1200-1201 1201-1202 1202-1203 1203-1204 1204-1205 1205-1206 1206-1207 1207-1208 1208-1209 1209-1210	DOLOMITE AND SOME LIMESTONE– Dolomite, 80%, pale yellowish brown to moderate yellowish brown and medium light gray, very-fine crystalline, moderately hard to hard; Limestone, 20%, very pale orange to yellowish gray, biosparitic, soft.
1210-1211 1211-1212 1212-1213 1213-1214 1214-1215 1215-1216 1216-1217 1217-1218 1218-1219 1219-1220	DOLOMITE AND SOME LIMESTONE– Dolomite, 80%, pale yellowish brown to moderate yellowish brown and medium light gray, very-fine crystalline, moderately hard to hard; Limestone, 20%, very pale orange to yellowish gray, biosparitic, soft.
1220-1221 1221-1222 1222-1223 1223-1224 1224-1225 1225-1226 1226-1227 1227-1228 1228-1229 1229-1230	DOLOMITE- Dolomite, 100%, pale yellowish brown to moderate yellowish brown and dark gray, very fine crystalline, moderately hard to hard.
1230-1231 1231-1232 1232-1233 1233-1234 1234-1235 1235-1236 1236-1237 1237-1238 1238-1239 1239-1240	DOLOMITE AND SOME LIMESTONE – Dolomite, 90%, pale yellowish brown, moderate yellowish brown and medium light gray to medium dark gray, very-fine crystalline, moderately hard to hard; Limestone, 10%, very pale orange, biosparitic, soft.
1240-1241 1241-1242 1242-1243 1243-1244 1244-1245 1245-1246 1246-1247 1247-1248 1248-1249 1249-1250	LIMESTONE AND DOLOMITE- Limestone, 60%, very pale orange, slightly fossiliferous, soft; Dolomite, 40%, pale yellowish brown, moderate yellowish brown and medium light gray to medium dark gray, sucrosic to very-fine crystalline, moderately hard to hard.
1250-1251 1251-1252 1252-1253 1253-1254 1254-1255 1255-1256 1256-1257 1257-1258 1258-1259 1259-1260	LIMESTONE AND DOLOMITE- Limestone, 60%, very pale orange, slightly fossiliferous, soft; Dolomite, 40%, pale yellowish brown, moderate yellowish brown and medium light gray to medium dark gray, sucrosic to very-fine crystalline, moderately hard to hard
1260-1261 1261-1262 1262-1263 1263-1264 1264-1265 1265-1266 1266-1267 1267-1268 1268-1269 1269-1270	LIMESTONE AND DOLOMITE- Limestone, 60%, very pale orange, slightly fossiliferous, soft; Dolomite, 40%, pale yellowish brown, moderate yellowish brown and medium light gray to medium dark gray, sucrosic to very-fine crystalline, moderately hard to hard
1270-1271 1271-1272 1272-1273 1273-1274 1274-1275 1275-1276 1276-1277 1277-1278 1278-1279 1279-1280	DOLOMITE WITH VERY LITTLE LIMESTONE; Dolomite, 95%, from pale yellowish brown to grayish olive green and greenish black with trace of medium light gray to medium gray, sucrosic to krypto-crystalline, hard to very hard. Limestone, 5%, very pale orange, mostly dolomitic, micritic, some biosparitic, soft to moderately hard
1280-1281 1281-1282 1282-1283 1283-1284 1284-1285 1285-1286 1286-1287 1287-1288 1288-1289 1289-1290	DOLOMITE WITH VERY LITTLE LIMESTONE; Dolomite, 95%, from pale yellowish brown to grayish olive green and greenish black with trace of medium light gray to medium gray, sucrosic to krypto-crystalline, hard to very hard. Limestone, 5%, very pale orange, mostly dolomitic, micritic, some biosparitic, soft to moderately hard
1290-1291 1291-1292 1292-1293 1293-1294 1294-1295 1295-1296 1296-1297 1297-1298 1298-1299 1299-1300	DOLOMITE WITH VERY LITTLE LIMESTONE; Dolomite, 95%, from pale yellowish brown to grayish olive green and greenish black with trace of medium light gray to medium gray, sucrosic to krypto-crystalline, hard to very hard. Limestone, 5%, very pale orange, mostly dolomitic, micritic, some biosparitic, soft to moderately hard

Injection Well No.1

Penetration rate (min/ft): ————
Weight On Bit (K lbs): - · - · - · -
Rotary Speed (rpm): ════



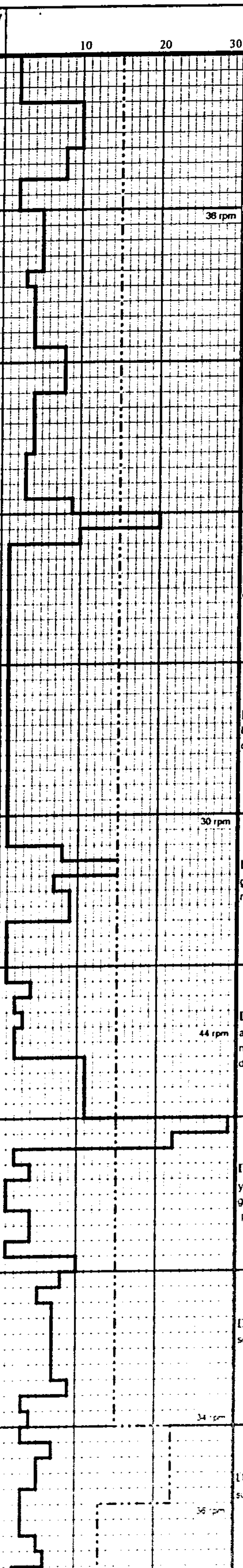
Depth Below Pad Level (ft)	Description
1400-1401	DOLOMITE AND VERY LITTLE LIMESTONE; Dolomite, 95%, from pale yellowish brown to grayish olive green with some medium light gray to medium gray, sucrosic to kryptocrystalline, hard to very hard; Limestone, 5%, very pale orange, grainstone, soft.
1401-1402	
1402-1403	
1403-1404	
1404-1405	
1405-1406	
1406-1407	
1407-1408	
1408-1409	
1409-1410	
1410-1411	LIMESTONE AND DOLOMITE– Limestone, 60%, very light gray, very soft to soft with little of yellowish gray, very calcareous, grainstone, moderately hard; Dolomite, 40%, from pale yellowish brown to grayish olive green, fine crystalline, hard.
1411-1412	
1412-1413	
1413-1414	
1414-1415	
1415-1416	
1416-1417	
1417-1418	
1418-1419	
1419-1420	
1420-1421	LIMESTONE AND SOME DOLOMITE- Limestone, 80%, very pale orange to grayish orange, biosparitic, moderately soft; Dolomite, 20%, moderate yellowish brown to dark yellowish brown, finely crystalline, hard.
1421-1422	
1422-1423	
1423-1424	
1424-1425	
1425-1426	
1426-1427	
1427-1428	
1428-1429	
1429-1430	
1430-1431	LIMESTONE AND SOME DOLOMITE- Limestone, 80%, very pale orange to grayish orange, biosparitic, moderately soft; Dolomite, 20%, moderate yellowish brown to dark yellowish brown, finely crystalline, hard.
1431-1432	
1432-1433	
1433-1434	
1434-1435	
1435-1436	
1436-1437	
1437-1438	
1438-1439	
1439-1440	
1440-1441	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to grayish orange and very little light gray, finely crystalline, hard; Limestone, 5%, very pale orange, grainstone, soft.
1441-1442	
1442-1443	
1443-1444	
1444-1445	
1445-1446	
1446-1447	
1447-1448	
1448-1449	
1449-1450	
1450-1451	LIMESTONE AND LITTLE DOLOMITE-Limestone, 90%, very pale orange to very light gray, oolitic grainstone, soft; Dolomite, 10%, pale yellowish brown to medium dark gray, finely- to micro- crystalline, hard
1451-1452	
1452-1453	
1453-1454	
1454-1455	
1455-1456	
1456-1457	
1457-1458	
1458-1459	
1459-1460	
1460-1461	DOLOMITE– Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, very little dark gray, sucrosic to microcrystalline, moderately hard to hard
1461-1462	
1462-1463	
1463-1464	
1464-1465	
1465-1466	
1466-1467	
1467-1468	
1468-1469	
1469-1470	
1470-1471	DOLOMITE- Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, very little dark gray, sucrosic to microcrystalline, moderately hard to hard
1471-1472	
1472-1473	
1473-1474	
1474-1475	
1475-1476	
1476-1477	
1477-1478	
1478-1479	
1479-1480	
1480-1481	DOLOMITE- Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, very little dark gray, sucrosic to microcrystalline, moderately hard to hard
1481-1482	
1482-1483	
1483-1484	
1484-1485	
1485-1486	
1486-1487	
1487-1488	
1488-1489	
1489-1490	
1490-1491	DOLOMITE- Dolomite, 100%, light brown to dark yellowish brown, finely crystalline, moderately soft, very little dark gray, sucrosic to microcrystalline, moderately hard to hard
1491-1492	
1492-1493	
1493-1494	
1494-1495	
1495-1496	
1496-1497	
1497-1498	
1498-1499	
1499-1500	

Injection Well No.1

Penetration rate (min/ft): ———

Weight On Bit (K lbs): - · - · - · -

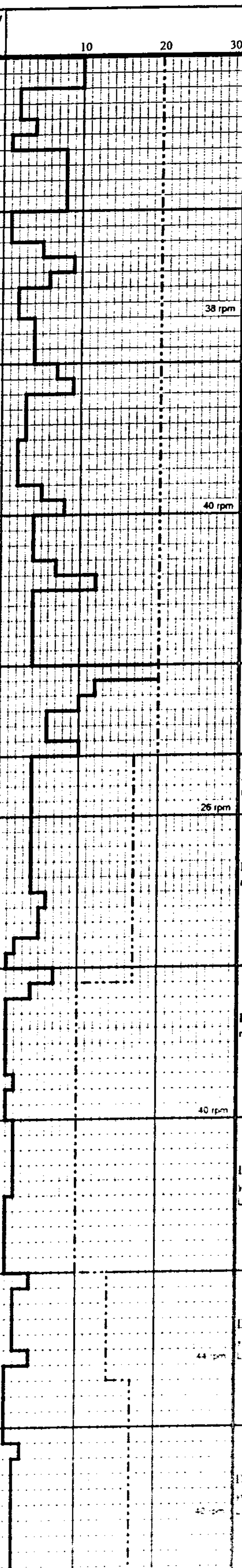
Rotary Speed (rpm): ═══



Depth Below Pad Level (ft)	Description
1600-1601	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;
1601-1602	
1602-1603	
1603-1604	
1604-1605	
1605-1606	
1606-1607	
1607-1608	
1608-1609	
1609-1610	
1610-1611	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;
1611-1612	
1612-1613	
1613-1614	
1614-1615	
1615-1616	
1616-1617	
1617-1618	
1618-1619	
1619-1620	
1620-1621	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 crystalline, moderately hard; Limestone, 15%, very pale orange, oolitic dolomitic grainstone, soft.
1621-1622	
1622-1623	
1623-1624	
1624-1625	
1625-1626	
1626-1627	
1627-1628	
1628-1629	
1629-1630	
1630-1631	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 crystalline, moderately hard; Limestone, 15%, very pale orange, oolitic dolomitic grainstone, soft.
1631-1632	
1632-1633	
1633-1634	
1634-1635	
1635-1636	
1636-1637	
1637-1638	
1638-1639	
1639-1640	
1640-1641	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 crystalline, moderately hard; Limestone, 15%, very pale orange, oolitic dolomitic grainstone, soft
1641-1642	
1642-1643	
1643-1644	
1644-1645	
1645-1646	
1646-1647	
1647-1648	
1648-1649	
1649-1650	
1650-1651	LIMESTONE AND SOME DOLOMITE– Limestone, 70%, very pale orange to yellowish gray, oolitic grainstone with nodules, partly dolomitic, soft, Dolomite, 30%, medium light gray to medium dark gray, microcrystalline, little pale yellowish, fine-crystalline, moderately hard
1651-1652	
1652-1653	
1653-1654	
1654-1655	
1655-1656	
1656-1657	
1657-1658	
1658-1659	
1659-1660	
1660-1661	DOLOMITE AND SOME LIMESTONE – Dolomite, 75%, pale yellowish brown, dark yellowish brown and grayish orange, sucrosic to fine crystalline, some medium light gray to medium dark gray, microcrystalline, moderately hard Limestone, 25%, very pale orange to yellowish gray, oolitic grainstone with nodules, partly dolomitic, soft
1661-1662	
1662-1663	
1663-1664	
1664-1665	
1665-1666	
1666-1667	
1667-1668	
1668-1669	
1669-1670	
1670-1671	DOLOMITE AND VERY LITTLE LIMESTONE– Dolomite, 95%, pale yellowish brown, dark 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, partly dolomitic soft
1671-1672	
1672-1673	
1673-1674	
1674-1675	
1675-1676	
1676-1677	
1677-1678	
1678-1679	
1679-1680	
1680-1681	DOLOMITE – Dolomite, 100%, pale yellowish brown, dark yellowish brown and grayish orange, sucrosic to fine crystalline some medium light gray to medium dark gray microcrystalline moderately hard
1681-1682	
1682-1683	
1683-1684	
1684-1685	
1685-1686	
1686-1687	
1687-1688	
1688-1689	
1689-1690	
1690-1691	DOLOMITE – Dolomite, 100%, pale yellowish brown, dark yellowish brown and grayish orange, sucrosic to fine crystalline some medium light gray to medium dark gray, microcrystalline, moderately hard
1691-1692	
1692-1693	
1693-1694	
1694-1695	
1695-1696	
1696-1697	
1697-1698	
1698-1699	
1699-1700	

Injection Well No.1

Penetration rate (min/ft): ————
Weight On Bit (K lbs): -·-·-·-·-
Rotary Speed (rpm): ═══════

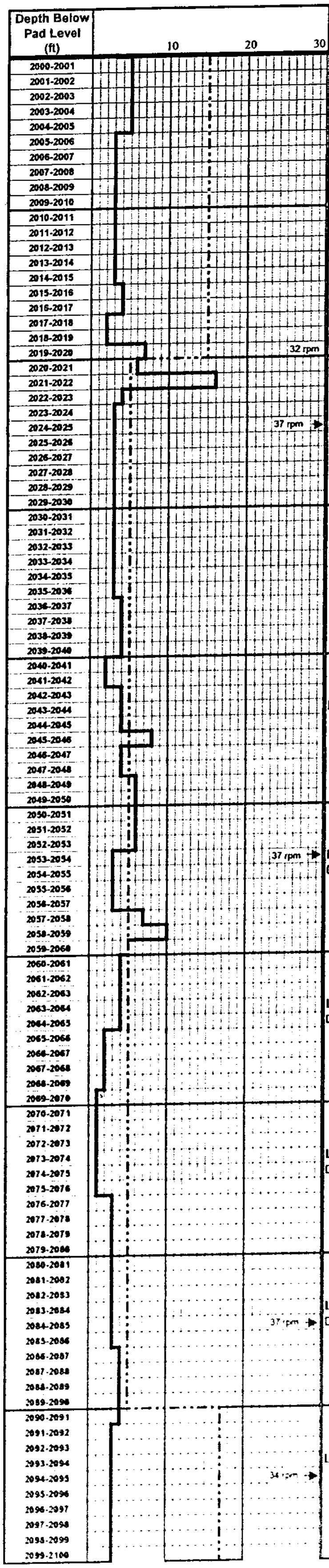


Depth Below Pad Level (ft)	Description
1800-1801	DOLOMITE – Dolomite, 100%, pale yellowish brown, dark yellowish brown, some dark gray, sucrosic to fine- crystalline, moderately hard.
1801-1802	
1802-1803	
1803-1804	
1804-1805	
1805-1806	
1806-1807	
1807-1808	
1808-1809	
1809-1810	
1810-1811	DOLOMITE – Dolomite, 100%, pale yellowish brown, dark yellowish brown, some dark gray, sucrosic to fine- crystalline, moderately hard.
1811-1812	
1812-1813	
1813-1814	
1814-1815	
1815-1816	
1816-1817	
1817-1818	
1818-1819	
1819-1820	
1820-1821	DOLOMITE AND SOME DOLOMITIC LIMESTONE– Dolomite, 80%, pale yellowish brown and grayish orange, little light gray, fine- to micro-crystalline, hard to very hard; Limestone, 20%, very pale orange to yellowish gray, mostly dolomitic, some chalky, fine crystalline, little pellitic, moderately hard to soft.
1821-1822	
1822-1823	
1823-1824	
1824-1825	
1825-1826	
1826-1827	
1827-1828	
1828-1829	
1829-1830	
1830-1831	DOLOMITE AND SOME DOLOMITIC LIMESTONE– Dolomite, 80%, pale yellowish brown and grayish orange, little light gray, fine- to micro-crystalline, hard to very hard; Limestone, 20%, very pale orange to yellowish gray, mostly dolomitic, some chalky, fine crystalline, little pellitic, moderately hard to soft.
1831-1832	
1832-1833	
1833-1834	
1834-1835	
1835-1836	
1836-1837	
1837-1838	
1838-1839	
1839-1840	
1840-1841	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, sucrosic, moderately hard to soft, moderately well to poorly cemented.
1841-1842	
1842-1843	
1843-1844	
1844-1845	
1845-1846	
1846-1847	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, little medium light gray, mostly fine- to krypto- crystalline, some sucrosic, moderately hard to very hard
1847-1848	
1848-1849	
1849-1850	
1850-1851	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, little medium light gray, mostly fine- to krypto- crystalline, some sucrosic, moderately hard to very hard
1851-1852	
1852-1853	
1853-1854	
1854-1855	
1855-1856	
1856-1857	
1857-1858	
1858-1859	
1859-1860	
1860-1861	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, little medium light gray, mostly fine- to krypto- crystalline, some sucrosic, moderately hard to very hard
1861-1862	
1862-1863	
1863-1864	
1864-1865	
1865-1866	
1866-1867	
1867-1868	
1868-1869	
1869-1870	
1870-1871	DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, pale yellowish brown to moderate yellowish brown, sucrosic, some light gray to medium light gray, very-fine crystalline, moderately hard to hard Limestone, 20%, very pale orange to yellowish gray, dolomitic, fine crystalline, dolomitic, soft
1871-1872	
1872-1873	
1873-1874	
1874-1875	
1875-1876	
1876-1877	
1877-1878	
1878-1879	
1879-1880	
1880-1881	DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, pale yellowish brown to moderate yellowish brown, sucrosic, some light gray to medium light gray, very-fine crystalline, moderately hard to hard Limestone, 20%, very pale orange to yellowish gray, dolomitic, fine crystalline, dolomitic, soft
1881-1882	
1882-1883	
1883-1884	
1884-1885	
1885-1886	
1886-1887	
1887-1888	
1888-1889	
1889-1890	
1890-1891	DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, pale yellowish brown to moderate yellowish brown, sucrosic, some light gray to medium light gray, very-fine crystalline, moderately hard to hard Limestone, 20%, very pale orange to yellowish gray, dolomitic, fine crystalline, dolomitic, soft
1891-1892	
1892-1893	
1893-1894	
1894-1895	
1895-1896	
1896-1897	
1897-1898	
1898-1899	
1899-1900	

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

Injection Well No.1

Penetration rate (min/ft): ———
Weight On Bit (K lbs): - - - - - -
Rotary Speed (rpm): ═══



Description

DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, moderate yellowish brown with little light gray, very-fine to fine crystalline, hard; Limestone, 20%, very pale orange to yellowish gray, very-fine grained, partially dolomitic, moderately hard.

LIMESTONE – Limestone, 100%, very pale orange, oolitic, very-fine to fine grained, soft.

DOLOMITE AND SOME DOLOMITIC LIMESTONE – Dolomite, 70%, pale yellowish brown to dark yellowish brown with little brownish black, very-fine to fine crystalline, hard; Limestone, 30%, very pale orange to pale yellowish brown, dolomitic, very-fine grained, moderately soft.

LIMESTONE – Limestone, 100%, very pale orange, oolitic, poorly cemented, soft.

LIMESTONE – Limestone, 100%, very pale orange, oolitic, poorly cemented, soft.

LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange, oolitic, soft; Dolomite, 5%, grayish brown, sucrosic, moderately hard.

LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange, oolitic, soft; Dolomite, 5%, grayish brown, sucrosic, moderately hard.

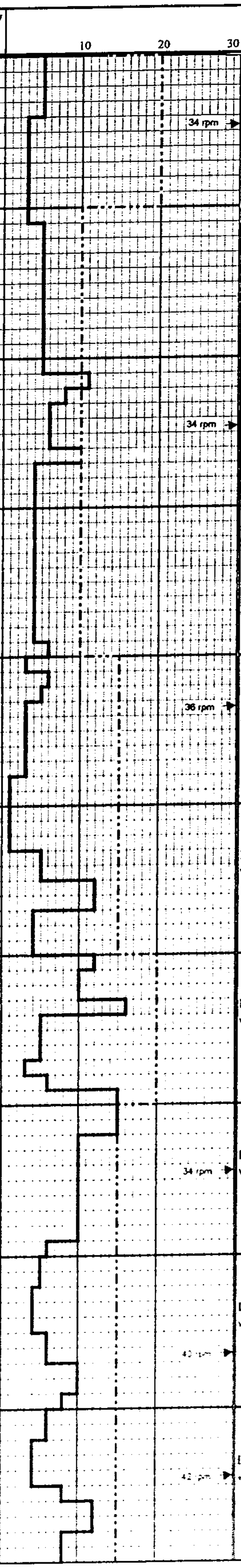
LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange, oolitic, soft; Dolomite, 5%, grayish brown, sucrosic, moderately hard.

LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange, oolitic, soft; Dolomite 5%, grayish brown, sucrosic, moderately hard

LIMESTONE – Limestone, 100%, very pale orange, oolitic, poorly cemented, soft

Injection Well No.1

Penetration rate (min/ft): ————
Weight On Bit (K lbs): - · - · - ·
Rotary Speed (rpm): ════

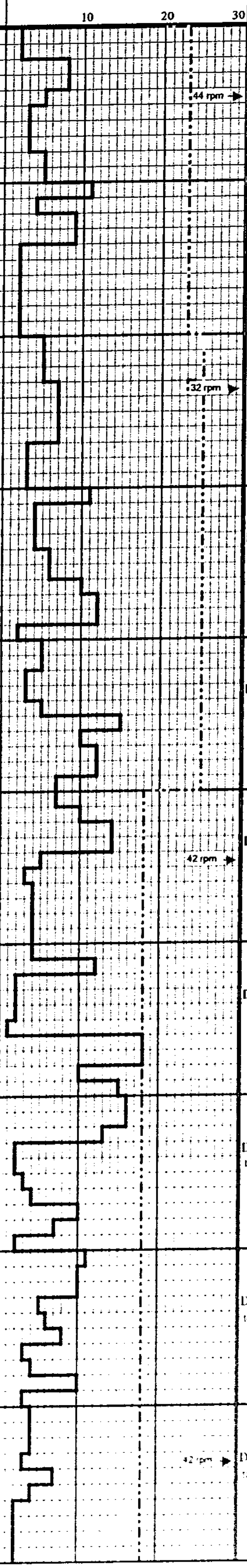


Depth Below Pad Level (ft)	Description
2200-2201	DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 80%, very pale orange to pale yellowish brown, very-fine grained, dolomitic, soft; Dolomite, 20%, moderate yellowish brown to dark yellowish brown, very-fine crystalline, moderately-well cemented, hard.
2201-2202	
2202-2203	
2203-2204	
2204-2205	
2205-2206	
2206-2207	
2207-2208	
2208-2209	
2209-2210	
2210-2211	DOLOMITIC LIMESTONE AND LITTLE DOLOMITE– Limestone, 90%, very pale orange, very-fine grained, dolomitic, soft; Dolomite, 10%, pale yellowish brown to moderate yellowish brown, very-fine crystalline, hard.
2211-2212	
2212-2213	
2213-2214	
2214-2215	
2215-2216	
2216-2217	
2217-2218	
2218-2219	
2219-2220	
2220-2221	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 to dark yellowish brown, very-fine crystalline, hard.
2221-2222	
2222-2223	
2223-2224	
2224-2225	
2225-2226	
2226-2227	
2227-2228	
2228-2229	
2229-2230	
2230-2231	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 to dark yellowish brown, very-fine crystalline, hard.
2231-2232	
2232-2233	
2233-2234	
2234-2235	
2235-2236	
2236-2237	
2237-2238	
2238-2239	
2239-2240	
2240-2241	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.
2241-2242	
2242-2243	
2243-2244	
2244-2245	
2245-2246	
2246-2247	
2247-2248	
2248-2249	
2249-2250	
2250-2251	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.
2251-2252	
2252-2253	
2253-2254	
2254-2255	
2255-2256	
2256-2257	
2257-2258	
2258-2259	
2259-2260	
2260-2261	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.
2261-2262	
2262-2263	
2263-2264	
2264-2265	
2265-2266	
2266-2267	
2267-2268	
2268-2269	
2269-2270	
2270-2271	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
2271-2272	
2272-2273	
2273-2274	
2274-2275	
2275-2276	
2276-2277	
2277-2278	
2278-2279	
2279-2280	
2280-2281	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
2281-2282	
2282-2283	
2283-2284	
2284-2285	
2285-2286	
2286-2287	
2287-2288	
2288-2289	
2289-2290	
2290-2291	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
2291-2292	
2292-2293	
2293-2294	
2294-2295	
2295-2296	
2296-2297	
2297-2298	
2298-2299	
2299-2300	

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

Injection Well No.1

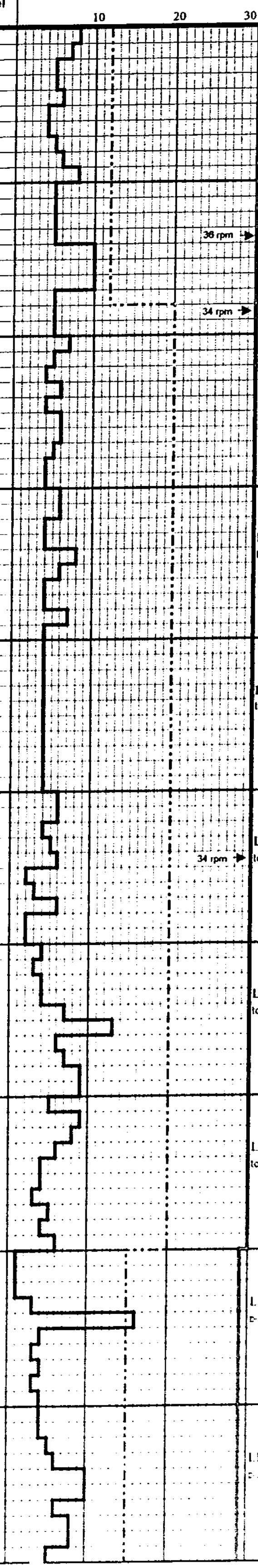
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
2400-2401	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown with little medium gray, micritic, partially sucrosic, moderately hard.
2401-2402	
2402-2403	
2403-2404	
2404-2405	
2405-2406	
2406-2407	
2407-2408	
2408-2409	
2409-2410	
2410-2411	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown with little medium gray, micritic, partially sucrosic, moderately hard.
2411-2412	
2412-2413	
2413-2414	
2414-2415	
2415-2416	
2416-2417	
2417-2418	
2418-2419	
2419-2420	
2420-2421	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, micritic, hard.
2421-2422	
2422-2423	
2423-2424	
2424-2425	
2425-2426	
2426-2427	
2427-2428	
2428-2429	
2429-2430	
2430-2431	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, micritic, hard.
2431-2432	
2432-2433	
2433-2434	
2434-2435	
2435-2436	
2436-2437	
2437-2438	
2438-2439	
2439-2440	
2440-2441	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, micritic, hard.
2441-2442	
2442-2443	
2443-2444	
2444-2445	
2445-2446	
2446-2447	
2447-2448	
2448-2449	
2449-2450	
2450-2451	DOLOMITE – Dolomite, 100%, dusky yellowish brown, micritic, hard.
2451-2452	
2452-2453	
2453-2454	
2454-2455	
2455-2456	
2456-2457	
2457-2458	
2458-2459	
2459-2460	
2460-2461	DOLOMITE – Dolomite, 100%, dusky yellowish brown, micritic, hard.
2461-2462	
2462-2463	
2463-2464	
2464-2465	
2465-2466	
2466-2467	
2467-2468	
2468-2469	
2469-2470	
2470-2471	DOLOMITE – Dolomite, 100%, dark yellowish brown to dusky yellowish brown, some very light gray to medium dark gray, micritic, hard
2471-2472	
2472-2473	
2473-2474	
2474-2475	
2475-2476	
2476-2477	
2477-2478	
2478-2479	
2479-2480	
2480-2481	DOLOMITE – Dolomite, 100%, dark yellowish brown to dusky yellowish brown, some very light gray to medium dark gray, micritic, hard
2481-2482	
2482-2483	
2483-2484	
2484-2485	
2485-2486	
2486-2487	
2487-2488	
2488-2489	
2489-2490	
2490-2491	DOLOMITE – Dolomite, 100%, dark yellowish brown to dusky yellowish brown, some very light gray to medium dark gray, micritic, hard
2491-2492	
2492-2493	
2493-2494	
2494-2495	
2495-2496	
2496-2497	
2497-2498	
2498-2499	
2499-2500	

Injection Well No.1

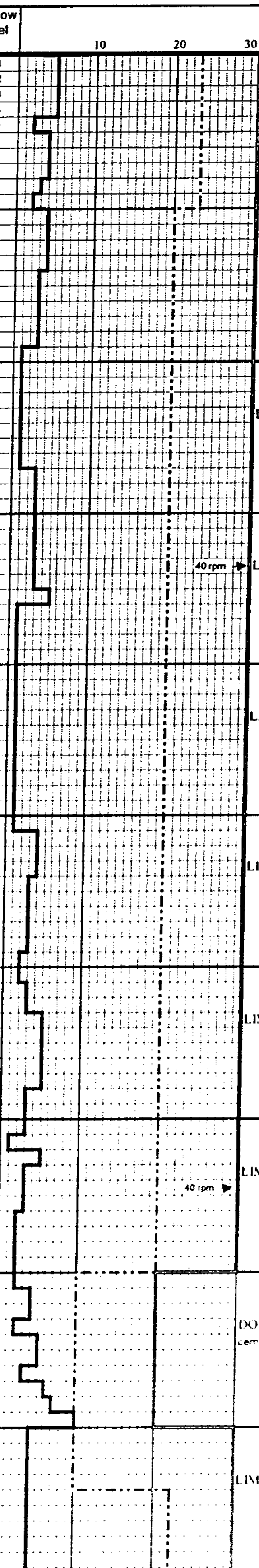
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
2600-2601	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft.
2601-2602	
2602-2603	
2603-2604	
2604-2605	
2605-2606	
2606-2607	
2607-2608	
2608-2609	
2609-2610	
2610-2611	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft.
2611-2612	
2612-2613	
2613-2614	LIMESTONE- Limestone, 100%, yellowish gray, with some smudges of darker material, fine grained to very fine crystalline, mostly slightly dolomitic, moderately well to well cemented, moderately hard to hard.
2614-2615	
2615-2616	
2616-2617	
2617-2618	
2618-2619	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft.
2619-2620	
2620-2621	
2621-2622	
2622-2623	
2623-2624	
2624-2625	
2625-2626	
2626-2627	
2627-2628	
2628-2629	
2629-2630	
2630-2631	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft.
2631-2632	
2632-2633	
2633-2634	
2634-2635	
2635-2636	
2636-2637	
2637-2638	
2638-2639	
2639-2640	
2640-2641	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft.
2641-2642	
2642-2643	
2643-2644	
2644-2645	
2645-2646	
2646-2647	
2647-2648	
2648-2649	
2649-2650	
2650-2651	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft
2651-2652	
2652-2653	
2653-2654	
2654-2655	
2655-2656	
2656-2657	
2657-2658	
2658-2659	
2659-2660	
2660-2661	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft
2661-2662	
2662-2663	
2663-2664	
2664-2665	
2665-2666	
2666-2667	
2667-2668	
2668-2669	
2669-2670	
2670-2671	LIMESTONE- Limestone, 100%, yellowish gray, little very pale orange and chalky, fine grained, poorly to moderately well cemented, soft
2671-2672	
2672-2673	
2673-2674	
2674-2675	
2675-2676	
2676-2677	
2677-2678	
2678-2679	
2679-2680	
2680-2681	LIMESTONE- Limestone, 100%, very pale orange, yellowish gray and some grayish orange with black specs, fine grained, poorly to moderately well cemented, slightly dolomitic, soft to moderately hard
2681-2682	
2682-2683	
2683-2684	
2684-2685	
2685-2686	
2686-2687	
2687-2688	
2688-2689	
2689-2690	
2690-2691	LIMESTONE- Limestone, 100%, very pale orange, yellowish gray and some grayish orange with black specs, fine grained, poorly to moderately well cemented, slightly dolomitic, soft to moderately hard
2691-2692	
2692-2693	
2693-2694	
2694-2695	
2695-2696	
2696-2697	
2697-2698	
2698-2699	
2699-2700	

Injection Well No.1

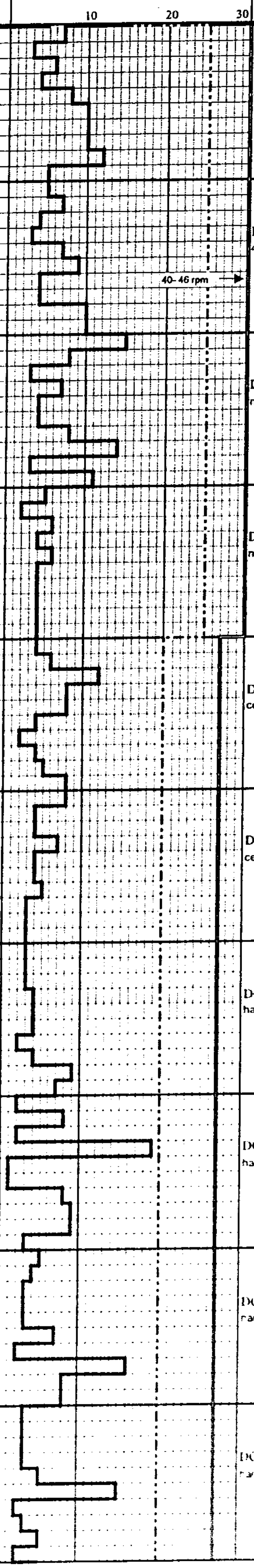
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
2800-2801	
2801-2802	
2802-2803	
2803-2804	LIMESTONE AND VERY LITTLE DOLOMITE- Limestone, 95%, very pale orange, some yellowish gray, poorly to moderately well cemented, soft; Dolomile, 5%, moderately yellowish brown lo dark yellowish brown, micritic, well cemented, hard.
2804-2805	
2805-2806	
2806-2807	
2807-2808	
2808-2809	
2809-2810	
2810-2811	
2811-2812	
2812-2813	
2813-2814	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2814-2815	
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	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2834-2835	
2835-2836	
2836-2837	
2837-2838	
2838-2839	
2839-2840	
2840-2841	
2841-2842	
2842-2843	
2843-2844	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2844-2845	
2845-2846	
2846-2847	
2847-2848	
2848-2849	
2849-2850	
2850-2851	
2851-2852	
2852-2853	
2853-2854	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2854-2855	
2855-2856	
2856-2857	
2857-2858	
2858-2859	
2859-2860	
2860-2861	
2861-2862	
2862-2863	
2863-2864	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2864-2865	
2865-2866	
2866-2867	
2867-2868	
2868-2869	
2869-2870	
2870-2871	
2871-2872	
2872-2873	
2873-2874	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft.
2874-2875	
2875-2876	
2876-2877	
2877-2878	
2878-2879	
2879-2880	
2880-2881	
2881-2882	
2882-2883	
2883-2884	DOLOMITE AND LIMESTONE- Dolomite, 70%, moderately yellowish brown to pale brown, well cemented, moderately hard; Limestone, 30%, very pale orange, poorly to moderately well cemented, soft
2884-2885	
2885-2886	
2886-2887	
2887-2888	
2888-2889	
2889-2890	
2890-2891	
2891-2892	
2892-2893	
2893-2894	LIMESTONE- Limestone, 100%, very pale orange, poorly to moderately well cemented, soft
2894-2895	
2895-2896	
2896-2897	
2897-2898	
2898-2899	
2899-2900	

Injection Well No.1

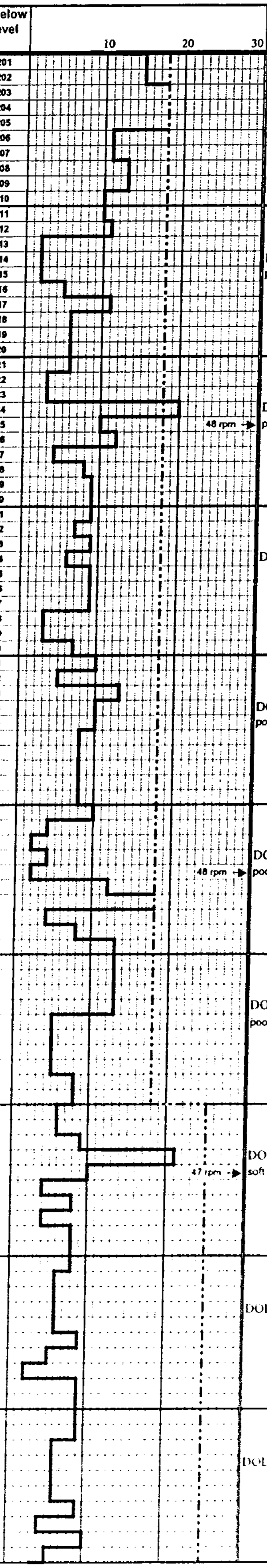
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
3000-3001	LIMESTONE AND DOLOMITE – Limestone, 60%, very pale orange, poorly cemented, soft; Dolomite, 40%, pale yellowish brown to moderate yellowish brown, poorly cemented, moderately hard to soft.
3001-3002	
3002-3003	
3003-3004	
3004-3005	
3005-3006	
3006-3007	
3007-3008	
3008-3009	
3009-3010	
3010-3011	LIMESTONE AND DOLOMITE – Limestone, 60%, very pale orange, poorly cemented, soft; Dolomite, 40%, pale yellowish brown to moderate yellowish brown, poorly cemented, moderately hard to soft.
3011-3012	
3012-3013	
3013-3014	
3014-3015	
3015-3016	
3016-3017	
3017-3018	
3018-3019	
3019-3020	
3020-3021	DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, pale yellowish brown to pale brown, moderately-well cemented, hard; Limestone, 30%, very pale orange, poorly cemented, soft.
3021-3022	
3022-3023	
3023-3024	
3024-3025	
3025-3026	
3026-3027	
3027-3028	
3028-3029	
3029-3030	
3030-3031	DOLOMITE AND LITTLE LIMESTONE – Dolomite, 90%, pale yellowish brown to pale brown, moderately-well cemented, hard; Limestone, 10%, very pale orange, poorly cemented, soft
3031-3032	
3032-3033	
3033-3034	
3034-3035	
3035-3036	
3036-3037	
3037-3038	
3038-3039	
3039-3040	
3040-3041	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, moderately-well cemented, hard.
3041-3042	
3042-3043	
3043-3044	
3044-3045	
3045-3046	
3046-3047	
3047-3048	
3048-3049	
3049-3050	
3050-3051	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, moderately-well cemented, hard
3051-3052	
3052-3053	
3052-3054	
3054-3055	
3055-3056	
3056-3057	
3057-3058	
3058-3059	
3059-3060	
3060-3061	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, moderately-well cemented, hard
3061-3062	
3062-3063	
3063-3064	
3064-3065	
3065-3066	
3066-3067	
3067-3068	
3068-3069	
3069-3070	
3070-3071	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, moderately-well cemented, hard
3071-3072	
3072-3073	
3073-3074	
3074-3075	
3075-3076	
3076-3077	
3077-3078	
3078-3079	
3079-3080	
3080-3081	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, moderately-well cemented, hard
3081-3082	
3082-3083	
3083-3084	
3084-3085	
3085-3086	
3086-3087	
3087-3088	
3088-3089	
3089-3090	
3090-3091	DOLOMITE – Dolomite, 100%, pale yellowish brown to dark yellowish brown, moderately-well cemented, hard
3091-3092	
3092-3093	
3093-3094	
3094-3095	
3095-3096	
3096-3097	
3097-3098	
3098-3099	
3099-3100	

Injection Well No.1

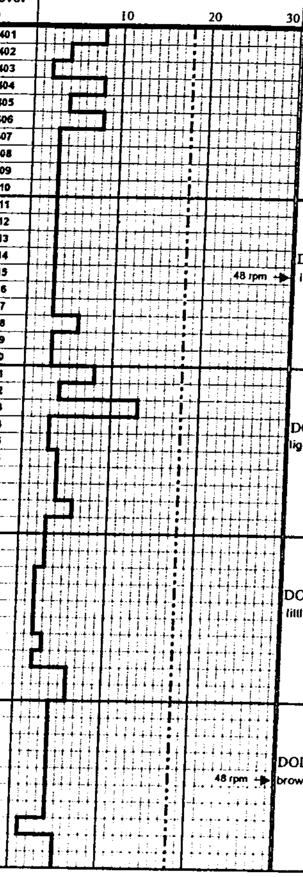
Penetration rate (min/ft):
Weight On Bit (K lbs):
Rotary Speed (rpm):



Depth Below Pad Level (ft)	Description
3200-3201	
3201-3202	
3202-3203	
3203-3204	DOLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, poorly cemented and soft, with very few boulder type fragments, very hard.
3204-3205	
3205-3206	
3206-3207	
3207-3208	
3208-3209	
3209-3210	
3210-3211	
3211-3212	
3212-3213	
3213-3214	DOLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, poorly cemented and soft, with very few boulder type fragments, very hard.
3214-3215	
3215-3216	
3216-3217	
3217-3218	
3218-3219	
3219-3220	
3220-3221	
3221-3222	
3222-3223	
3223-3224	DOLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, poorly cemented and soft, with very few boulder type fragments, very hard.
3224-3225	
3225-3226	
3226-3227	
3227-3228	
3228-3229	
3229-3230	
3230-3231	
3231-3232	
3232-3233	
3233-3234	DOLOMITE – Dolomite, 100%, moderate yellowish brown, poorly cemented and soft.
3234-3235	
3235-3236	
3236-3237	
3237-3238	
3238-3239	
3239-3240	
3240-3241	
3241-3242	
3242-3243	
3243-3244	DOLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, poorly cemented and soft
3244-3245	
3245-3246	
3246-3247	
3247-3248	
3248-3249	
3249-3250	
3250-3251	
3251-3252	
3252-3253	
3253-3254	DOLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, poorly cemented and soft
3254-3255	
3255-3256	
3256-3257	
3257-3258	
3258-3259	
3259-3260	
3260-3261	
3261-3262	
3262-3263	
3263-3264	DOLOMITE – Dolomite, 100%, light olive gray to dark yellowish brown, some light gray to dark gray, poorly cemented and soft
3264-3265	
3265-3266	
3266-3267	
3267-3268	
3268-3269	
3269-3270	
3270-3271	
3271-3272	
3272-3273	
3273-3274	DOLOMITE – Dolomite, 100%, pale yellowish brown to moderate yellowish brown, poorly cemented, soft
3274-3275	
3275-3276	
3276-3277	
3277-3278	
3278-3279	
3279-3280	
3280-3281	
3281-3282	
3282-3283	
3283-3284	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, well cemented, hard
3284-3285	
3285-3286	
3286-3287	
3287-3288	
3288-3289	
3289-3290	
3290-3291	
3291-3292	
3292-3293	
3293-3294	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, well cemented, hard
3294-3295	
3295-3296	
3296-3297	
3297-3298	
3298-3299	
3299-3300	

Injection Well No.1

Penetration rate (min/ft): ————
Weight On Bit (K lbs): - · - · - · -
Rotary Speed (rpm): ═════



Depth Below Pad Level (ft)	Description
3400-3401	DOLOMITE – Dolomite, 100%, moderate yellowish brown, sucrosic, poorly cemented and soft, with very little light gray, micritic and moderately hard.
3401-3402	
3402-3403	
3403-3404	
3404-3405	
3405-3406	
3406-3407	
3407-3408	
3408-3409	
3409-3410	
3410-3411	DOLOMITE – Dolomite, 100%, moderate yellowish brown, sucrosic, poorly cemented and soft, with very little light gray, micritic and moderately hard.
3411-3412	
3412-3413	
3413-3414	
3414-3415	
3415-3416	
3416-3417	
3417-3418	
3418-3419	
3419-3420	
3420-3421	DOLOMITE – Dolomite, 100%, moderate yellowish brown, sucrosic, poorly cemented and soft, with some light gray, micritic and moderately hard.
3421-3422	
3422-3423	
3423-3424	
3424-3425	
3425-3426	
3426-3427	
3427-3428	
3428-3429	
3429-3430	
3430-3431	DOLOMITE – Dolomite, 100%, moderate yellowish brown, sucrosic, poorly cemented and soft, with very little light gray, micritic and moderately hard.
3431-3432	
3432-3433	
3433-3434	
3434-3435	
3435-3436	
3436-3437	
3437-3438	
3438-3439	
3439-3440	
3440-3441	DOLOMITE – Dolomite, 100%, pale yellowish brown to moderate yellowish brown, some dusky yellowish brown, micritic and very-fine crystalline, sucrosic, poorly cemented, moderately hard to soft.
3441-3442	
3442-3443	
3443-3444	
3444-3445	
3445-3446	
3446-3447	
3447-3448	
3448-3449	
3449-3450	

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GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

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GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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

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GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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

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GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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

ARCADIS

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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

ARCADIS

GEOLOGIC LOG

INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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

ARCADIS

GEOLOGIC LOG

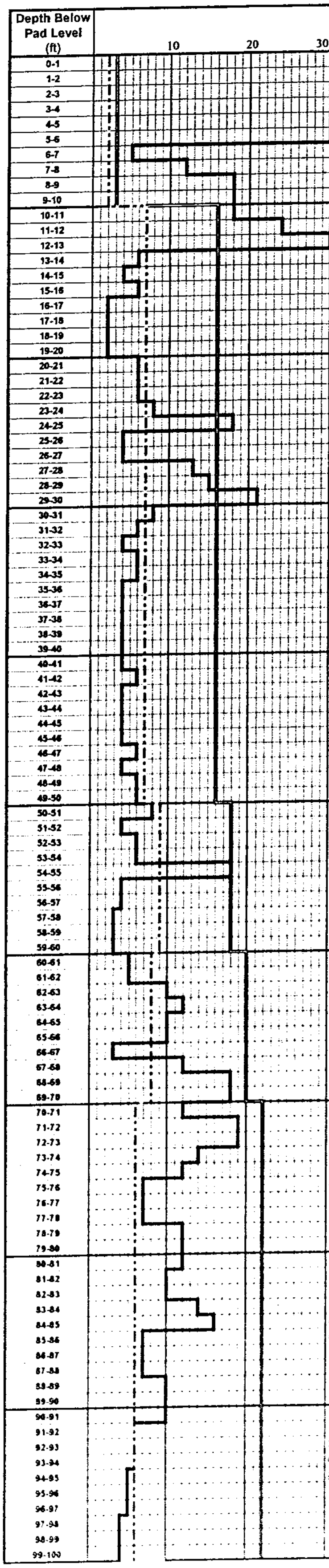
INJECTION WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

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

Injection Well No.1

Penetration rate (min/ft): ————
Weight On Bit (K lbs): - · - · - · -
Rotary Speed (rpm): ════



Description

LIMEROCK (compacted fill), SAND, ORGANIC MATTER.

HARDPAN- Sand 70%, dark brown to black, cemented; Organic Matter, 30%, black, silty, decomposed.

SANDY CLAY- Clay, 70%, light olive gray, silty, very soft, low plasticity; Sand, 30%, clear, quartz; Organic Matter, trace, brown, poorly decomposed.

SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.

SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.

SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.

SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown, "hash" of mostly shell fragments with some whole shells; Sand, 20%, clear, quartz, fine grained.

SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE– Shell, 50%, very pale orange to light brown, mostly shell fragments, some whole shells. Sand, 30%, clear, quartz, fine grained. Clay, 10%, medium gray, very soft, moderate plasticity, slightly phosphatic. Sandstone, 10%, light gray, quartz, fine grained, soft

SANDSTONE WITH SAND AND SOME SHELL- Sandstone, 50%, medium gray, quartz, slightly phosphatic, fine to coarse grained, moderately hard. Sand, 30%, clear, quartz, fine to medium grained. Shell, 20%, very pale orange to light brown , fragments, some whole

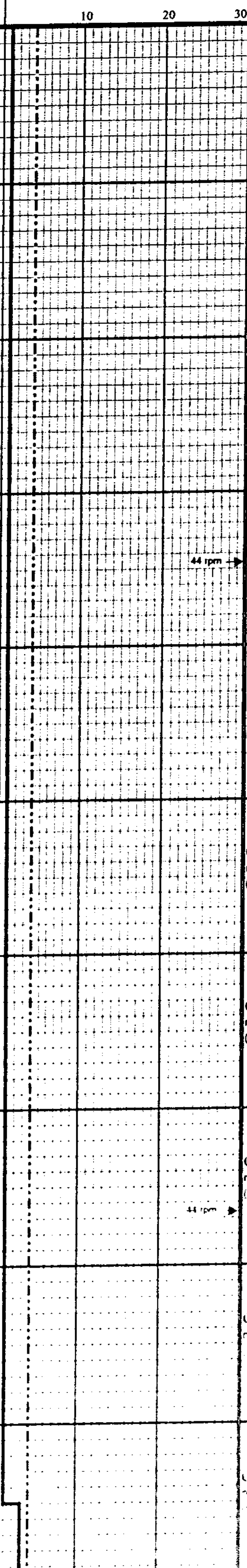
SHELL WITH SOME SAND AND SANDSTONE - Shell, 50%, very pale orange to light brown, mostly shell fragments to 0.4- inch. Sand, 25%, clear, quartz, fine grained. Sandstone, 25%, medium light gray, quartz with calcareous matrix, moderately hard

SHELL WITH SOME SAND AND SANDSTONE - Shell, 50%, very pale orange to light brown, mostly shell fragments to 0.4- inch. Sand, 25%, clear, quartz, fine grained. Sandstone, 25%, medium light gray, quartz with calcareous matrix, moderately hard

SHELL WITH SOME LIMESTONE, LITTLE SANDSTONE AND SAND - Shell, 50%, very pale orange to light brown, mostly shell fragments to 0.4- inch. Limestone, 20%, medium light gray, intraclast shells grainstone, moderately hard. Sandstone, 15%, medium dark gray, quartz with calcareous matrix, moderately hard. Sand, 15%, clear to very light gray, mostly quartz

Injection Well No.1

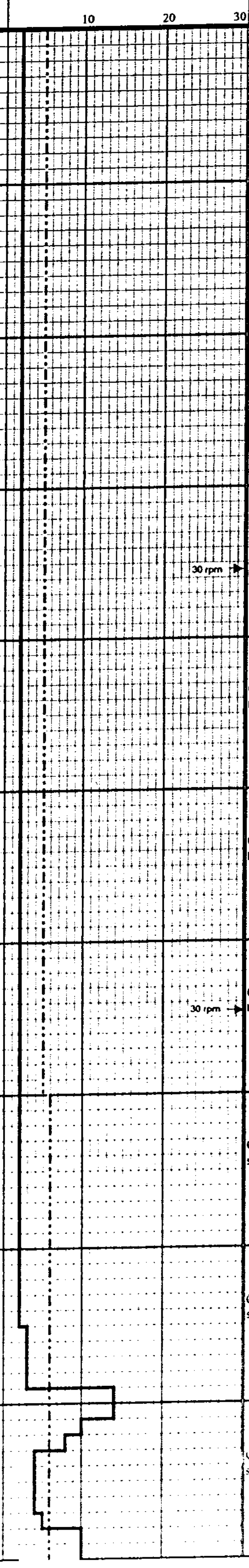
Penetration rate (min/ft): ————
Weight On Bit (K lbs): - - - - - -
Rotary Speed (rpm): ════



Depth Below Pad Level (ft)	Description
200-201	
201-202	
202-203	
203-204	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 (more than 50%) amount of cement fragments in cuttings.
204-205	
205-206	
206-207	
207-208	
208-209	
209-210	
210-211	
211-212	
212-213	
213-214	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 (more than 50%) amount of cement fragments in cuttings.
214-215	
215-216	
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, silty, very soft to soft, cohesive, 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.
224-225	
225-226	
226-227	
227-228	
228-229	
229-230	
230-231	
231-232	
232-233	
233-234	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 (more than 50%) amount of cement fragments in cuttings.
234-235	
235-236	
236-237	
237-238	
238-239	
239-240	
240-241	
241-242	
242-243	
243-244	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 (more than 50%) amount of cement fragments in cuttings.
244-245	
245-246	
246-247	
247-248	
248-249	
249-250	
250-251	
251-252	
252-253	
253-254	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 (more than 50%) amount of cement fragments in cuttings
254-255	
255-256	
256-257	
257-258	
258-259	
259-260	
260-261	
261-262	
262-263	
263-264	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 (more than 50%) amount of cement fragments in cuttings
264-265	
265-266	
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, silty, very soft to soft, cohesive, 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
274-275	
275-276	
276-277	
277-278	
278-279	
279-280	
280-281	
281-282	
282-283	
283-284	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 (more than 50%) amount of cement fragments in cuttings
284-285	
285-286	
286-287	
287-288	
288-289	
289-290	
290-291	
291-292	
292-293	
293-294	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 (more than 50%) amount of cement fragments in cuttings
294-295	
295-296	
296-297	
297-298	
298-299	
299-300	

Injection Well No.1

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

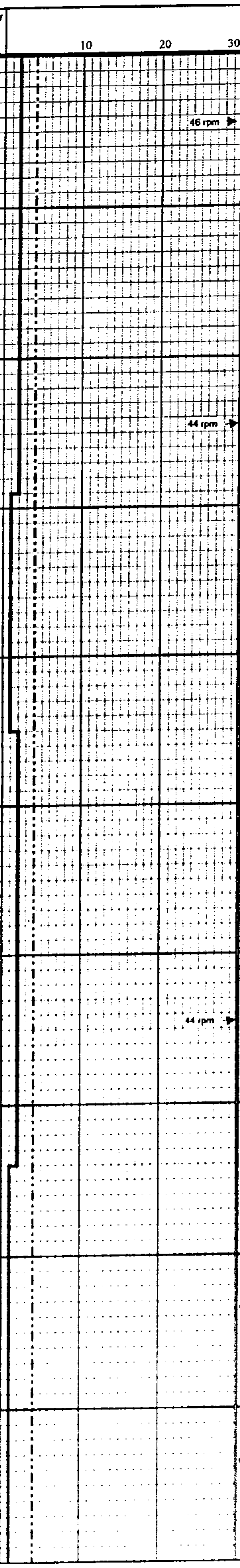


Depth Below Pad Level (ft)	Description
400-401	CLAY- Clay, 100%, grayish olive to dark greenish gray, silty, very cohesive, very soft to moderately hard, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange.
401-402	
402-403	
403-404	
404-405	
405-406	
406-407	
407-408	
408-409	
409-410	
410-411	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, white to very pale orange.
411-412	
412-413	
413-414	
414-415	
415-416	
416-417	
417-418	
418-419	
419-420	
420-421	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, white to very pale orange.
421-422	
422-423	
423-424	
424-425	
425-426	
426-427	
427-428	
428-429	
429-430	
430-431	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, white to very pale orange.
431-432	
432-433	
433-434	
434-435	
435-436	
436-437	
437-438	
438-439	
439-440	
440-441	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, white to very pale orange.
441-442	
442-443	
443-444	
444-445	
445-446	
446-447	
447-448	
448-449	
449-450	
450-451	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, white to very pale orange
451-452	
452-453	
453-454	
454-455	
455-456	
456-457	
457-458	
458-459	
459-460	
460-461	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, white to very pale orange
461-462	
462-463	
463-464	
464-465	
465-466	
466-467	
467-468	
468-469	
469-470	
470-471	CLAY WITH VERY LITTLE SAND – Clay, 95%, olive gray to grayish yellow green, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
471-472	
472-473	
473-474	
474-475	
475-476	
476-477	
477-478	
478-479	
479-480	
480-481	CLAY WITH VERY LITTLE SAND – Clay, 95%, olive gray to grayish yellow green, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz.
481-482	
482-483	
483-484	
484-485	
485-486	
486-487	
487-488	
488-489	
489-490	
490-491	CLAY WITH VERY LITTLE SAND – Clay, 95%, olive gray to grayish yellow green, cohesive, very soft, low plasticity to non-plastic; Sand, 5%, clear, quartz
491-492	
492-493	
493-494	
494-495	
495-496	
496-497	
497-498	
498-499	
499-500	

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

Injection Well No.1

Penetration rate (min/ft): ————
Weight On Bit (K lbs): - · - · - · -
Rotary Speed (rpm): ═══════



Depth Below Pad Level (ft)	Description
600-601	
601-602	
602-603	
603-604	CLAY – Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft, cohesive, non- plastic.
604-605	
605-606	
606-607	
607-608	
608-609	
609-610	
610-611	
611-612	
612-613	
613-614	CLAY – Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft, cohesive, non- plastic.
614-615	
615-616	
616-617	
617-618	
618-619	
619-620	
620-621	
621-622	
622-623	
623-624	CLAY – Clay, 100%, pale olive to pale greenish yellow, slightly calcareous, silty, very soft to soft, cohesive, non- plastic.
624-625	
625-626	
626-627	
627-628	
628-629	
629-630	
630-631	
631-632	
632-633	
633-634	CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH LITTLE SAND – Clay, 70%, yellowish gray, calcareous, little silty, phosphatic, moderately soft to very soft, non-plastic, non-cohesive; Limestone, 20%, yellowish gray, soft to moderately hard; Sand, 10%, clear to light gray, mostly detritic.
634-635	
635-636	
636-637	
637-638	
638-639	
639-640	
640-641	
641-642	
642-643	
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, poorly cemented; Shell, 5%, very pale orange to white.
644-645	
645-646	
646-647	
647-648	
648-649	
649-650	
650-651	
651-652	
652-653	
653-654	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, poorly cemented; Shell, 5%, very pale orange to white
654-655	
655-656	
656-657	
657-658	
658-659	
659-660	
660-661	
661-662	
662-663	
663-664	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, poorly cemented. Shell, 5%, very pale orange to white
664-665	
665-666	
666-667	
667-668	
668-669	
669-670	
670-671	
671-672	
672-673	
673-674	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, poorly cemented. Shell, 5%, very pale orange to white
674-675	
675-676	
676-677	
677-678	
678-679	
679-680	
680-681	
681-682	
682-683	
683-684	CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay, 70%, yellowish gray, calcareous, moderately soft to very soft, non-plastic, non-cohesive. Limestone, 25%, yellowish gray, soft to moderately hard, poorly cemented. Sand, 5%, clear to light gray
684-685	
685-686	
686-687	
687-688	
688-689	
689-690	
690-691	
691-692	
692-693	
693-694	CLAY WITH LITTLE LIMESTONE – Clay, 90%, mostly pale greenish yellow, mostly calcareous marl, very soft to soft, highly cohesive, non-plastic to low plasticity, Limestone, 10%, grayish yellow green to white, soft, poorly cemented
694-695	
695-696	
696-697	
697-698	
698-699	
699-700	

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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, sub-rounded; 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 biosparitc with numerous shell intraclasts, phosphatic, fine grained, soft to moderately 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.	RPM: 16-22, WOB: 6K	120-170	50

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, 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.	RPM: 30, WOB: 5K	360 – 380	20
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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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, 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.	RPM: 40-48 WOB: 4-10K	530 –540	10

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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, sub-rounded 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, phosphatic,very soft to soft, non-plastic, cohesive; Sand, 15%, clear, quartz, to light gray, calcareous, detritic, very fine to medium grained, sub-rounded 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.	RPM: 28, WOB: 6-8K	700-735	35

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 COMMENTS	DEPTH INTERVAL	THICKNESS
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, sub-rounded.	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, hard.	RPM: 32, WOB: 10K	910 – 920	10
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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
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 crystalline, slightly vuggy, hard.	RPM: 40-42 WOB: 5-10K	1140-1150	10
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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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 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.	RPM: 42 WOB: 10-15K	1420-1430	10

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 (5Y 7/2), very fine grained, poorly cemented.	RPM: 27 WOB: 15-20K	1590-1620	30
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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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
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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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 cemented, moderately hard to hard; Limestone, trace, white (N9) to yellowish gray (5Y 8/1), fine grained, vuggy, poorly cemented, soft.	RPM: 44, WOB: 20K	1690-1710	20
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) to yellowish gray (5Y 8/1), fine grained, vuggy, poorly cemented, soft.	RPM: 48, WOB: 20k	1710-1730	20
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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

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

DEEP MONITOR WELL NO. 1
CITY OF PORT ST. LUCIE WESTPORT INJECTION WELL SYSTEM

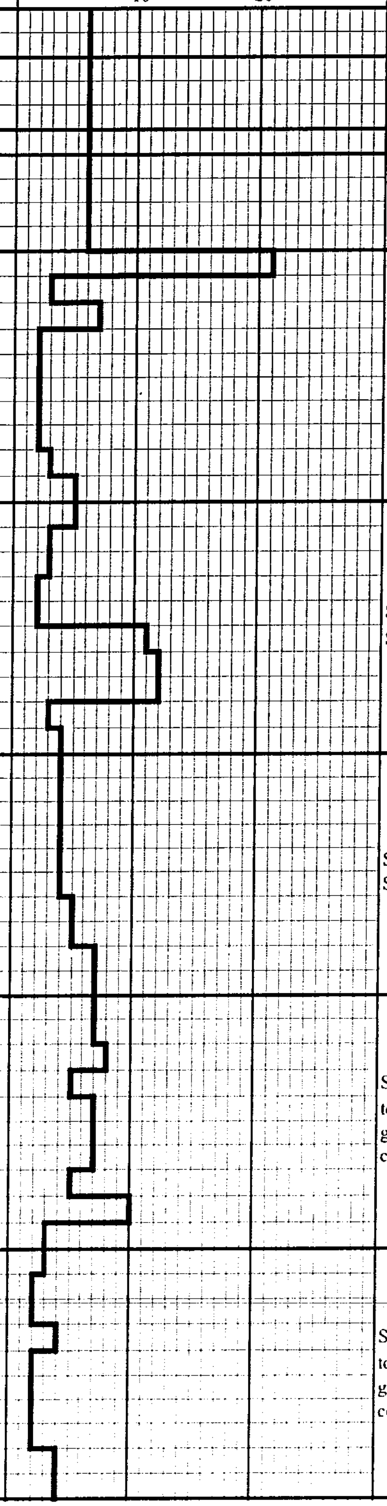
GEOLOGIC LOG	DRILLING COMMENTS	DEPTH INTERVAL	THICKNESS
DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, pale yellowish brown (10YR 6/2) to dark yellowish brown (10YR 4/2) and little medium light gray (N6), microcrystalline to very-fine crystalline, moderately to well cemented; Limestone, 15%, very pale 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

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

ARCADIS

City of Port St. Lucie, Westport Injection Well System
PENETRATION RATE LOG

Dual-Zone Deep Monitor Well



Depth Below Pad Level (ft)	Description
0-1	SAND – Sand, 100%, clear, quartz, fine to medium grained, well sorted.
1-2	
2-3	SILTY SAND - Sand, 70%, clear to dusky brown, quartz, very fine to fine grained; Silt, 30%, dusky brown.
3-4	
4-5	
5-6	HARD PAN
6-7	
7-8	SANDY CLAY- Clay, 70%, light olive gray, silty, very soft, low plasticity; Sand, 30%, clear, quartz.
8-9	
9-10	
10-11	
11-12	
12-13	
13-14	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown and medium gray; Sand, 20%, clear, quartz, fine grained.
14-15	
15-16	
16-17	
17-18	
18-19	
19-20	
20-21	
21-22	
22-23	
23-24	
24-25	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown and medium gray; Sand, 20%, clear, quartz, fine grained.
25-26	
26-27	
27-28	
28-29	
29-30	
30-31	
31-32	
32-33	
33-34	
34-35	SHELL WITH SOME SAND– Shell, 80%, very pale orange to light brown and medium gray; Sand, 20%, clear, quartz, fine grained.
35-36	
36-37	
37-38	
38-39	
39-40	
40-41	
41-42	
42-43	
43-44	SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE– Shell, 50%, very pale orange to light brown and medium gray , mostly shell fragments; Sand, 30%, clear, quartz, fine grained;Clay, 10%, medium gray , very soft, moderate plasticity, slightly phosphatic; Sandstone, 10%, light gray , quartz, fine grained, poorly cemented.
44-45	
45-46	
46-47	
47-48	
48-49	
49-50	
50-51	
51-52	
52-53	
53-54	SHELL WITH SAND AND LITTLE CLAY AND SANDSTONE– Shell, 50%, very pale orange to light brown and medium gray , mostly shell fragments; Sand, 30%, clear, quartz, fine grained;Clay, 10%, medium gray , very soft, moderate plasticity, slightly phosphatic; Sandstone, 10%, light gray , quartz, fine grained, poorly cemented.
54-55	
55-56	
56-57	
57-58	
58-59	
59-60	

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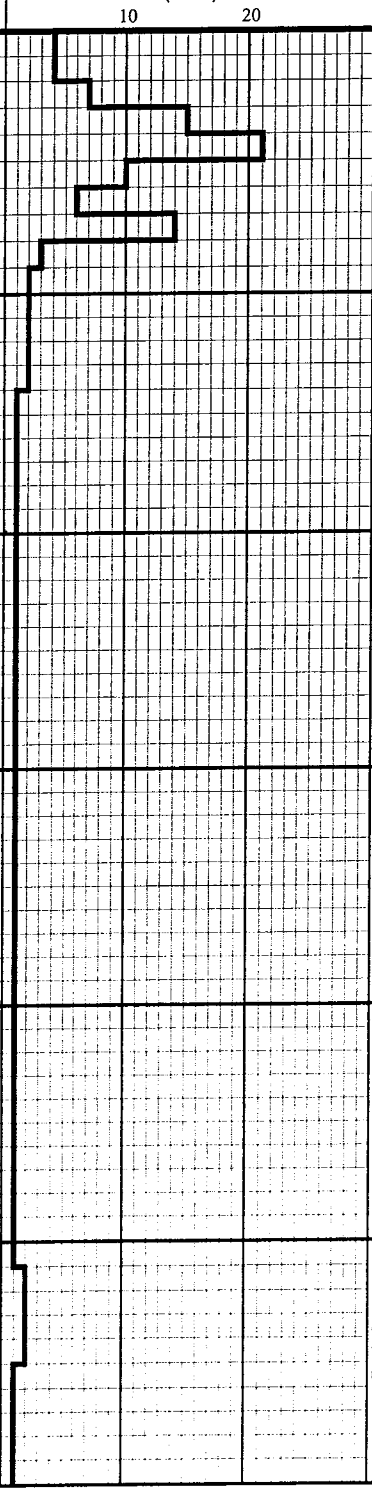
City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)



Depth Below Pad Level (ft)	Description
60-61	
61-62	
62-63	
63-64	SANDSTONE WITH SAND AND SOME SHELL- Sandstone, 50%, medium gray, quartz, moderately well cemented, slightly phosphatic; Sand, 30%, clear, quartz; Shell, 20%, very pale orange to light brown, fragments, tests to 0.8 inch.
64-65	
65-66	
66-67	
67-68	
68-69	
69-70	
70-71	
71-72	
72-73	
73-74	SHELL WITH SAND, SANDSTONE AND LITTLE CLAY – Shell, 40%, very pale orange to light brown; Sand, 25%, clear, quartz, fine grained; Sandstone, 25%, medium gray, quartz, fine to medium grained, moderately well cemented; Clay, 10%, medium light gray, very soft, medium plasticity.
74-75	
75-76	
76-77	
77-78	
78-79	
79-80	
80-81	
81-82	
82-83	
83-84	SHELL WITH SOME LIMESTONE AND LITTLE SAND – Shell, 60%, very pale orange to light brown; Limestone, 25%, medium gray, arenaceous, fine grained, moderately well cemented; Sand, 15%, clear to very light gray, mostly quartz, some calcareous.
84-85	
85-86	
86-87	
87-88	
88-89	
89-90	
90-91	
91-92	
92-93	
93-94	SHELL WITH LIMESTONE, SOME SAND AND LITTLE CLAY- Shell, 40%, very pale orange to l ight brown; Limestone, 30%, medium gray, arenaceous, fine grained, moderately well cemented; Sand, 20%, clear to light gray quartz, some calcareous; Clay, 10%, medium light gray, very soft, medium plasticity, calcareous.
94-95	
95-96	
96-97	
97-98	
98-99	
99-100	
100-101	
101-102	
102-103	
103-104	SHELL WITH LIMESTONE, SOME SAND AND LITTLE CLAY- Shell, 40%, very pale orange to l ight brown; Limestone, 30%, medium gray, arenaceous, fine grained, moderately well cemented; Sand, 20%, clear to light gray quartz, some calcareous; Clay, 10%, medium light gray, very soft, medium plasticity, calcareous.
104-105	
105-106	
106-107	
107-108	
108-109	
109-110	
110-111	
111-112	
112-113	
113-114	SHELL WITH LIMESTONE, SOME SAND AND LITTLE CLAY- Shell, 40%, very pale orange to l ight brown; Limestone, 30%, medium gray, arenaceous, fine grained, moderately well cemented; Sand, 20%, clear to light gray quartz, some calcareous; Clay, 10%, medium light gray, very soft, medium plasticity, calcareous.
114-115	
115-116	
116-117	
117-118	
118-119	
119-120	

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City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
120-121		SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white,light brown to medium gray; Limestone, 30%, light olive gray, arenaceous and biosparitc, 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, non- plastic.
121-122		
122-123		
123-124		
124-125		
125-126		
126-127		
127-128		
128-129		
129-130		
130-131		SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white,light brown to medium gray; Limestone, 30%, light olive gray, arenaceous and biosparitc, 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, non- plastic.
131-132		
132-133		
133-134		
134-135		
135-136		
136-137		
137-138		
138-139		
139-140		
140-141		SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white,light brown to medium gray; Limestone, 30%, light olive gray, arenaceous and biosparitc, 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, non- plastic.
141-142		
142-143		
143-144		
144-145		
145-146		
146-147		
147-148		
148-149		
149-150		
150-151		SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white,light brown to medium gray; Limestone, 30%, light olive gray, arenaceous and biosparitc, 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, non- plastic.
151-152		
152-153		
153-154		
154-155		
155-156		
156-157		
157-158		
158-159		
159-160		
160-161		SHELLWITH LIMESTONE AND SOME SAND- Shell, 50%, very pale orange, white,light brown to medium gray; Limestone, 30%, light olive gray, arenaceous and biosparitc, 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, non- plastic.
161-162		
162-163		
163-164		
164-165		
165-166		
166-167		
167-168		
168-169		
169-170		
170-171		LIMESTONE WITH SHELL, SOME CLAY AND LITTLE SAND- Limestone, 50%, yellowish gray, biosparitic; Shell, 25%, very pale orange to light gray; Clay, 15%, light olive gray, calcareous, soft, non- plastic; Sand, 10%, light gray to clear,calcareous, some quartz, fine grained.
171-172		
172-173		
173-174		
174-175		
175-176		
176-177		
177-178		
178-179		
179-180		

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City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

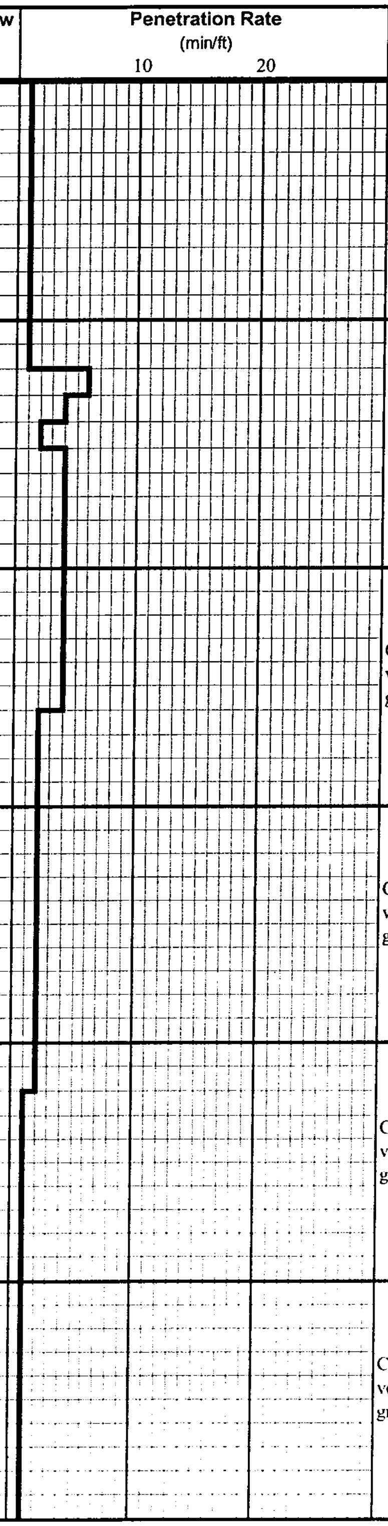
Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
180-181		SANDY CLAY WITH SHELL AND LITTLE LIMESTONE– Clay, 50%, grayish olive, silty, slightly phosphatic, very soft to soft, cohesive, non-plastic; Shell, 25%, very pale orange to light brown; Sand, 15%, very light gray, calcareous, some clear, quartz, very fine to fine grained; Limestone, 10%, yellowish gray, biosparitic, moderately well cemented.
181-182		
182-183		
183-184		
184-185		
185-186		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 grained; Shell, trace, isolated tests to 0.2 inch. Cement dominating in cuttings.
186-187		
187-188		
188-189		
189-190		
190-191		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 grained; Shell, trace, isolated tests to 0.2 inch. Cement dominating in cuttings.
191-192		
192-193		
193-194		
194-195		
195-196		
196-197		
197-198		
198-199		
199-200		
200-201		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 grained; Shell, trace, isolated tests to 0.2 inch. Cement dominating in cuttings.
201-202		
202-203		
203-204		
204-205		
205-206		
206-207		
207-208		
208-209		
209-210		
210-211		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 grained; Shell, trace, isolated tests to 0.2 inch. Cement present in cuttings.
211-212		
212-213		
213-214		
214-215		
215-216		
216-217		
217-218		
218-219		
219-220		
220-221		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 grained; Shell, trace, isolated tests to 0.2 inch. Cement present in cuttings.
221-222		
222-223		
223-224		
224-225		
225-226		
226-227		
227-228		
228-229		
229-230		
230-231		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 grained; Shell, trace, isolated tests to 0.2 inch.
231-232		
232-233		
233-234		
234-235		
235-236		
236-237		
237-238		
238-239		
239-240		

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
240-241		
241-242		
242-243		
243-244		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 grained; Shell, trace, isolated tests to 0.2 inch.
244-245		
245-246		
246-247		
247-248		
248-249		
249-250		
250-251		
251-252		
252-253		
253-254		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 grained; Shell, trace, isolated tests to 0.2 inch.
254-255		
255-256		
256-257		
257-258		
258-259		
259-260		
260-261		
261-262		
262-263		
263-264		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 grained; Shell, trace, isolated tests to 0.2 inch.
264-265		
265-266		
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, 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.
274-275		
275-276		
276-277		
277-278		
278-279		
279-280		
280-281		
281-282		
282-283		
283-284		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 grained; Shell, trace, isolated tests to 0.2 inch.
284-285		
285-286		
286-287		
287-288		
288-289		
289-290		
290-291		
291-292		
292-293		
293-294		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 grained; Shell, trace, isolated tests to 0.2 inch.
294-295		
295-296		
296-297		
297-298		
298-299		
299-300		

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well



Depth Below Pad Level (ft)	Description
300-301	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 grained; Shell, trace, isolated tests to 0.2 inch.
301-302	
302-303	
303-304	
304-305	
305-306	
306-307	
307-308	
308-309	
309-310	
310-311	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 grained; Shell, trace, isolated tests to 0.2 inch.
311-312	
312-313	
313-314	
314-315	
315-316	
316-317	
317-318	
318-319	
319-320	
320-321	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 grained; Shell, trace, isolated tests to 0.2 inch.
321-322	
322-323	
323-324	
324-325	
325-326	
326-327	
327-328	
328-329	
329-330	
330-331	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 grained; Shell, trace, isolated tests to 0.2 inch.
331-332	
332-333	
333-334	
334-335	
335-336	
336-337	
337-338	
338-339	
339-340	
340-341	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 grained; Shell, trace, isolated tests to 0.2 inch.
341-342	
342-343	
343-344	
344-345	
345-346	
346-347	
347-348	
348-349	
349-350	
350-351	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 grained; Shell, trace, isolated tests to 0.2 inch.
351-352	
352-353	
353-354	
354-355	
355-356	
356-357	
357-358	
358-359	
359-360	

ARCADIS

City of Port St. Lucie, Westport Injection Well System

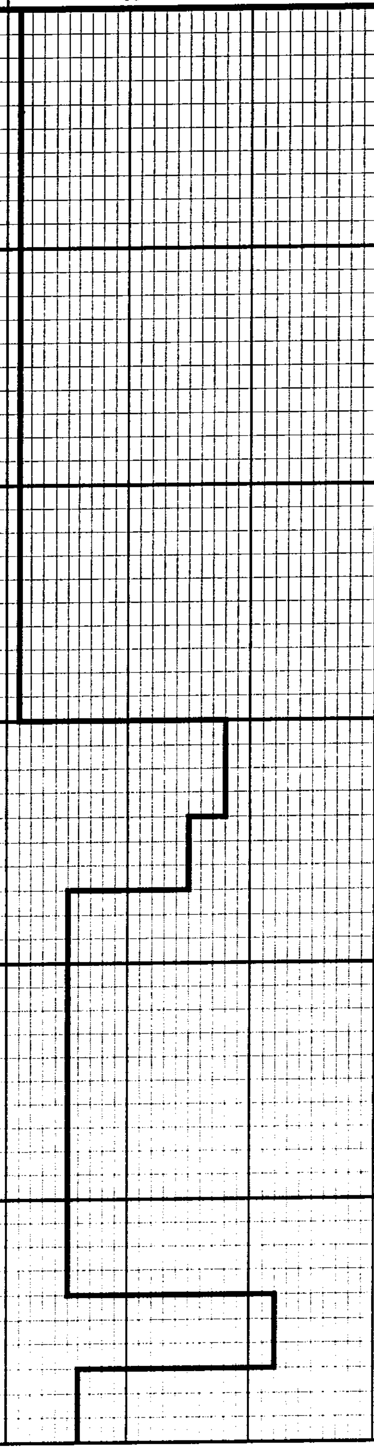
PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
360-361		
361-362		
362-363		
363-364		CLAY WITH VERY LITTLE SAND AND LIMESTONE– Clay, 90%, dark greenish gray, some grayish olive green), silty, soft to very soft, very cohesive, non-plastic; Sand, 5%, clear, quartz, fine grained, sub-rounded; Limestone, trace, very pale orange to yellowish gray soft, poorly cemented, phosphatic.
364-365		
365-366		
366-367		
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 grayish olive green), silty, soft to very soft, very cohesive, non-plastic; Sand, 5%, clear, quartz, fine grained, sub-rounded; Limestone, trace, very pale orange to yellowish gray soft, poorly cemented, phosphatic.
374-375		
375-376		
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, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
384-385		
385-386		
386-387		
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, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
394-395		
395-396		
396-397		
397-398		
398-399		
399-400		
400-401		
401-402		
402-403		
403-404		CLAY- – Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
404-405		
405-406		
406-407		
407-408		
408-409		
409-410		
410-411		
411-412		
412-413		
413-414		CLAY- – Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
414-415		
415-416		
416-417		
417-418		
418-419		
419-420		

Dual-Zone Deep Monitor Well

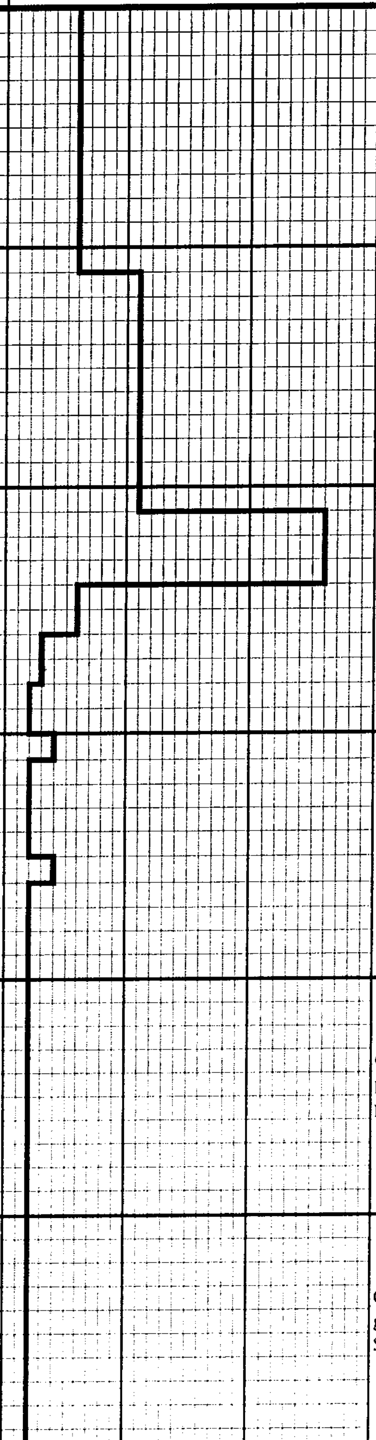
Penetration Rate (min/ft)



Depth Below Pad Level (ft)	Description
420-421	
421-422	
422-423	
423-424	CLAY- – Clay, 100%, grayish yellow green to olive gray, silty, very cohesive, soft to very soft, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
424-425	
425-426	
426-427	
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, non-plastic; Sand, trace, clear, quartz, very fine grained; Shell, trace, white to very pale orange, tests up to 0.2 inch.
434-435	
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 gray, cohesive, soft, low plasticity to non-plastic, phosphatic; Limestone, 5%, yellowish gray, soft; Sand, trace, clear, quartz.
444-445	
445-446	
446-447	
447-448	
448-449	
449-450	
450-451	
451-452	
452-453	
453-454	CLAY WTH VERY LITTLE LIMESTONE – Clay, 95%, grayish yellow green to olive gray, cohesive, soft, low plasticity to non-plastic, phosphatic; Limestone, 5%, yellowish gray, soft; Sand, trace, clear, quartz.
454-455	
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, highly cohesive, low plasticity, very phosphatic; Limestone, trace, yellowish gray, arenaceous, soft, moderately cemented; Sand, trace, clear, quartz.
464-465	
465-466	
466-467	
467-468	
468-469	
469-470	
470-471	
471-472	
472-473	
473-474	CLAY WITH VERY LITTLE LIMESTONE – Clay, 95%, grayish olive to pale olive, calcareous, some silty, phosphatic, soft, highly cohesive, low plasticity; Limestone, 5%, grayish yellow green to white, fine grained, soft, poorly cemented, slightly phosphatic; Sand, trace, quartz and calcareous.
474-475	
475-476	
476-477	
477-478	
478-479	
479-480	

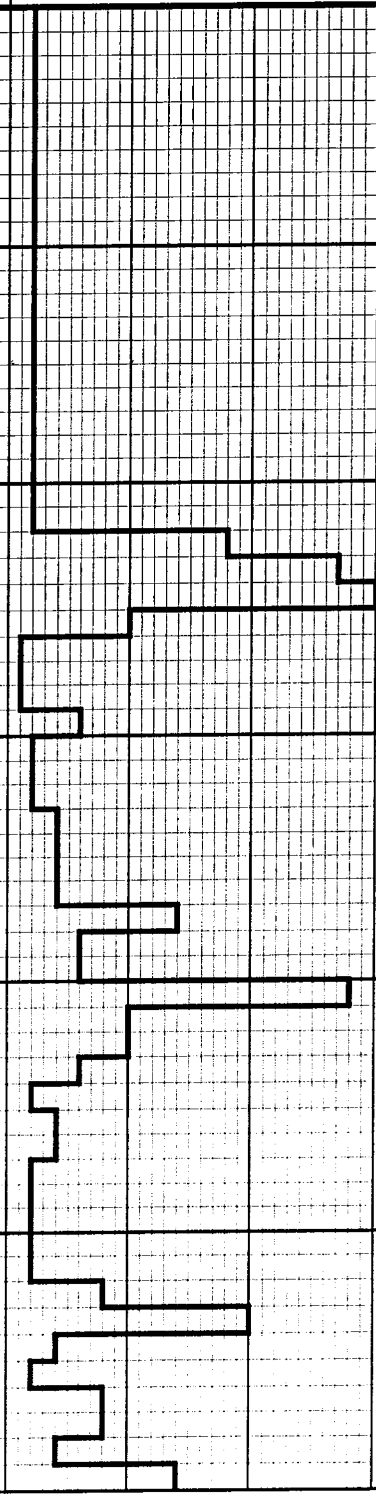
Dual-Zone Deep Monitor Well

Penetration Rate (min/ft) 10 20



Depth Below Pad Level (ft)	Description
480-481	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 phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
481-482	
482-483	
483-484	
484-485	
485-486	
486-487	
487-488	
488-489	
489-490	
490-491	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 phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
491-492	
492-493	
493-494	
494-495	
495-496	
496-497	
497-498	
498-499	
499-500	
500-501	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 phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
501-502	
502-503	
503-504	
504-505	
505-506	
506-507	
507-508	
508-509	
509-510	
510-511	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 phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
511-512	
512-513	
513-514	
514-515	
515-516	
516-517	
517-518	
518-519	
519-520	
520-521	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 phosphatic; Sand, trace, clear to light greenish gray, quartz and calcareous, very fine to fine grained.
521-522	
522-523	
523-524	
524-525	
525-526	
526-527	
527-528	
528-529	
529-530	
530-531	CLAY, SOME LIMESTONE AND LITTLE SAND – Clay, 80%, pale greenish yellow to yellowish gray, very soft to soft, calcareous, some silty; Limestone, 15%, yellowish gray, arenaceous, soft, poorly cemented; Sand, 5%, clear to light gray, mostly calcareous, some quartz.
531-532	
532-533	
533-534	
534-535	
535-536	
536-537	
537-538	
538-539	
539-540	

Dual-Zone Deep Monitor Well



Depth Below Pad Level (ft)	Description
540-541 541-542 542-543 543-544 544-545 545-546 546-547 547-548 548-549 549-550	CALCAREOUS CLAY (MARL) WITH LIMESTONE AND LITTLE SAND AND SHELL – Clay, 60%, mostly pale greenish yellow, silty, very soft to soft; Limestone, 30%, very pale orange to yellowish gray, very soft to soft; Sand, 5%, vey pale orange to clear, mostly calcareous, detritic; Shell, 5%, tests to 0.2-inch.
550-551 551-552 552-553 553-554 554-555 555-556 556-557 557-558 558-559 559-560	CLAY- Clay, 100%, dusky yellow green, silty, slightly calcareous, soft to hard; Limestone, trace, very pale orange to yellowish gray, very soft to soft; Sand, trace, clear, quartz; Shell, trace, single tests to 0.2-inch.
560-561 561-562 562-563 563-564 564-565 565-566 566-567 567-568 568-569 569-570	CLAY- Clay, 100%, dusky yellow green, silty, slightly calcareous, soft to hard; Limestone, trace, very pale orange to yellowish gray, very soft to soft; Sand, trace, clear, quartz; Shell, trace, single tests to 0.2-inch.
570-571 571-572 572-573 573-574 574-575 575-576 576-577 577-578 578-579 579-580	CLAY – Clay, 100%, grayish olive, silty to dusky yellow, calcareous, very soft to hard; Limestone, trace, very pale orange to yellowish gray, very soft to soft; Sand, trace, clear, quartz, very fine grained; Shell, trace, very pale orange, single tests to 0.1-inch.
580-581 581-582 582-583 583-584 584-585 585-586 586-587 587-588 588-589 589-590	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl), some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%, tests to 0.1-inch; Sand, trace, clear, quartz.
590-591 591-592 592-593 593-594 594-595 595-596 596-597 597-598 598-599 599-600	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl), some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%, tests to 0.1-inch; Sand, trace, clear, quartz.

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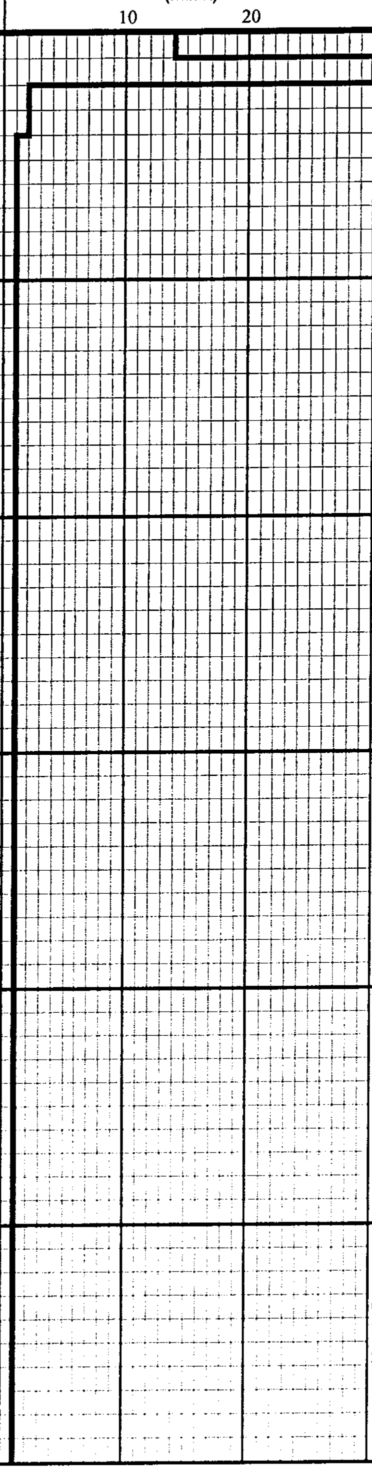
City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)

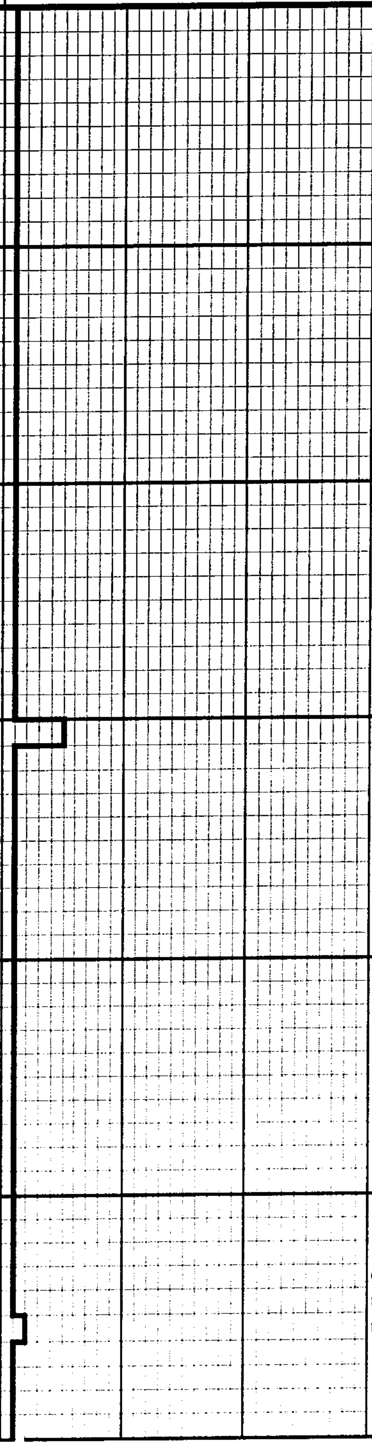


Depth Below Pad Level (ft)	Description
600-601	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl), some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%, tests to 0.1-inch; Sand, trace, clear, quartz.
601-602	
602-603	
603-604	
604-605	
605-606	
606-607	
607-608	
608-609	
609-610	
610-611	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl), some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%, tests to 0.1-inch; Sand, trace, clear, quartz.
611-612	
612-613	
613-614	
614-615	
615-616	
616-617	
617-618	
618-619	
619-620	
620-621	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl), some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%, tests to 0.1-inch; Sand, trace, clear, quartz.
621-622	
622-623	
623-624	
624-625	
625-626	
626-627	
627-628	
628-629	
629-630	
630-631	CLAY WITH LITTLE LIMESTONE AND SHELL – Clay, 90%, pale olive, calcareous (marl), some grayish olive green, very soft to soft; Limestone, 5%, very pale orange to white, very soft to soft; Shell, 5%, tests to 0.1-inch; Sand, trace, clear, quartz.
631-632	
632-633	
633-634	
634-635	
635-636	
636-637	
637-638	
638-639	
639-640	
640-641	CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay, 70%, yellowish gray, calcareous, little grayish olive), silty, moderately soft to very soft; Limestone, 25%, yellowish gray, soft to moderately hard; Sand, 5%, clear to light gray.
641-642	
642-643	
643-644	
644-645	
645-646	
646-647	
647-648	
648-649	
649-650	
650-651	CALCAREOUS CLAY (MARL) AND SOME LIMESTONE WITH VERY LITTLE SAND – Clay, 70%, yellowish gray, calcareous, little grayish olive), silty, moderately soft to very soft; Limestone, 25%, yellowish gray, soft to moderately hard; Sand, 5%, clear to light gray.
651-652	
652-653	
653-654	
654-655	
655-656	
656-657	
657-658	
658-659	
659-660	

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft): 10, 20



Depth Below Pad Level (ft)	Description
660-661	CALCAREOUS CLAY (MARL), LIMESTONE AND SAND – Clay, 35%, yellowish gray, calcareous, very soft to soft; Limestone, 35%, yellowish gray, soft; Sand, 30%, clear, quartz, to light gray, calcareous, detritic.
661-662	
662-663	
663-664	
664-665	
665-666	
666-667	
667-668	
668-669	
669-670	
670-671	CALCAREOUS CLAY (MARL), LIMESTONE AND SAND – Clay, 35%, yellowish gray, calcareous, very soft to soft; Limestone, 35%, yellowish gray - soft; Sand, 30%, clear, quartz, to light gray, calcareous, detritic.
671-672	
672-673	
673-674	
674-675	
675-676	
676-677	
677-678	
678-679	
679-680	
680-681	CALCAREOUS CLAY (MARL), LIMESTONE AND SAND – Clay, 35%, yellowish gray, calcareous, very soft to soft; Limestone, 35%, yellowish gray, soft; Sand, 30%, clear, quartz, to light gray, calcareous, detritic.
681-682	
682-683	
683-684	
684-685	
685-686	
686-687	
687-688	
688-689	
689-690	
690-691	CALCAREOUS CLAY (MARL) WITH LIMESTONE, SOME SAND AND LITTLE SHELL- Clay, 50%, pale olive, calcareous, very soft; Limestone, 25%, yellowish gray to dark gray, soft to very soft; Sand, 20%, clear, quartz, to light gray, calcareous; Shell, 5%, very pale orange, tests to 0.2- inch.
691-692	
692-693	
693-694	
694-695	
695-696	
696-697	
697-698	
698-699	
699-700	
700-701	CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE- Clay, 80%, pale olive, very soft to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft to soft; Shell, trace, very pale orange, single tests to 0.3- inch.
701-702	
702-703	
703-704	
704-705	
705-706	
706-707	
707-708	
708-709	
709-710	
710-711	CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE- Clay, 80%, pale olive, very soft to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft to soft; Shell, trace, very pale orange, single tests to 0.3- inch.
711-712	
712-713	
713-714	
714-715	
715-716	
716-717	
717-718	
718-719	
719-720	

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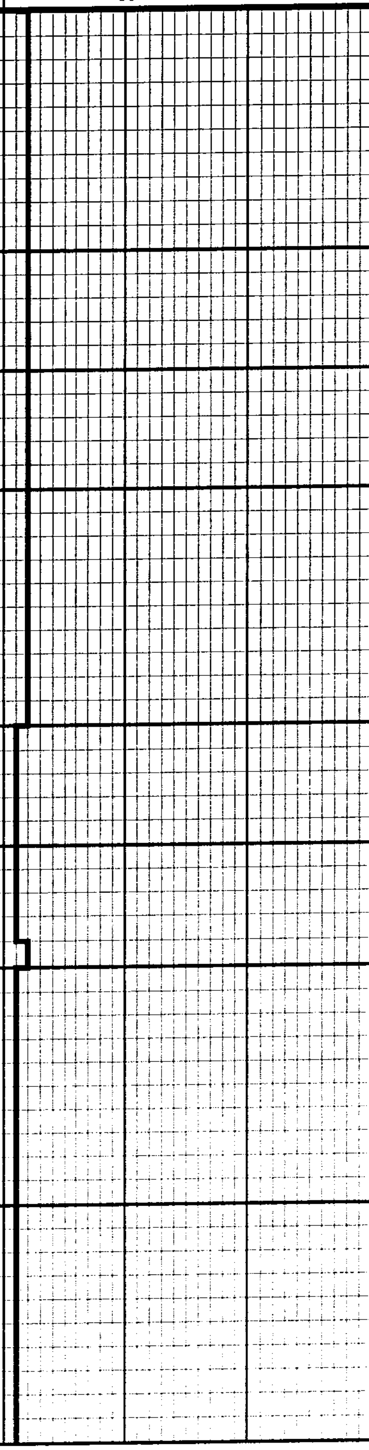
Dual-Zone Deep Monitor Well

Penetration Rate (min/ft) 10 20



Depth Below Pad Level (ft)	Description
720-721	
721-722	
722-723	
723-724	CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE– Clay, 80%, pale olive, very soft to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft to soft; Shell, trace, very pale orange, single tests to 0.3- inch.
724-725	
725-726	
726-727	
727-728	
728-729	
729-730	
730-731	
731-732	CLAY WITH SOME SAND AND VERY LITTLE LIMESTONE– Clay, 80%, pale olive, very soft to soft; Sand, 15%, clear, quartz, to light gray, calcareous; Limestone, 5%, very pale orange to light gray, very soft to soft; Shell, trace, very pale orange, single tests to 0.3- inch.
732-733	
733-734	
734-735	
735-736	
736-737	CLAYEY LIMESTONE WITH SOME SAND -- Limestone, 50%, very pale orange to light gray, soft to moderately hard cemented, fossiliferous; Clay, 30%, light greenish gray, calcareous (marl), very soft; Sand, 20%, very light gray, calcareous, detritic; Shell, trace, very pale orange, tests to 0.2-inch.
737-738	
738-739	
739-740	
740-741	
741-742	
742-743	
743-744	LIMESTONE WITH SOME SAND AND LITTLE CLAY— Limestone, 70%, very pale orange to light gray, soft to moderately hard, fossiliferous, with trace of forams; Sand, 20%, very light gray, calcareous, detritic; Clay, 10%, light olive gray, very soft, calcareous (marl); Shell, trace, very pale orange, tests to 0.2-inch..
744-745	
745-746	
746-747	
747-748	
748-749	
749-750	
750-751	
751-752	LIMESTONE WITH SOME SAND AND LITTLE CLAY— Limestone, 70%, very pale orange to light gray, soft to moderately hard, fossiliferous, with trace of forams; Sand, 20%, very light gray, calcareous, detritic; Clay, 10%, light olive gray, very soft, calcareous (marl); Shell, trace, very pale orange, tests to 0.2-inch..
752-753	
753-754	
754-755	
755-756	
756-757	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, calcareous (marl), very soft; Shell, 5%, very pale orange to white, tests to 0.3-inch.
757-758	
758-759	
759-760	
760-761	
761-762	
762-763	
763-764	LIMESTONE - Limestone, 100%, yellowish gray, slightly phospahtic, soft, poorly cmented; Clay, trace, olive gray, microcrystalline, very hard.
764-765	
765-766	
766-767	
767-768	
768-769	
769-770	
770-771	
771-772	
772-773	
773-774	LIMESTONE - Limestone, 100%, yellowish gray, slightly phospahtic, soft, poorly cmented; Clay, trace, olive gray, microcrystalline, very hard.
774-775	
775-776	
776-777	
777-778	
778-779	
779-780	

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
780-781		LIMESTONE WITH LITTLE CLAY AND SAND - Limestone, 80%, yellowish gray, sparry grainstone, poorly cemented, porous; Clay, 10%, yellowish gray, calcareous, non-plastic; Sand, 10%, yellowish gray, calcareous, fine to medium grained.
781-782		
782-783		
783-784		
784-785		
785-786		
786-787		
787-788		
788-789		
789-790		
790-791		LIMESTONE - Limestone, 100%, yellowish gray, sparry grainstone, trace of fossils, vuggy, porous.
791-792		
792-793		
793-794		
794-795		
795-796		
796-797		
797-798		
798-799		
799-800		
800-801		LIMESTONE - Limestone, 100%, yellowish gray, sparry grainstone, trace of fossils, vuggy, porous.
801-802		
802-803		
803-804		
804-805		
805-806		
806-807		
807-808		
808-809		
809-810		
810-811		LIMESTONE - Limestone, 100%, yellowish gray, biosparitic grainstone, fossiliferous, vuggy, porous.
811-812		
812-813		
813-814		
814-815		
815-816		
816-817		
817-818		
818-819		
819-820		
820-821		LIMESTONE - Limestone, 100%, yellowish gray, biosparitic grainstone, fossiliferous, vuggy, porous.
821-822		
822-823		
823-824		
824-825		
825-826		
826-827		
827-828		
828-829		
829-830		
830-831		LIMESTONE - Limestone, 100%, yellowish gray, biosparitic grainstone, fossiliferous, vuggy, porous.
831-832		
832-833		
833-834		
834-835		
835-836		
836-837		
837-838		
838-839		
839-840		

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City of Port St. Lucie, Westport Injection Well System
PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
840-841		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light gray to medium light gray, microcrystalline, partly dolomitic.
841-842		
842-843		
843-844		
844-845		
845-846		
846-847		
847-848		
848-849		
849-850		
850-851		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
851-852		
852-853		
853-854		
854-855		
855-856		
856-857		
857-858		
858-859		
859-860		
860-861		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
861-862		
862-863		
863-864		
864-865		
865-866		
866-867		
867-868		
868-869		
869-870		
870-871		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
871-872		
872-873		
873-874		
874-875		
875-876		
876-877		
877-878		
878-879		
879-880		
880-881		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
881-882		
882-883		
883-884		
884-885		
885-886		
886-887		
887-888		
888-889		
889-890		
890-891		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
891-892		
892-893		
893-894		
894-895		
895-896		
896-897		
897-898		
898-899		
899-900		

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
900-901		
901-902		
902-903		
903-904		LIMESTONE - Limestone, 100%, 90% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 10% light
904-905		
905-906		
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 grainstone, highly fossiliferous, fine grained, 30% yellowish gray, dolomitic, finely crystalline, slightly vuggy; Dolomite, 10%, very light gray microcrystalline to very-fine crystalline.
914-915		
915-916		
916-917		
917-918		
918-919		
919-920		
920-921		
921-922		
922-923		
923-924		LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40% yellowish gray, dolomitic, fine crystalline, slightly vuggy.
924-925		
925-926		
926-927		
927-928		
928-929		
929-930		
930-931		
931-932		
932-933		
933-934		LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40% yellowish gray, dolomitic, fine crystalline, slightly vuggy.
934-935		
935-936		
936-937		
937-938		
938-939		
939-940		
940-941		
941-942		
942-943		
943-944		LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40% yellowish gray, dolomitic, fine crystalline, slightly vuggy.
944-945		
945-946		
946-947		
947-948		
948-949		
949-950		
950-951		
951-952		
952-953		
953-954		LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40% yellowish gray, dolomitic, fine crystalline, slightly vuggy.
954-955		
955-956		
956-957		
957-958		
958-959		
959-960		

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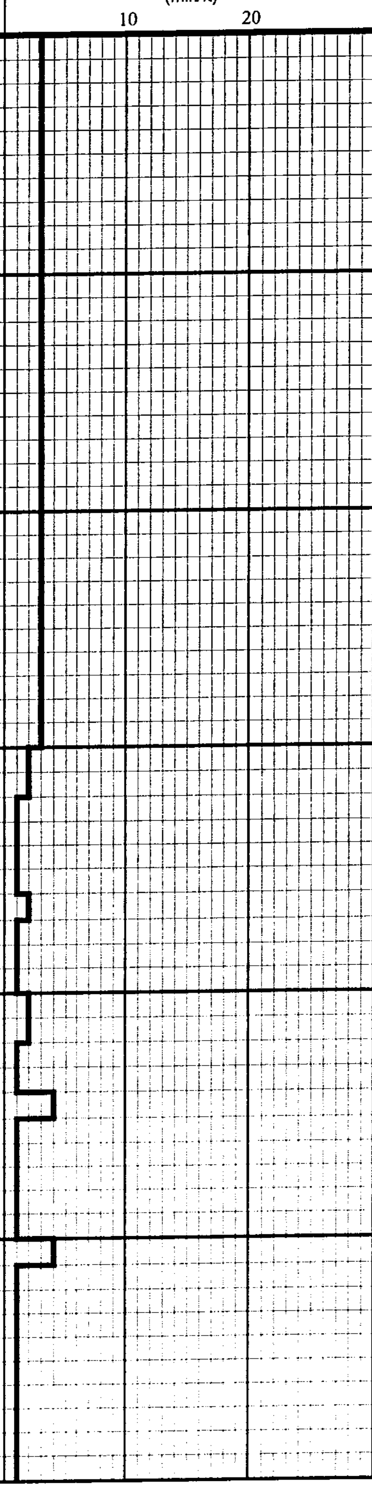
City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)



Depth Below Pad Level (ft)	Description
960-961	LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40% yellowish gray, dolomitic, fine crystalline, slightly vuggy.
961-962	
962-963	
963-964	
964-965	
965-966	
966-967	
967-968	
968-969	
969-970	
970-971	LIMESTONE - Limestone, 100%, 60% yellowish gray, biosparitic, highly fossiliferous, vuggy, porous, 40% yellowish gray, dolomitic, fine crystalline, slightly vuggy.
971-972	
972-973	
973-974	
974-975	
975-976	
976-977	
977-978	
978-979	
979-980	
980-981	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 orange to medium gray, microcrystalline to very-fine crystalline, slightly vuggy.
981-982	
982-983	
983-984	
984-985	
985-986	
986-987	
987-988	
988-989	
989-990	
990-991	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 orange to medium gray, microcrystalline to very-fine crystalline, slightly vuggy.
991-992	
992-993	
993-994	
994-995	
995-996	
996-997	
997-998	
998-999	
999-1000	
1000-1001	LIMESTONE - Limestone, 100%, yellowish gray to very light gray, fine grained, fossiliferous; Dolomite, trace, medium light gray, moderately well cemented.
1001-1002	
1002-1003	
1003-1004	
1004-1005	
1005-1006	
1006-1007	
1007-1008	
1008-1009	
1009-1010	
1010-1011	LIMESTONE - Limestone, 100%, yellowish gray to very light gray, fine grained, fossiliferous; Dolomite, trace, medium light gray, moderately well cemented.
1011-1012	
1012-1013	
1013-1014	
1014-1015	
1015-1016	
1016-1017	
1017-1018	
1018-1019	
1019-1020	

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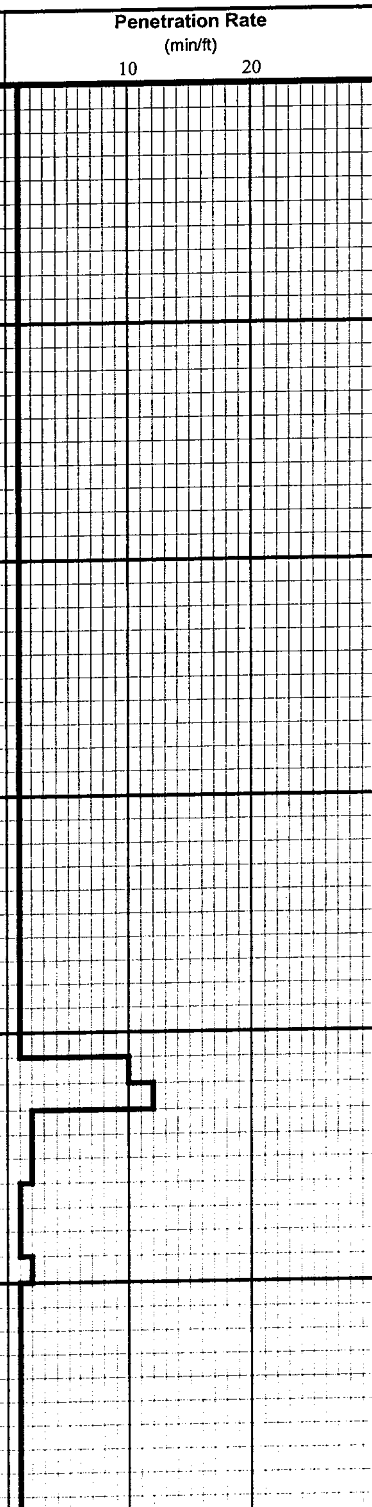
City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well



Depth Below Pad Level (ft)	Description
1020-1021 1021-1022 1022-1023 1023-1024 1024-1025 1025-1026 1026-1027 1027-1028 1028-1029 1029-1030	LIMESTONE - Limestone, 100%, grayish orange, fine grained, poorly cemented, slightly vuggy.
1030-1031 1031-1032 1032-1033 1033-1034 1034-1035 1035-1036 1036-1037 1037-1038 1038-1039 1039-1040	LIMESTONE - Limestone, 100%, yellowish gray to light gray, fine grained, moderately well cemented, slightly fossiliferous, slightly vuggy.
1040-1041 1041-1042 1042-1043 1043-1044 1044-1045 1045-1046 1046-1047 1047-1048 1048-1049 1049-1050	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.
1050-1051 1051-1052 1052-1053 1053-1054 1054-1055 1055-1056 1056-1057 1057-1058 1058-1059 1059-1060	LIMESTONE WITH VERY LITTLE DOLOMITE AND CLAY (MARL) – Limestone, 90%, 70% yellowish gray, soft; 30% very light gray, dolomitic, fine crystalline, moderately hard; Dolomite, 5%, medium light gray, fine crystalline, hard; Clay (Marl), 5%, yellowish gray to white, soft, very calcareous, cohesive.
1060-1061 1061-1062 1062-1063 1063-1064 1064-1065 1065-1066 1066-1067 1067-1068 1068-1069 1069-1070	LIMESTONE WITH VERY LITTLE DOLOMITE– Limestone, 90%, yellowish gray to pale yellowish brown, very fine grained, partially dolomitic; Clayey Limestone, 5%, yellowish gray, very fine grained, soft; Dolomite, 5%, brownish black, very-fine crystalline, hard.
1070-1071 1071-1072 1072-1073 1073-1074 1074-1075 1075-1076 1076-1077 1077-1078 1078-1079 1079-1080	LIMESTONE – Limestone, 100%, yellowish gray to very pale orange , very fine grained, vuggy.

City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
1080-1081		
1081-1082		
1082-1083		
1083-1084		LIMESTONE – Limestone, 100%, yellowish gray to very pale orange , very fine grained, vuggy.
1084-1085		
1085-1086		
1086-1087		
1087-1088		
1088-1089		
1089-1090		
1090-1091		
1091-1092		
1092-1093		
1093-1094		LIMESTONE – Limestone, 100%, yellowish gray to very pale orange , very fine grained, vuggy.
1094-1095		
1095-1096		
1096-1097		
1097-1098		
1098-1099		
1099-1100		
1100-1101		
1101-1102		
1102-1103		
1103-1104		LIMESTONE – Limestone, 100%, light gray, very fine grained, well cemented, slightly vuggy
1104-1105		
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; Clayey Limestone, 5%, very light gray to light gray, soft, slightly cohesive.
1114-1115		
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, trace light gray to medium gray, very fine grained, moderately well cemented.
1124-1125		
1125-1126		
1126-1127		
1127-1128		
1128-1129		
1129-1130		
1130-1131		
1131-1132		
1132-1133		
1133-1134		CLAYEY LIMESTONE AND LIMESTONE – Clayey Limestone, 60%, very light gray to light gray, very fine grained, soft, slightly cohesive; Limestone, 40%, light gray to medium gray, very-fine grained, poorly to moderately-well cemented, vuggy.
1134-1135		
1135-1136		
1136-1137		
1137-1138		
1138-1139		
1139-1140		

PENETRATION RATE LOG

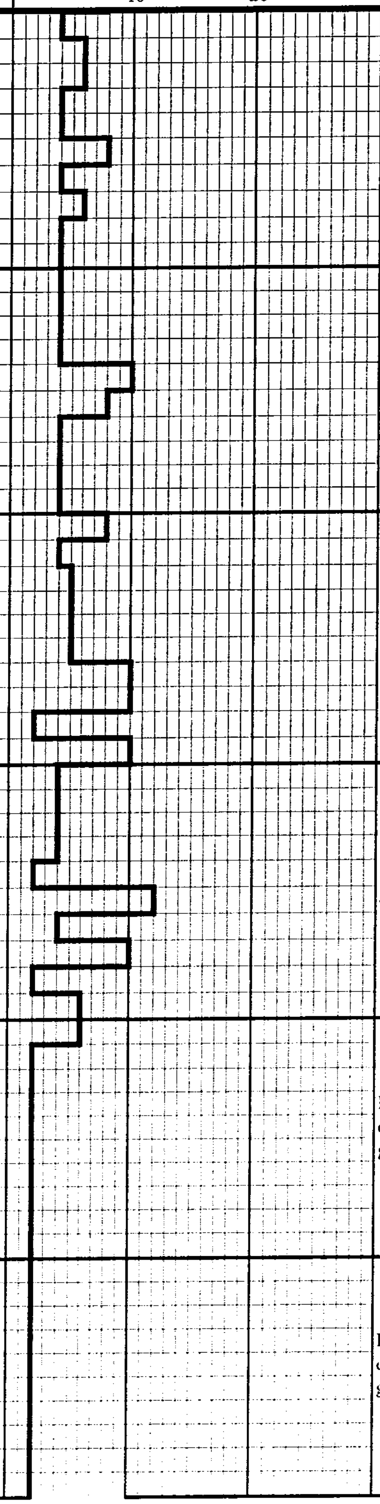
Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)

Depth Below Pad Level (ft)	Description
1140-1141	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, slightly vuggy, hard.
1141-1142	
1142-1143	
1143-1144	
1144-1145	
1145-1146	
1146-1147	
1147-1148	
1148-1149	
1149-1150	
1150-1151	LIMESTONE AND VERY LITTLE DOLOMITE – Limestone, 95%, very pale orange to yellowish gray with little light gray, very fine grained, slightly fossiliferous; Dolomite, 5%, moderate yellowish brown, very fine crystalline, well cemented.
1151-1152	
1152-1153	
1153-1154	
1154-1155	
1155-1156	
1156-1157	
1157-1158	
1158-1159	
1159-1160	
1160-1161	LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange to yellowish gray, very fine grained, poorly to moderately cemented, slightly dolomitic, vuggy; Dolomite, 30%, moderate yellowish brown to dark gray, very-fine crystalline, moderately well cemented.
1161-1162	
1162-1163	
1163-1164	
1164-1165	
1165-1166	
1166-1167	
1167-1168	
1168-1169	
1169-1170	
1170-1171	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 moderately cemented.
1171-1172	
1172-1173	
1173-1174	
1174-1175	
1175-1176	
1176-1177	
1177-1178	
1178-1179	
1179-1180	
1180-1181	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 moderately cemented.
1181-1182	
1182-1183	
1183-1184	
1184-1185	
1185-1186	
1186-1187	
1187-1188	
1188-1189	
1189-1190	
1190-1191	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 moderately cemented.
1191-1192	
1192-1193	
1193-1194	
1194-1195	
1195-1196	
1196-1197	
1197-1198	
1198-1199	
1199-1200	

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)

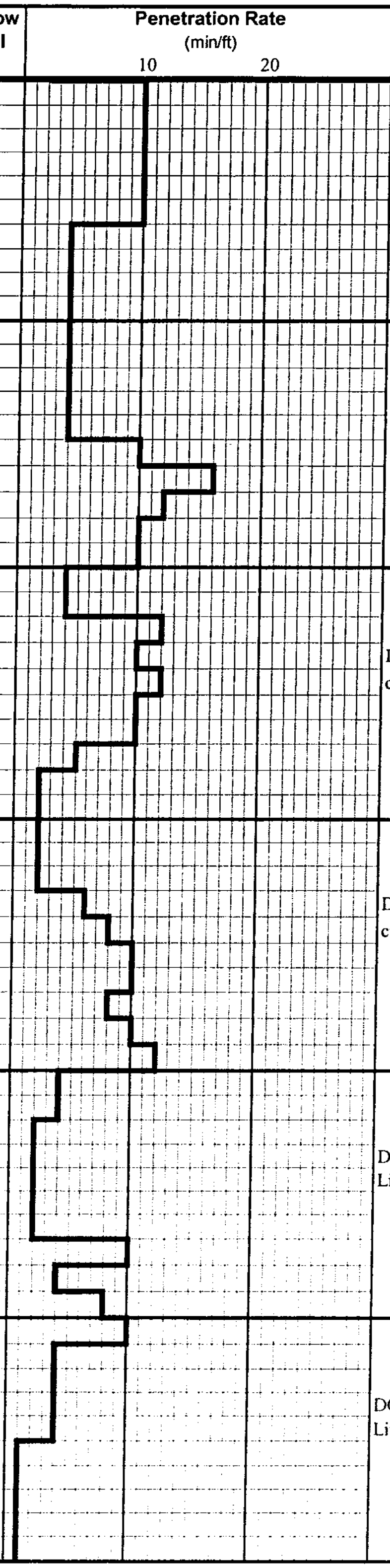


Depth Below Pad Level (ft)	Description
1200-1201	
1201-1202	
1202-1203	
1203-1204	DOLOMITE AND VERY LITTLE LIMESTONE– Dolomite, 95%, moderate yellowish brown to dark yellowish brown and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale orange to yellowish gray, very fine grained, moderately well cemented.
1204-1205	
1205-1206	
1206-1207	
1207-1208	
1208-1209	
1209-1210	
1210-1211	
1211-1212	
1212-1213	
1213-1214	DOLOMITE AND VERY LITTLE LIMESTONE– Dolomite, 95%, moderate yellowish brown to dark yellowish brown and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale orange to yellowish gray, very fine grained, moderately well cemented.
1214-1215	
1215-1216	
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 and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale orange to yellowish gray, very fine grained, moderately well cemented.
1224-1225	
1225-1226	
1226-1227	
1227-1228	
1228-1229	
1229-1230	
1230-1231	
1231-1232	
1232-1233	
1233-1234	DOLOMITE AND VERY LITTLE LIMESTONE– Dolomite, 95%, moderate yellowish brown to dark yellowish brown and medium light gray to medium dark gray, very-fine crystalline, vuggy, well cemented; Limestone, 5%, very pale orange to yellowish gray, very fine grained, moderately well cemented.
1234-1235	
1235-1236	
1236-1237	
1237-1238	
1238-1239	
1239-1240	
1240-1241	
1241-1242	
1242-1243	
1243-1244	LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange and very light gray, very fine grained, dolomitic, slighty vuggy, moderately well cemented; Dolomite, 30%, moderate yellowish brown and medium dark gray, very-fine crystalline, well cemented, hard.
1244-1245	
1245-1246	
1246-1247	
1247-1248	
1248-1249	
1249-1250	
1250-1251	
1251-1252	
1252-1253	
1253-1254	LIMESTONE AND SOME DOLOMITE – Limestone, 70%, very pale orange and very light gray, very fine grained, dolomitic, slighty vuggy, moderately well cemented; Dolomite, 30%, moderate yellowish brown and medium dark gray, very-fine crystalline, well cemented, hard.
1254-1255	
1255-1256	
1256-1257	
1257-1258	
1258-1259	
1259-1260	

ARCADIS

City of Port St. Lucie, Westport Injection Well System
PENETRATION RATE LOG

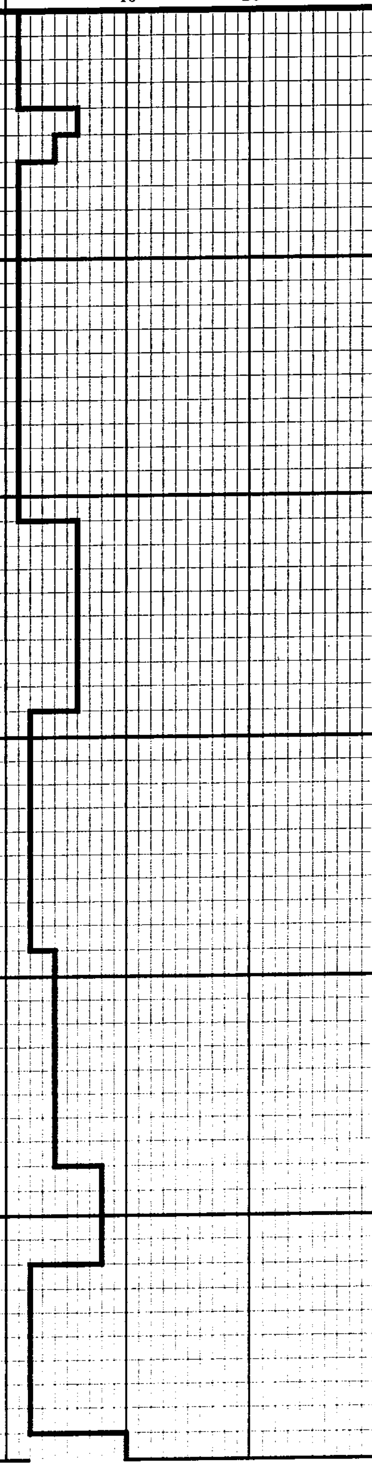
Dual-Zone Deep Monitor Well



Depth Below Pad Level (ft)	Description
1260-1261	LIMESTONE – Limestone, 100%, yellowish gray to pale yellowish brown, very fine grained, dolomitic, slightly fossiliferous, vuggy, moderately cemented.
1261-1262	
1262-1263	
1263-1264	
1264-1265	
1265-1266	
1266-1267	
1267-1268	
1268-1269	
1269-1270	
1270-1271	LIMESTONE – Limestone, 100%, yellowish gray to pale yellowish brown, very fine grained, dolomitic, slightly fossiliferous, vuggy, moderately cemented.
1271-1272	
1272-1273	
1273-1274	
1274-1275	
1275-1276	
1276-1277	
1277-1278	
1278-1279	
1279-1280	
1280-1281	DOLOMITE-Dolomite, 100%, 90% grayish orange pink, moderately hard, crystalline; 10% dark gray, well cemented, hard, microcrystalline; Clay, trace, medium dark gray, moderately soft, cohesive.
1281-1282	
1282-1283	
1283-1284	
1284-1285	
1285-1286	
1286-1287	
1287-1288	
1288-1289	
1289-1290	
1290-1291	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, medium gray, some grayish orange, very finely crystalline to microcrystalline, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1291-1292	
1292-1293	
1293-1294	
1294-1295	
1295-1296	
1296-1297	
1297-1298	
1298-1299	
1299-1300	
1300-1301	DOLOMITE– Dolomite, 100%, light gray to grayish orange, sucritic to microcrystalline, moderately hard to hard; Limestone, trace, very pale orange, soft.
1301-1302	
1302-1303	
1303-1304	
1304-1305	
1305-1306	
1306-1307	
1307-1308	
1308-1309	
1309-1310	
1310-1311	DOLOMITE– Dolomite, 100%, light gray to grayish orange, sucritic to microcrystalline, moderately hard to hard; Limestone, trace, very pale orange, soft.
1311-1312	
1312-1313	
1313-1314	
1314-1315	
1315-1316	
1316-1317	
1317-1318	
1318-1319	
1319-1320	

Dual-Zone Deep Monitor Well

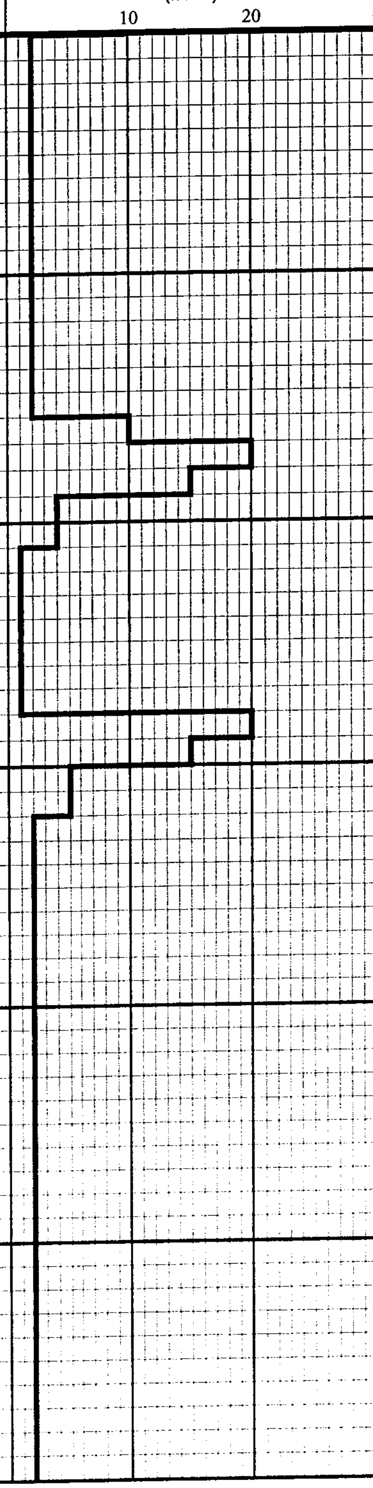
Penetration Rate (min/ft)



Depth Below Pad Level (ft)	Description
1320-1321	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1321-1322	
1322-1323	
1323-1324	
1324-1325	
1325-1326	
1326-1327	
1327-1328	
1328-1329	
1329-1330	
1330-1331	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1331-1332	
1332-1333	
1333-1334	
1334-1335	
1335-1336	
1336-1337	
1337-1338	
1338-1339	
1339-1340	
1340-1341	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1341-1342	
1342-1343	
1343-1344	
1344-1345	
1345-1346	
1346-1347	
1347-1348	
1348-1349	
1349-1350	
1350-1351	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to grayish orange, sucritic to microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, soft.
1351-1352	
1352-1353	
1353-1354	
1354-1355	
1355-1356	
1356-1357	
1357-1358	
1358-1359	
1359-1360	
1360-1361	DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, grayish orange pink to light brown, microcrystalline, vuggy, moderately hard to hard; Limestone, 15%, very pale orange, grainstone, some forams, soft.
1361-1362	
1362-1363	
1363-1364	
1364-1365	
1365-1366	
1366-1367	
1367-1368	
1368-1369	
1369-1370	
1370-1371	DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, grayish orange pink to light brown, microcrystalline, vuggy, moderately hard to hard; Limestone, 15%, very pale orange, grainstone, some forams, soft.
1371-1372	
1372-1373	
1373-1374	
1374-1375	
1375-1376	
1376-1377	
1377-1378	
1378-1379	
1379-1380	

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)



Depth Below Pad Level (ft)	Description
1380-1381	DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, 60% light brownish gray and 40% light gray, microcrystalline to cryptocrystalline, vuggy, moderately hard to hard; Limestone, 20%, very pale orange, grainstone, soft.
1381-1382	
1383-1384	
1384-1385	
1385-1386	
1386-1387	
1387-1388	
1388-1389	
1389-1390	
1389-1390	
1390-1391	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, dark yellowish orange to pale yellowish brown, microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, some forams, soft,
1391-1392	
1392-1393	
1393-1394	
1394-1395	
1395-1396	
1396-1397	
1397-1398	
1398-1399	
1399-1400	
1400-1401	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, dark yellowish orange to pale yellowish brown, microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, some forams, soft,
1401-1402	
1402-1403	
1403-1404	
1404-1405	
1405-1406	
1406-1407	
1407-1408	
1408-1409	
1409-1410	
1410-1411	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, dark yellowish orange to pale yellowish brown, microcrystalline, vuggy, moderately hard to hard; Limestone, 5%, very pale orange, grainstone, some forams, soft,
1411-1412	
1412-1413	
1413-1414	
1414-1415	
1415-1416	
1416-1417	
1417-1418	
1418-1419	
1419-1420	
1420-1421	LIMESTONE AND SOME CLAY – Limestone, 80%, 90% yellowish gray, very calcareous, grainstone, moderately hard, vuggy; 10% very light gray, clayey limestone, moderately soft; Clay, 20%, greenish gray to medium gray, slightly calcareous, soft to very soft.
1421-1422	
1422-1423	
1423-1424	
1424-1425	
1425-1426	
1426-1427	
1427-1428	
1428-1429	
1429-1430	
1430-1431	DOLOMITE AND SOME LOMESTONE - Dolomite, 80%, pale yellowish brown, finely crystalline to microcrystalline, well cemented, moderately hard; Limestone, 20%, very pale orange to yellowish gray, grainstone, fine grained, moderately soft, poorly cemented, vuggy, porous.
1431-1432	
1432-1433	
1433-1434	
1434-1435	
1435-1436	
1436-1437	
1437-1438	
1438-1439	
1439-1440	

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Dual-Zone Deep Monitor Well

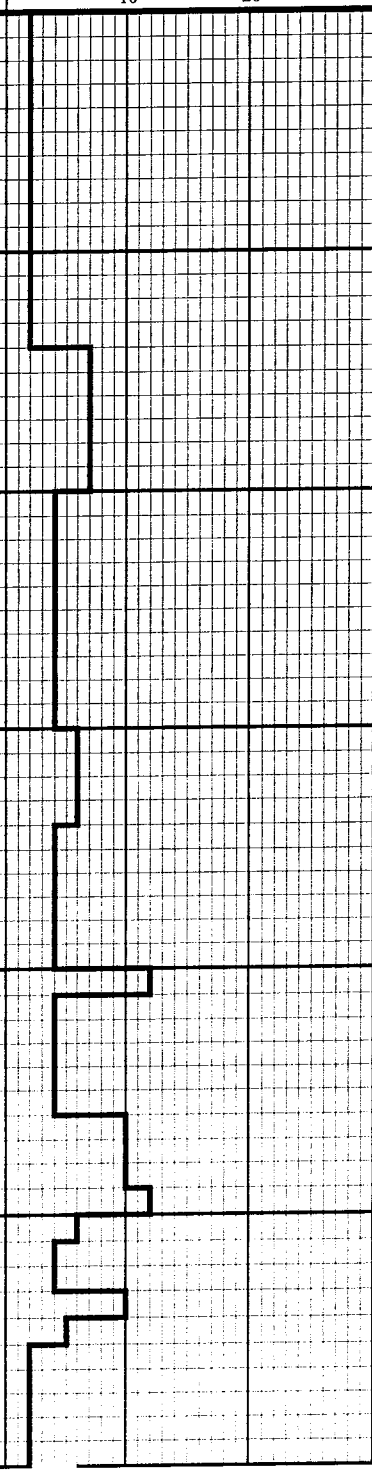
Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
1440-1441		LIMESTONE AND VERY LITTLE DOLOMITE - Limestone, 90%, very pale orange to very light gray, fine grained, soft, poorly cemented; Dolomite, 10%, pale yellowish brown to medium dark gray, microcrystalline, compact, well cemented, hard.
1441-1442		
1442-1443		
1443-1444		
1444-1445		
1445-1446		
1446-1447		
1447-1448		
1448-1449		
1449-1450		
1450-1451		DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly cemented.
1451-1452		
1452-1453		
1453-1454		
1454-1455		
1455-1456		
1456-1457		
1457-1458		
1458-1459		
1459-1460		
1460-1461		DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly cemented.
1461-1462		
1462-1463		
1463-1464		
1464-1465		
1465-1466		
1466-1467		
1467-1468		
1468-1469		
1469-1470		
1470-1471		DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly cemented.
1471-1472		
1472-1473		
1473-1474		
1474-1475		
1475-1476		
1476-1477		
1477-1478		
1478-1479		
1479-1480		
1480-1481		DOLOMITE WITH VERY LITTLE LIMESTONE - Dolomite, 95%, light brown to dark yellowish brown, finely crystalline, vuggy, moderately soft; Limestone, 5%, very pale orange, finely grained, moderately soft, poorly cemented.
1481-1482		
1482-1483		
1483-1484		
1484-1485		
1485-1486		
1486-1487		
1487-1488		
1488-1489		
1489-1490		
1490-1491		DOLOMITE WITH LITTLE LIMESTONE - Dolomite, 90%, medium light gray to pale yellowish brown, crystalline, moderately hard, vuggy; Limestone, 10%, very pale orange, fine grained, soft, poorly cemented.
1491-1492		
1492-1493		
1493-1494		
1494-1495		
1495-1496		
1496-1497		
1497-1498		
1498-1499		
1499-1500		

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
1500-1501		LIMESTONE AND DOLOMITE - Limestone, 60%, yellowish gray, very fine grained, vuggy, partially dolomitic, poorly to moderately cemented; Dolomite, 40%, moderately yellowish brown, microcrystalline, vuggy, moderately cemented.
1501-1502		
1502-1503		
1503-1504		
1504-1505		
1505-1506		
1506-1507		
1507-1508		
1508-1509		
1509-1510		
1510-1511		DOLOMITE - Dolomite, 100%, pale yellowish brown to dark yellowish brown, microcrystalline, partially vuggy, moderately well cemented.
1511-1512		
1512-1513		
1513-1514		
1514-1515		
1515-1516		
1516-1517		
1517-1518		
1518-1519		
1519-1520		
1520-1521		LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained, dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown, microcrystalline, poorly to moderately cemented, slightly vuggy.
1521-1522		
1522-1523		
1523-1524		
1524-1525		
1525-1526		
1526-1527		
1527-1528		
1528-1529		
1529-1530		
1530-1531		LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained, dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown, microcrystalline, poorly to moderately cemented, slightly vuggy.
1531-1532		
1532-1533		
1533-1534		
1534-1535		
1535-1536		
1536-1537		
1537-1538		
1538-1539		
1539-1540		
1540-1541		LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained, dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown, microcrystalline, poorly to moderately cemented, slightly vuggy.
1541-1542		
1542-1543		
1543-1544		
1544-1545		
1545-1546		
1546-1547		
1547-1548		
1548-1549		
1549-1550		
1550-1551		LIMESTONE AND DOLOMITE - Limestone, 60%, very pale orange to pale yellowish brown, very fine grained, dolomitic, fossiliferous, poorly to moderately cemented; Dolomite, 40%, moderate yellowish brown, microcrystalline, poorly to moderately cemented, slightly vuggy.
1551-1552		
1552-1553		
1553-1554		
1554-1555		
1555-1556		
1556-1557		
1557-1558		
1558-1559		
1559-1560		

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft) 10 20



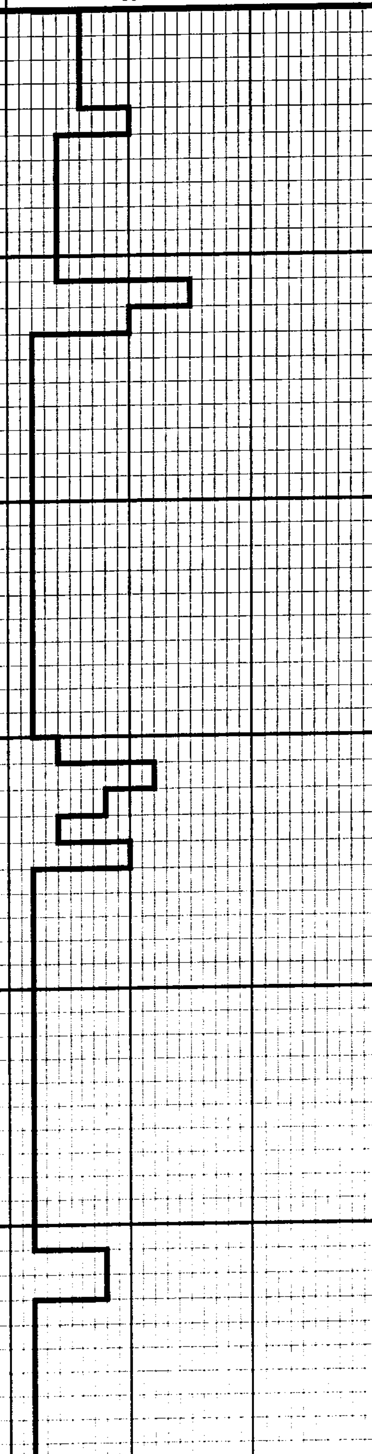
Depth Below Pad Level (ft)	Description
1560-1561	LIMESTONE AND SOME DOLOMITE - Limestone, 80%, very pale orange to pale yellowish brown, very fine grained, fossiliferous, dolomitic, poorly to moderately cemented, slightly vuggy; Dolomite, 20%, medium light gray t medium dark gray, microcrystalline, fossiliferous, moderately cemented.
1561-1562	
1562-1563	
1563-1564	
1564-1565	
1565-1566	
1566-1567	
1567-1568	
1568-1569	
1569-1570	
1570-1571	DOLOMITE AND LIMESTONE – Dolomite, 75%, moderate yellowish brown , microcrystalline, hard, well cemented; Limestone, 25%, very pale orange to yellowish gray , very fine grained, fossiliferous, dolomitic.
1571-1572	
1572-1573	
1573-1574	
1574-1575	
1575-1576	
1576-1577	
1577-1578	
1578-1579	
1579-1580	
1580-1581	DOLOMITE – Dolomite, 95%, pale yellowish brown to moderate yellowish brown, microcrystalline to very-fine crystalline, well cemented, slightly vuggy; Limestone, 5%, very pale orange to yellowish gray, very fine grained, poorly cemented.
1581-1582	
1582-1583	
1583-1584	
1584-1585	
1585-1586	
1586-1587	
1587-1588	
1588-1589	
1589-1590	
1590-1591	DOLOMITE AND LIMESTONE – Dolomite, 80%, pale yellowish brown to dark yellowish brown and medium light gray to medium dark gray , microcrystalline to very-fine crystalline, slightly vuggy, well cemented; Limestone, 20%, very pale orange to yellowish gray , very fine grained, poorly cemented.
1591-1592	
1592-1593	
1593-1594	
1594-1595	
1595-1596	
1596-1597	
1597-1598	
1598-1599	
1599-1600	
1600-1601	DOLOMITE AND LIMESTONE – Dolomite, 80%, pale yellowish brown to dark yellowish brown and medium light gray to medium dark gray , microcrystalline to very-fine crystalline, slightly vuggy, well cemented; Limestone, 20%, very pale orange to yellowish gray , very fine grained, poorly cemented.
1601-1602	
1602-1603	
1603-1604	
1604-1605	
1605-1606	
1606-1607	
1607-1608	
1608-1609	
1609-1610	
1610-1611	DOLOMITE AND LIMESTONE – Dolomite, 80%, pale yellowish brown to dark yellowish brown and medium light gray to medium dark gray , microcrystalline to very-fine crystalline, slightly vuggy, well cemented; Limestone, 20%, very pale orange to yellowish gray , very fine grained, poorly cemented.
1611-1612	
1612-1613	
1613-1614	
1614-1615	
1615-1616	
1616-1617	
1617-1618	
1618-1619	
1619-1620	

City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft): 10, 20



Depth Below Pad Level (ft)	Description
1620-1621	DOLOMITE AND LIMESTONE – Dolomite, 70%, pale yellowish brown to moderate yellowish brown, very-fine grained to fine grained, moderately-well cemented, vuggy; Limestone, 30%, very pale orange, very-fine grained, poorly cemented.
1621-1622	
1622-1623	
1623-1624	
1624-1625	
1625-1626	
1626-1627	
1627-1628	
1628-1629	
1629-1630	
1630-1631	LIMESTONE AND DOLOMITIC LIMESTONE WITH VERY LITTLE DOLOMITE – Limestone, 75%, yellowish gray to very pale orange, fine grained, fosiliferous, slightly vuggy, moderately soft to soft, moderately cemented; Dolomitic limestone, 20%, very pale orange to pale yellowish brown, well cemented, moderately hard; Dolomite, 5%, pale yellowish brown to moderate yellowish brown, microcrystalline to very-fine crystalline, slightly vuggy, well cemented, moderately hard to hard.
1631-1632	
1632-1633	
1633-1634	
1634-1635	
1635-1636	
1636-1637	
1637-1638	
1638-1639	
1639-1640	
1640-1641	DOLOMITE AND SOME LIMESTONE – Dolomite, 80%, dark yellowish orange to moderate yellowish brown and some dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 20%, very pale orange to yellowish gray, fine grained, fossiliferous, slightly vuggy, moderately cemented.
1641-1642	
1642-1643	
1643-1644	
1644-1645	
1645-1646	
1646-1647	
1647-1648	
1648-1649	
1649-1650	
1650-1651	DOLOMITE AND LIMESTONE – Dolomite, 50%, pale yellowish brown to dark yellowish brown and some dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 50%, very pale orange to yellowish gray, fine grained, fossiliferous, slightly vuggy, moderately cemented.
1651-1652	
1652-1653	
1653-1654	
1654-1655	
1655-1656	
1656-1657	
1657-1658	
1658-1659	
1659-1660	
1660-1661	LIMESTONE AND SOME DOLOMITIC LIMESTONE-Limestone, 70%, yellowish gray to very pale orange, fine grained, fossiliferous, vuggy, moderately cemented, moderately soft; Dolomitic limestone, 30%, very light gray to medium light gray, crystalline to fine crystalline, vuggy, well cemented, moderately hard to hard.
1661-1662	
1662-1663	
1663-1664	
1664-1665	
1665-1666	
1666-1667	
1667-1668	
1668-1669	
1669-1670	
1670-1671	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to dark yellowish brown and some medium light gray to dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 5%, very pale orange to yellowish gray , fine grained, fossiliferous, slightly vuggy, moderately cemented.
1671-1672	
1672-1673	
1673-1674	
1674-1675	
1675-1676	
1676-1677	
1677-1678	
1678-1679	
1679-1680	

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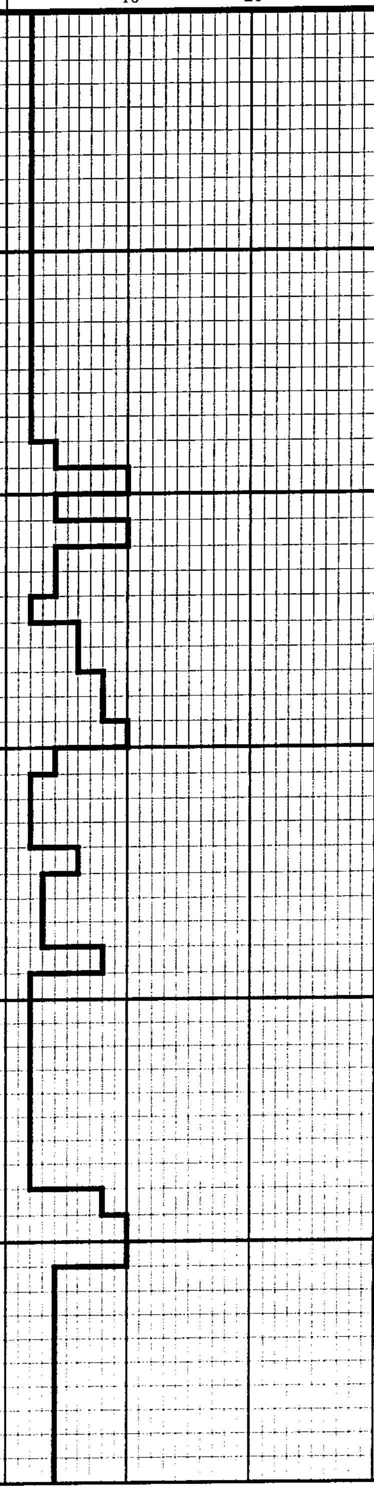
PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

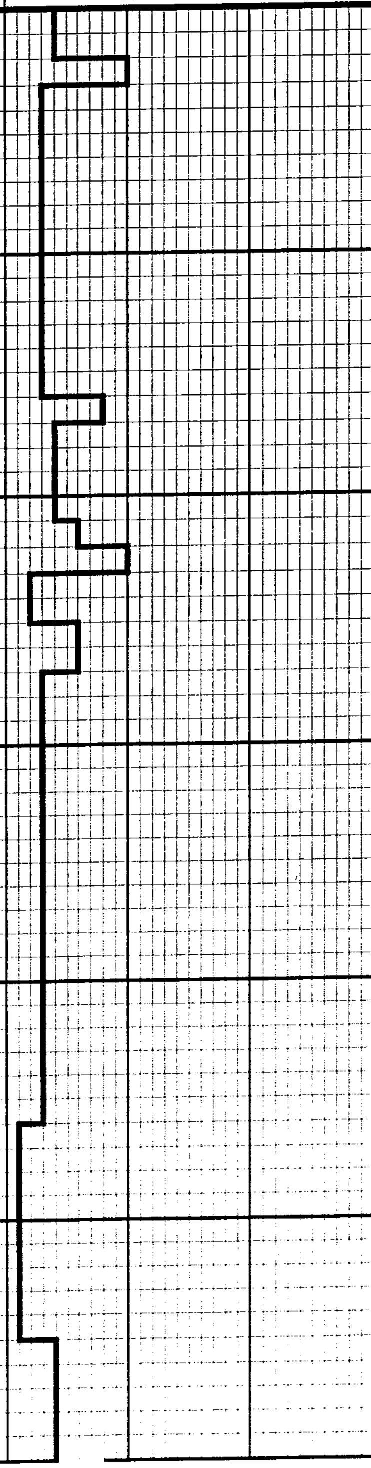


Depth Below Pad Level (ft)	Description
1680-1681 1681-1682 1682-1683 1683-1684 1684-1685 1685-1686 1686-1687 1687-1688 1688-1689 1689-1690	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, pale yellowish brown to dark yellowish brown and some medium light gray to dark gray, sucritic to fine crystalline, vuggy, well cemented, moderately hard to hard; Limestone, 5%, very pale orange to yellowish gray , fine grained, fossiliferous, slightly vuggy, moderately cemented.
1690-1691 1691-1692 1692-1693 1693-1694 1694-1695 1695-1696 1696-1697 1697-1698 1698-1699 1699-1700	DOLOMITE-Dolomite, 100%, light brownish gray to moderate yellowish brown, sucrosic to fine crystalline, vuggy to compact, well cemented, moderately hard to hard; Limestone, trace, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.
1700-1701 1701-1702 1702-1703 1703-1704 1704-1705 1705-1706 1706-1707 1707-1708 1708-1709 1709-1710	DOLOMITE-Dolomite, 100%, light brownish gray to moderate yellowish brown, sucrosic to fine crystalline, vuggy to compact, well cemented, moderately hard to hard; Limestone, trace, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.
1710-1711 1711-1712 1712-1713 1713-1714 1714-1715 1715-1716 1716-1717 1717-1718 1718-1719 1719-1720	DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, light brownish gray to moderate yellowish brown and 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.
1720-1721 1721-1722 1722-1723 1723-1724 1724-1725 1725-1726 1726-1727 1727-1728 1728-1729 1729-1730	DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, light brownish gray to moderate yellowish brown and 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.
1730-1731 1731-1732 1732-1733 1733-1734 1734-1735 1735-1736 1736-1737 1737-1738 1738-1739 1739-1740	DOLOMITE WITH VERY LITTLE LIMESTONE-Dolomite, 95%, 50% light brownish gray to moderate yellowish 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.

PENETRATION RATE LOG

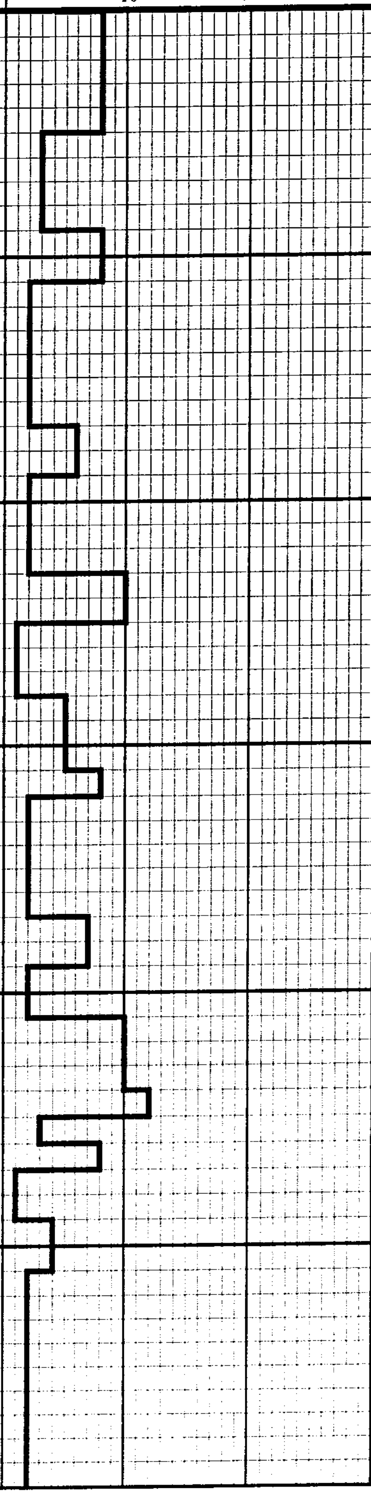
Dual-Zone Deep Monitor Well

Penetration Rate (min/ft) — 10, 20



Depth Below Pad Level (ft)	Description
1740-1741	DOLOMITE WITH LITTLE LIMESTONE-Dolomite, 90%, moderate yellowish brown, sucrosic to fine crystalline, vuggy, well cemented, hard; Limestone, 10%, white to yellowish gray, fine grained, vuggy, poorly cemented, soft.
1741-1742	
1742-1743	
1743-1744	
1744-1745	
1745-1746	
1746-1747	
1747-1748	
1748-1749	
1749-1750	
1750-1751	LIMESTONE AND DOLOMITE-Limestone, 50%, very pale orange, fine grained, vuggy, moderately well cemented, moderately hard; Dolomite, 50%, dark yellowish orange, microcrystalline, vuggy, well cemented moderately hard to hard.
1751-1752	
1752-1753	
1753-1754	
1754-1755	
1755-1756	
1756-1757	
1757-1758	
1758-1759	
1759-1760	
1760-1761	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, fossiliferous, vuggy, moderately cemented, soft.
1761-1762	
1762-1763	
1763-1764	
1764-1765	
1765-1766	
1766-1767	
1767-1768	
1768-1769	
1769-1770	
1770-1771	DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, vuggy, well cemented, hard.
1771-1772	
1772-1773	
1773-1774	
1774-1775	
1775-1776	
1776-1777	
1777-1778	
1778-1779	
1779-1780	
1780-1781	DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, vuggy, well cemented, hard.
1781-1782	
1782-1783	
1783-1784	
1784-1785	
1785-1786	
1786-1787	
1787-1788	
1788-1789	
1789-1790	
1790-1791	DOLOMITE AND VERY LITTLE LIMESTONE-Dolomite, 95%, pale yellowish brown to moderate yellowish brown, microcrystalline, vuggy, well cemented, hard; Limestone, 5%, very pale orange, fine grained, fossiliferous, vuggy, moderately cemented, soft.
1791-1792	
1792-1793	
1793-1794	
1794-1795	
1795-1796	
1796-1797	
1797-1798	
1798-1799	
1799-1800	

Dual-Zone Deep Monitor Well

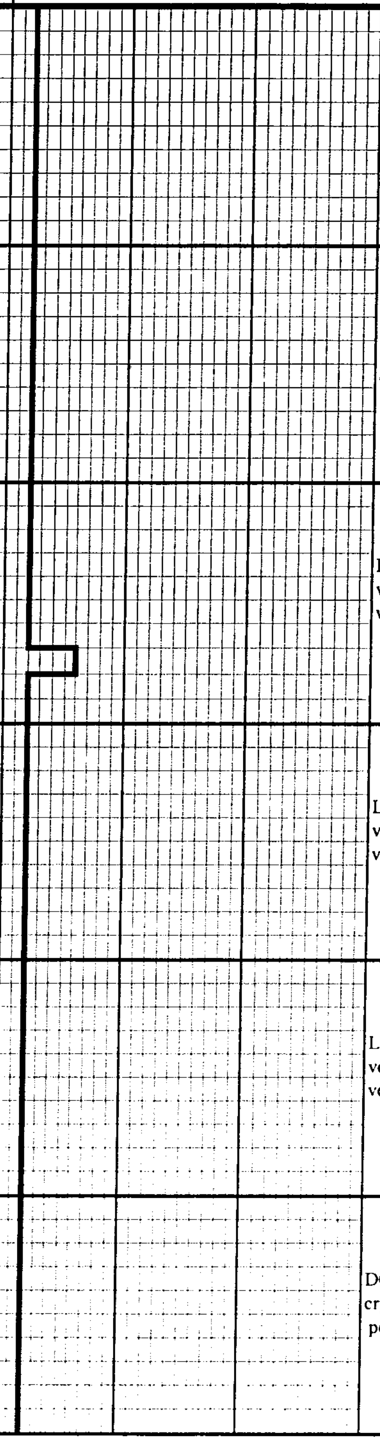
Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
1800-1801		DOLOMITE-Dolomite, 100%, 50% pale yellowish brown to moderate yellowish brown, 50% medium gray to dark gray, microcrystalline, vuggy, well cemented, hard; Limestone, trace, very pale orange, fine grained, fossiliferous, vuggy, moderately cemented, soft.
1801-1802		
1802-1803		
1803-1804		
1804-1805		
1805-1806		
1806-1807		
1807-1808		
1808-1809		
1809-1810		
1810-1811		DOLOMITE – Dolomite, 100%, 80% pale yellowish brown to dark yellowish brown, very-fine crystalline, vuggy, well cemented, 20% medium gray to grayish black, very-fine crystalline, slightly vuggy, well cemented.
1811-1812		
1812-1813		
1813-1814		
1814-1815		
1815-1816		
1816-1817		
1817-1818		
1818-1819		
1819-1820		
1820-1821		DOLOMITE – Dolomite, 85%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray to medium dark gray, very-fine crystalline, vuggy; Limestone, 15%, very pale orange to yellowish gray, very-fine grained, poorly cemented.
1821-1822		
1822-1823		
1823-1824		
1824-1825		
1825-1826		
1826-1827		
1827-1828		
1828-1829		
1829-1830		
1830-1831		DOLOMITE AND SOME LIMESTONE – Dolomite, 70%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray to medium dark gray, very-fine crystalline, vuggy; Limestone, 30%, very pale orange to yellowish gray, very-fine grained, poorly cemented.
1831-1832		
1832-1833		
1833-1834		
1834-1835		
1835-1836		
1836-1837		
1837-1838		
1838-1839		
1839-1840		
1840-1841		DOLOMITE – Dolomite, 80%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray to medium dark gray, very-fine crystalline, vuggy; Limestone, 20%, very pale orange to yellowish gray, very-fine grained, slightly fossiliferous, poorly cemented.
1841-1842		
1842-1843		
1843-1844		
1844-1845		
1845-1846		
1846-1847		
1847-1848		
1848-1849		
1849-1850		
1850-1851		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.
1851-1852		
1852-1853		
1853-1854		
1854-1855		
1855-1856		
1856-1857		
1857-1858		
1858-1859		
1859-1860		

ARCADIS

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft) 10 20

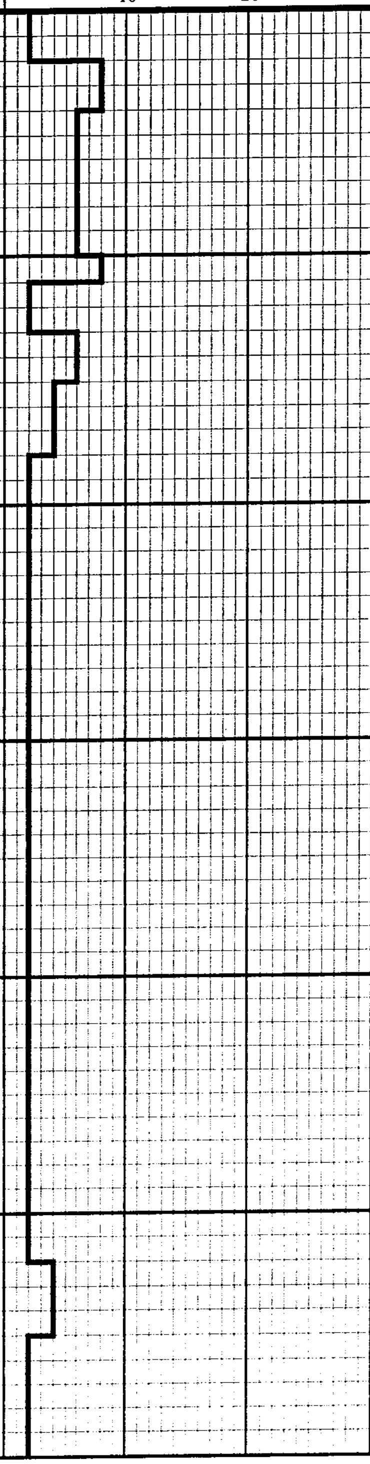


Depth Below Pad Level (ft)	Description
1860-1861	
1861-1862	
1862-1863	
1863-1864	DOLOMITE – Dolomite, 85%, pale yellowish brown to dark yellowish brown with trace amounts of medium gray to medium dark gray, very-fine crystalline, vuggy; Limestone, 15%, very pale orange to yellowish gray, very-fine grained, poorly cemented, partially dolomitic.
1864-1865	
1865-1866	
1866-1867	
1867-1868	
1868-1869	
1869-1870	
1870-1871	
1871-1872	
1872-1873	
1873-1874	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, dolomitic, poorly to moderately cemented.
1874-1875	
1875-1876	
1876-1877	
1877-1878	
1878-1879	
1879-1880	
1880-1881	
1881-1882	
1882-1883	
1883-1884	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, very-fine to fine crystalline, vuggy, moderately-well cemented.
1884-1885	
1885-1886	
1886-1887	
1887-1888	
1888-1889	
1889-1890	
1890-1891	
1891-1892	
1892-1893	
1893-1894	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, very-fine to fine crystalline, vuggy, moderately-well cemented.
1894-1895	
1895-1896	
1896-1897	
1897-1898	
1898-1899	
1899-1900	
1900-1901	
1901-1902	
1902-1903	
1903-1904	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, very-fine to fine crystalline, vuggy, moderately-well cemented.
1904-1905	
1905-1906	
1906-1907	
1907-1908	
1908-1909	
1909-1910	
1910-1911	
1911-1912	
1912-1913	
1913-1914	DOLOMITE AND LIMESTONE – Dolomite, 75%, pale yellowish brown to moderate yellowish brown, very-fine crystalline, vuggy; Limestone, 25%, very pale orange to yellowish gray, very-fine grained, slightly fossiliferous, poorly cemented.
1914-1915	
1915-1916	
1916-1917	
1917-1918	
1918-1919	
1919-1920	

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

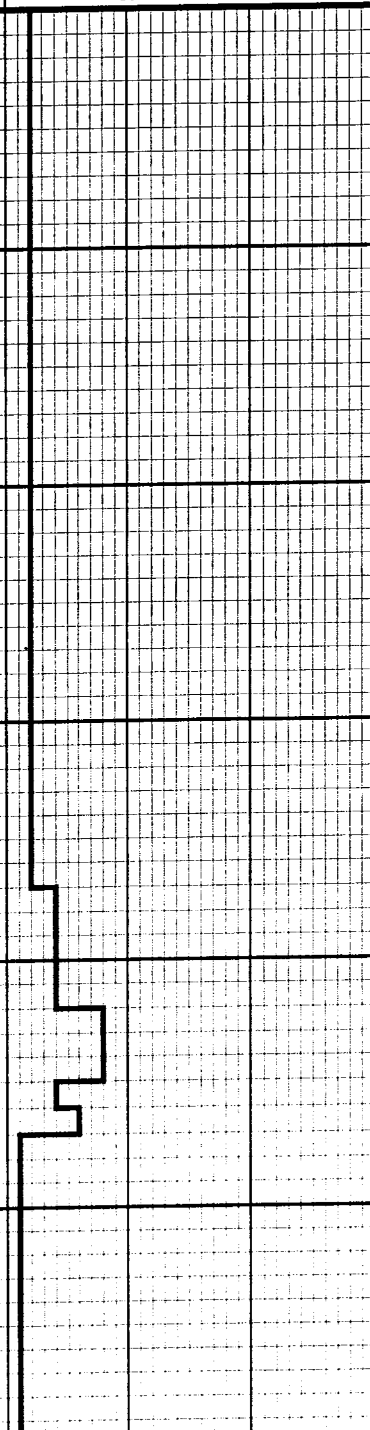
Penetration Rate (min/ft): 10, 20



Depth Below Pad Level (ft)	Description
1920-1921	
1921-1922	
1922-1923	
1923-1924	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 grained, partially crystalline, poorly cemented.
1924-1925	
1925-1926	
1926-1927	
1927-1928	
1928-1929	
1929-1930	
1930-1931	
1931-1932	
1932-1933	
1933-1934	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 grained, partially crystalline, poorly cemented.
1934-1935	
1935-1936	
1936-1937	
1937-1938	
1938-1939	
1939-1940	
1940-1941	
1941-1942	
1942-1943	
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 grained, partially crystalline, poorly cemented.
1944-1945	
1945-1946	
1946-1947	
1947-1948	
1948-1949	
1949-1950	
1950-1951	
1951-1952	
1952-1953	
1953-1954	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 grained, partially crystalline, poorly cemented.
1954-1955	
1955-1956	
1956-1957	
1957-1958	
1958-1959	
1959-1960	
1960-1961	
1961-1962	
1962-1963	
1963-1964	DOLOMITE – Dolomite, 95%, moderate yellowish brown to dark yellowish brown, microcrystalline to very-fine crystalline, porous, vuggy, moderately to well cemented; Limestone, 5%, very pale orange, very-fine grained, poorly cemented.
1964-1965	
1965-1966	
1966-1967	
1967-1968	
1968-1969	
1969-1970	
1970-1971	
1971-1972	
1972-1973	
1973-1974	DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 90%, very pale orange to pale yellowish brown, very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%, moderate yellowish brown to dark yellowish brown and little medium dark gray, very-fine crystalline, vuggy, unconsolidated, calcareous.
1974-1975	
1975-1976	
1976-1977	
1977-1978	
1978-1979	
1979-1980	

Dual-Zone Deep Monitor Well

Penetration Rate (min/ft)



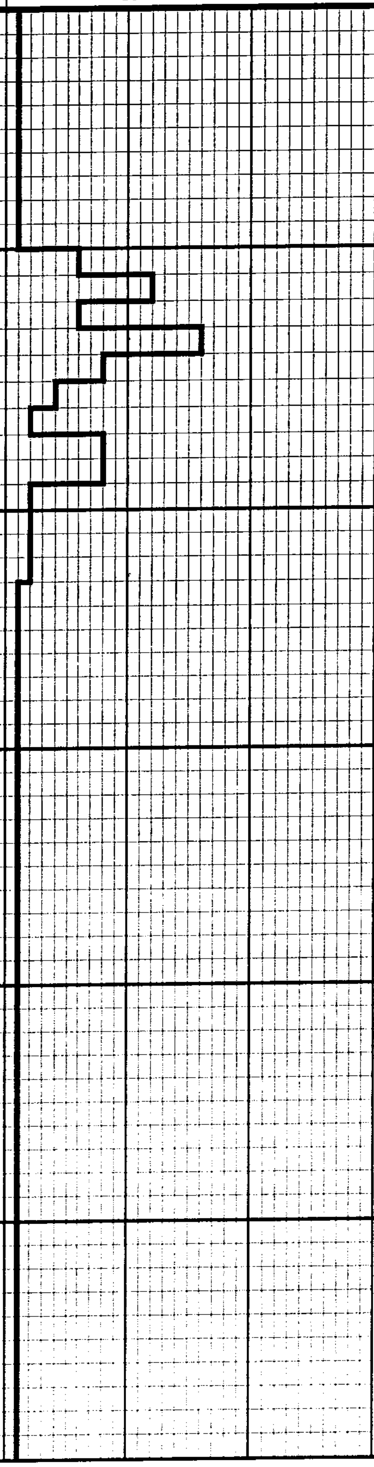
Depth Below Pad Level (ft)	Description
1980-1981	DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 90%, very pale orange to pale yellowish brown, very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%, moderate yellowish brown to dark yellowish brown and little medium dark gray, very-fine crystalline, vuggy, unconsolidated, calcareous.
1981-1982	
1982-1983	
1983-1984	
1984-1985	
1985-1986	
1986-1987	
1987-1988	
1988-1989	
1989-1990	
1990-1991	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline to very-fine crystalline, porous, vuggy, moderately to well cemented; Limestone, trace, very pale orange, very-fine grained, poorly cemented.
1991-1992	
1992-1993	
1993-1994	
1994-1995	
1995-1996	
1996-1997	
1997-1998	
1998-1999	
1999-2000	
2000-2001	DOLOMITE AND SOME DOLOMITIC LIMESTONE – Dolomite, 85%, moderate yellowish brown to dark yellowish brown, very-fine to fine crystalline, vuggy, multiple limestone inclusions, moderately to well cemented; Dolomitic Limestone, 15%, very pale orange to yellowish gray, very-fine to fine grained, partially crystalline, slightly fossiliferous, poorly cemented, vuggy.
2001-2002	
2002-2003	
2003-2004	
2004-2005	
2005-2006	
2006-2007	
2007-2008	
2008-2009	
2009-2010	
2010-2011	DOLOMITIC LIMESTONE AND SOME DOLOMITE – Limestone, 90%, very pale orange to pale yellowish brown, very fine grained, dolomitic, slightly fossiliferous, vuggy, poorly to moderately cemented; Dolomite, 10%, moderate yellowish brown to dark yellowish brown and little medium dark gray, very-fine crystalline, vuggy, moderately hard.
2011-2012	
2012-2013	
2013-2014	
2014-2015	
2015-2016	
2016-2017	
2017-2018	
2018-2019	
2019-2020	
2020-2021	DOLOMITIC LIMESTONE, LIMESTONE AND SOME DOLOMITE- Dolomitic limestone, 50%, pale yellowish brown, to medium dark gray, fine grained, dolomitic, fossiliferous, vuggy, well cemented, moderately hard; Limestone, 40%, very pale orange, oolitic, slightly vuggy, moderately cemented, soft; Dolomite, 10%, moderate brown, microcrystalline, vuggy, well cemented, hard.
2021-2022	
2022-2023	
2023-2024	
2024-2025	
2025-2026	
2026-2027	
2027-2028	
2028-2029	
2029-2030	
2030-2031	LIMESTONE AND LITTLE DOLOMITE-Limestone, 95%, very pale orange, oolitic, slightly dolomitic, slightly vuggy, moderately well cemented, soft; Dolomite, 5%, moderate brown, microcrystalline, vuggy, well cemented, hard.
2031-2032	
2032-2033	
2033-2034	
2034-2035	
2035-2036	
2036-2037	
2037-2038	
2038-2039	
2039-2040	

ARCADIS

City of Port St. Lucie, Westport Injection Well System
PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

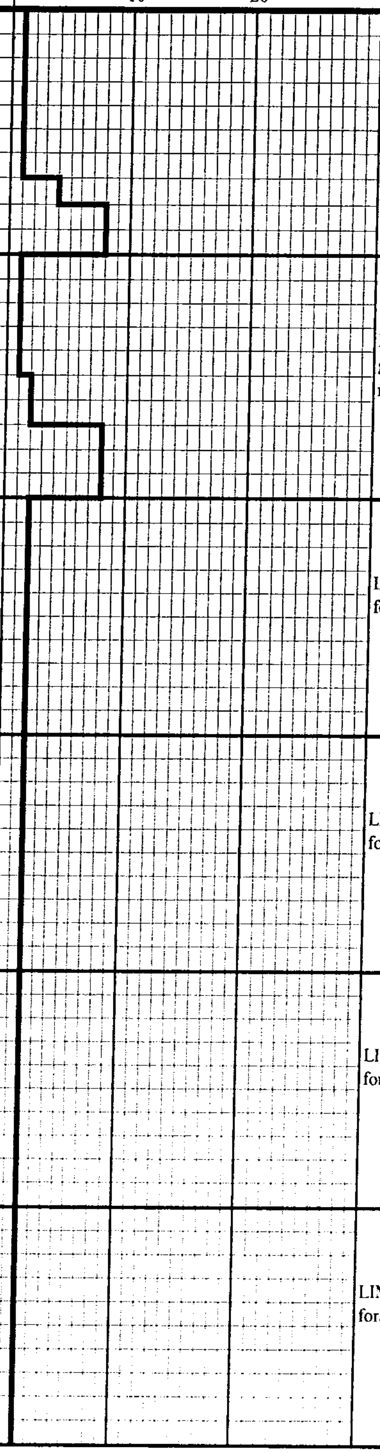
Penetration Rate (min/ft) 10 20



Depth Below Pad Level (ft)	Description
2040-2041	LIMESTONE AND LITTLE DOLOMITE-Limestone, 95%, very pale orange, oolitic, slightly dolomitic, slightly vuggy, moderately well cemented, soft; Dolomite, 5%, moderate brown, microcrystalline, vuggy, well cemented, hard.
2041-2042	
2042-2043	
2043-2044	
2044-2045	
2045-2046	
2046-2047	
2047-2048	
2048-2049	
2049-2050	
2050-2051	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.
2051-2052	
2052-2053	
2053-2054	
2054-2055	
2055-2056	
2056-2057	
2057-2058	
2058-2059	
2059-2060	
2060-2061	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.
2061-2062	
2062-2063	
2063-2064	
2064-2065	
2065-2066	
2066-2067	
2067-2068	
2068-2069	
2069-2070	
2070-2071	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.
2071-2072	
2072-2073	
2073-2074	
2074-2075	
2075-2076	
2076-2077	
2077-2078	
2078-2079	
2079-2080	
2080-2081	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.
2081-2082	
2082-2083	
2083-2084	
2084-2085	
2085-2086	
2086-2087	
2087-2088	
2088-2089	
2089-2090	
2090-2091	LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.
2091-2092	
2092-2093	
2093-2094	
2094-2095	
2095-2096	
2096-2097	
2097-2098	
2098-2099	
2099-2100	

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
2100-2101		LIMESTONE-Limestone, 100%, very pale orange, oolitic, slightly foraminiferous, slightly vuggy, moderately cemented, soft.
2101-2102		
2102-2103		
2103-2104		
2104-2105		
2105-2106		
2106-2107		
2107-2108		
2108-2109		
2109-2110		
2110-2111		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 medium dark gray, fine crystalline, vuggy, well cemented, moderately hard to hard.
2111-2112		
2112-2113		
2113-2114		
2114-2115		
2115-2116		
2116-2117		
2117-2118		
2118-2119		
2119-2120		
2120-2121		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,
2121-2122		
2122-2123		
2123-2124		
2124-2125		
2125-2126		
2126-2127		
2127-2128		
2128-2129		
2129-2130		
2130-2131		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,
2131-2132		
2132-2133		
2133-2134		
2134-2135		
2135-2136		
2136-2137		
2137-2138		
2138-2139		
2139-2140		
2140-2141		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,
2141-2142		
2142-2143		
2143-2144		
2144-2145		
2145-2146		
2146-2147		
2147-2148		
2148-2149		
2149-2150		
2150-2151		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,
2151-2152		
2152-2153		
2153-2154		
2154-2155		
2155-2156		
2156-2157		
2157-2158		
2158-2159		
2159-2160		

ARCADIS

City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

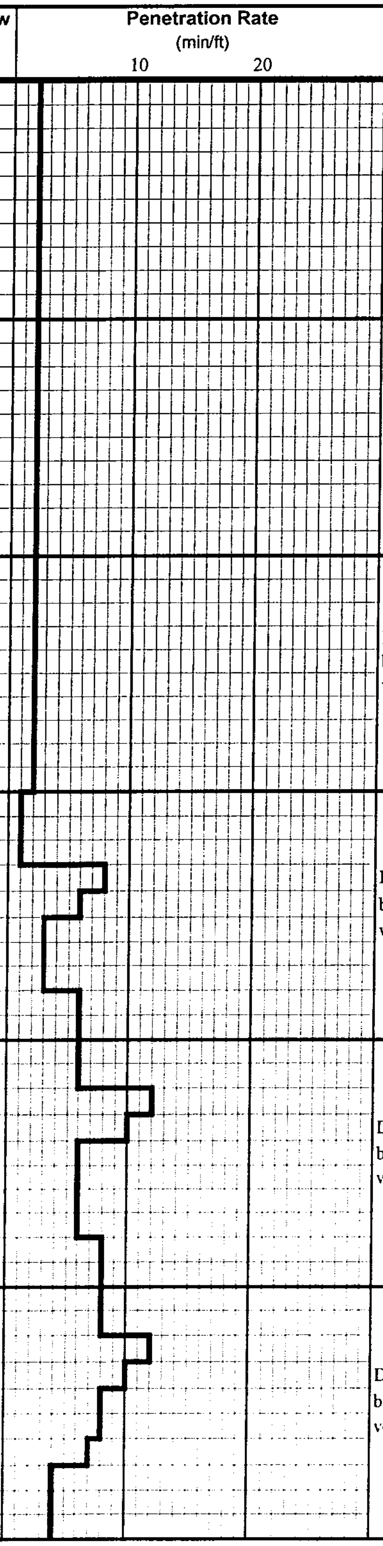
Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
2160-2161		
2161-2162		
2162-2163		
2163-2164		LIMESTONE AND DOLOMITE-Limestone, 60%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately cemented, soft; Dolomite, 40%, grayish orange to pale yellowish brown some medium gray, sucrosic to microcrystalline, vuggy, calcitic, well cemented, moderately hard to hard.
2164-2165		
2165-2166		
2166-2167		
2167-2168		
2168-2169		
2169-2170		
2170-2171		
2171-2172		
2172-2173		
2173-2174		LIMESTONE -Limestone, 100%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately cemented, soft; Dolomite, trace, moderate brown to dark gray, microcrystalline, hard.
2174-2175		
2175-2176		
2176-2177		
2177-2178		
2178-2179		
2179-2180		
2180-2181		
2181-2182		
2182-2183		
2183-2184		DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, vuggy, well cemented, hard.
2184-2185		
2185-2186		
2186-2187		
2187-2188		
2188-2189		
2189-2190		
2190-2191		
2191-2192		
2192-2193		
2193-2194		DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, vuggy, well cemented, hard.
2194-2195		
2195-2196		
2196-2197		
2197-2198		
2198-2199		
2199-2200		
2200-2201		
2201-2202		
2202-2203		
2203-2204		DOLOMITE-Dolomite, 100%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, vuggy, well cemented, hard.
2204-2205		
2205-2206		
2206-2207		
2207-2208		
2208-2209		
2209-2210		
2210-2211		
2211-2212		
2212-2213		
2213-2214		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, sucrosic to microcrystalline, vuggy, well cemented, hard.
2214-2215		
2215-2216		
2216-2217		
2217-2218		
2218-2219		
2219-2220		

ARCADIS

PENETRATION RATE LOG

Dual-Zone Deep Monitor Well



Depth Below Pad Level (ft)	Description
2220-2221	
2221-2222	
2222-2223	
2223-2224	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, sucrosic to microcrystalline, vuggy, well cemented, hard.
2224-2225	
2225-2226	
2226-2227	
2227-2228	
2228-2229	
2229-2230	
2230-2231	
2231-2232	
2232-2233	
2233-2234	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, sucrosic to microcrystalline, vuggy, well cemented, hard.
2234-2235	
2235-2236	
2236-2237	
2237-2238	
2238-2239	
2239-2240	
2240-2241	
2241-2242	
2242-2243	
2243-2244	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, calcitic, some forams present, vuggy, well cemented, hard; Limestone, 5%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately cemented, soft.
2244-2245	
2245-2246	
2246-2247	
2247-2248	
2248-2249	
2249-2250	
2250-2251	
2251-2252	
2252-2253	
2253-2254	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, calcitic, some forams present, vuggy, well cemented, hard; Limestone, 5%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately cemented, soft.
2254-2255	
2255-2256	
2256-2257	
2257-2258	
2258-2259	
2259-2260	
2260-2261	
2261-2262	
2262-2263	
2263-2264	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, calcitic, some forams present, vuggy, well cemented, hard; Limestone, 5%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately cemented, soft.
2264-2265	
2265-2266	
2266-2267	
2267-2268	
2268-2269	
2269-2270	
2270-2271	
2271-2272	
2272-2273	
2273-2274	DOLOMITE AND VERY LITTLE LIMESTONE – Dolomite, 95%, moderate yellowish brown to dark yellowish brown, sucrosic to microcrystalline, calcitic, some forams present, vuggy, well cemented, hard; Limestone, 5%, very pale orange to grayish orange, oolitic, foraminiferous, vuggy, moderately cemented, soft.
2274-2275	
2275-2276	
2276-2277	
2277-2278	
2278-2279	
2279-2280	

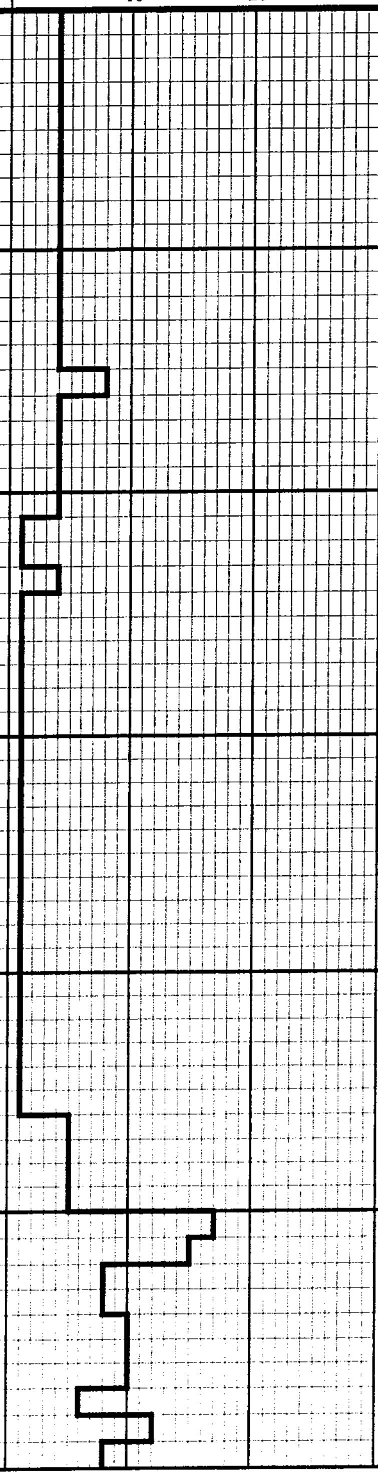
ARCADIS

City of Port St. Lucie, Westport Injection Well System

PENETRATION RATE LOG

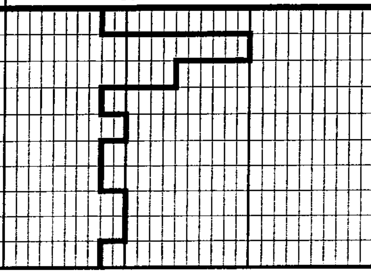
Dual-Zone Deep Monitor Well

Penetration Rate (min/ft) 10 20



Depth Below Pad Level (ft)	Description
2280-2281	DOLOMITE AND SOME LIMESTONE – Dolomite, 75%, moderate yellowish brown to dark yellowish brown, microcrystalline, vuggy, well cemented, hard; Limestone, 25%, very pale orange to yellowish gray, very-fine grained, partially dolomitic, poorly cemented.
2281-2282	
2282-2283	
2283-2284	
2284-2285	
2285-2286	
2286-2287	
2287-2288	
2288-2289	
2289-2290	
2290-2291	DOLOMITE AND SOME LIMESTONE – Dolomite, 75%, moderate yellowish brown to dark yellowish brown, microcrystalline, vuggy, well cemented, hard; Limestone, 25%, very pale orange to yellowish gray, very-fine grained, partially dolomitic, poorly cemented.
2291-2292	
2292-2293	
2293-2294	
2294-2295	
2295-2296	
2296-2297	
2297-2298	
2298-2299	
2299-2300	
2300-2301	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, slightly vuggy, well cemented, hard; Limestone, trace, very pale orange to yellowish gray, very-fine grained, partially dolomitic, poorly cemented.
2301-2302	
2302-2303	
2303-2304	
2304-2305	
2305-2306	
2306-2307	
2307-2308	
2308-2309	
2309-2310	
2310-2311	DOLOMITE – Dolomite, 100%, moderate yellowish brown to dark yellowish brown, microcrystalline, slightly vuggy, well cemented, hard; Limestone, trace, very pale orange to yellowish gray, very-fine grained, partially dolomitic, poorly cemented.
2311-2312	
2312-2313	
2313-2314	
2314-2315	
2315-2316	
2316-2317	
2317-2318	
2318-2319	
2319-2320	
2320-2321	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, very-fine grained, partially dolomitic, poorly cemented.
2321-2322	
2322-2324	
2322-2324	
2324-2325	
2325-2326	
2326-2327	
2327-2328	
2328-2329	
2329-2330	
2330-2331	DOLOMITE AND SOME LIMESTONE – Dolomite, 85%, pale yellowish brown to dark yellowish brown and little medium light gray, microcrystalline to very-fine crystalline, moderately to well cemented; Limestone, 15%, very pale orange to yellowish gray, very-fine grained, partially crystalline, slightly fossiliferous, partially dolomitic, poorly to moderately cemented.
2331-2332	
2332-2333	
2333-2334	
2334-2335	
2335-2336	
2336-2337	
2337-2338	
2338-2339	
2339-2340	

Dual-Zone Deep Monitor Well

Depth Below Pad Level (ft)	Penetration Rate (min/ft) 10 20	Description
2340-2341		DOLOMITE AND LITTLE LIMESTONE– Dolomite, 90%, moderate yellowish brown to dusky yellowish brown, microcrystalline, slightly vuggy, well cemented, hard; Limestone, 10%, very pale orange to yellowish gray, very-fine grained, partially dolomitic, poorly cemented.
2341-2342		
2342-2343		
2343-2344		
2344-2345		
2345-2346		
2346-2347		
2347-2348		
2348-2349		
2349-2350		

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 Lab
RESERVOIR OPTIMIZATION

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 re-measured 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	Basic Rock Properties	Formation Resistivity Factor	Triaxial Compressive Test
1H	1854.3-55.0	X	X	
1V	1854.3-55.0	X		X
2H	1855.4-56.9	X	X	
2V	1855.4-56.9	X		X
3H	1857.7-58.8	X	X	
3V	1857.7-58.8	X		X

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:

$$F = R_o / R_w$$

$$m = \log F / \log \text{Porosity}$$

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

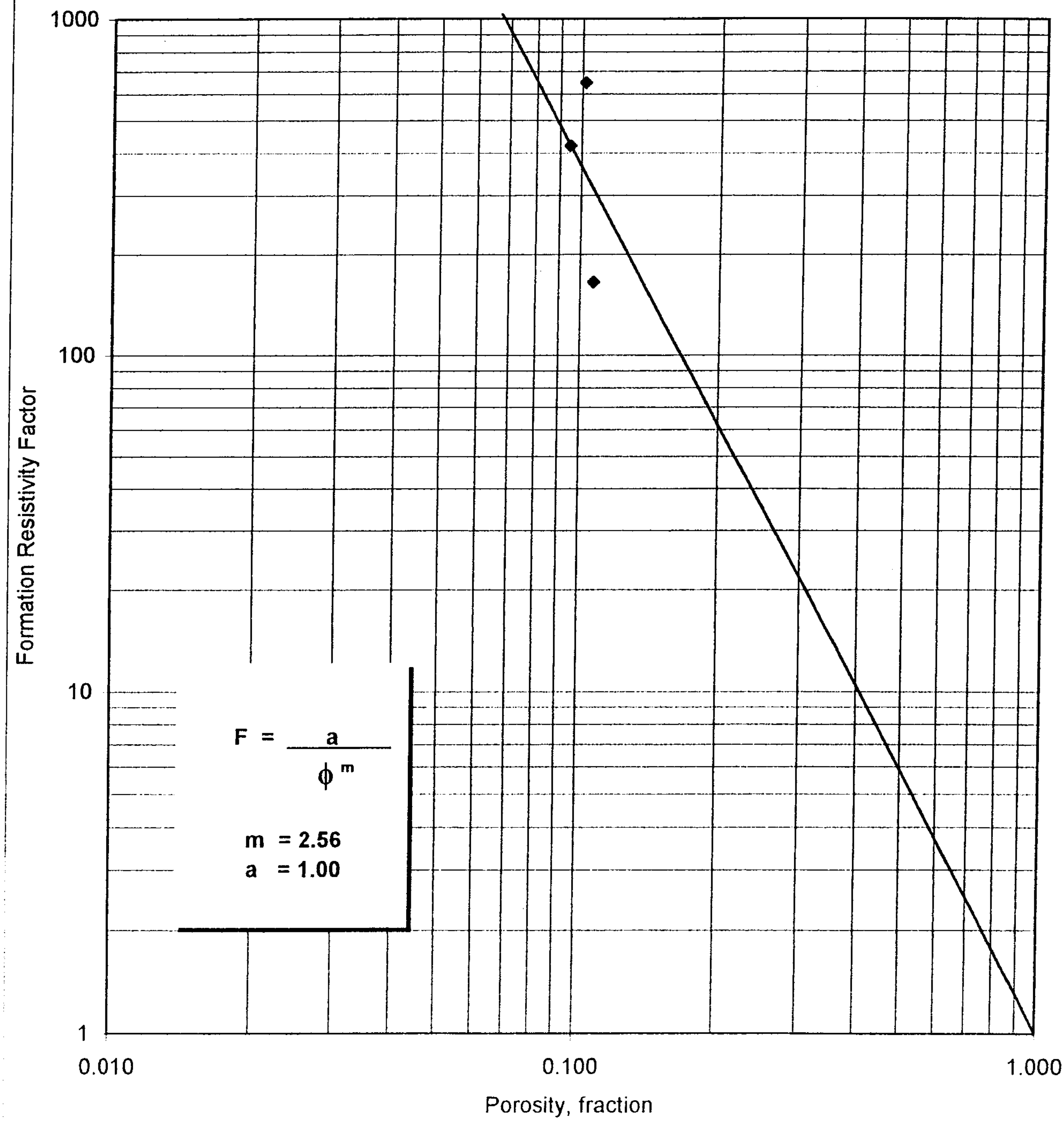
Sample Number	Depth, feet	Grain Density gm/cc	Klinkenberg Permeability md	Porosity, fraction	Formation Factor, (Apparent)		
					Fa	Ro, ohm-m	m
1H	1854.3-55.0	2.83	147.	0.107	165.29	37.57	2.29
2H	1855.4-56.9	2.83	.035	0.095	421.65	95.84	2.56
3H	1857.7-58.8	2.83	.029	0.102	647.59	147.20	2.83

Core Laboratories

FORMATION RESISTIVITY FACTOR

1000 Hertz

Company:	Youngquist Brothers, Inc.	Saturant, ppm:	27,700
Project:	PF001153.003/Westport IW1	Confining Stress, psi:	800
Location:	Port St. Lucie, Florida	Brine Resistivity, ohm-m @25°C:	0.2273
File:	HOU-030446	Porosity Exponent (m) [Composite]:	2.56
		Intercept (a):	1.00



GEOMECHANICAL PROPERTIES

Triaxial Compressive Test

Triaxial Compressive Tests

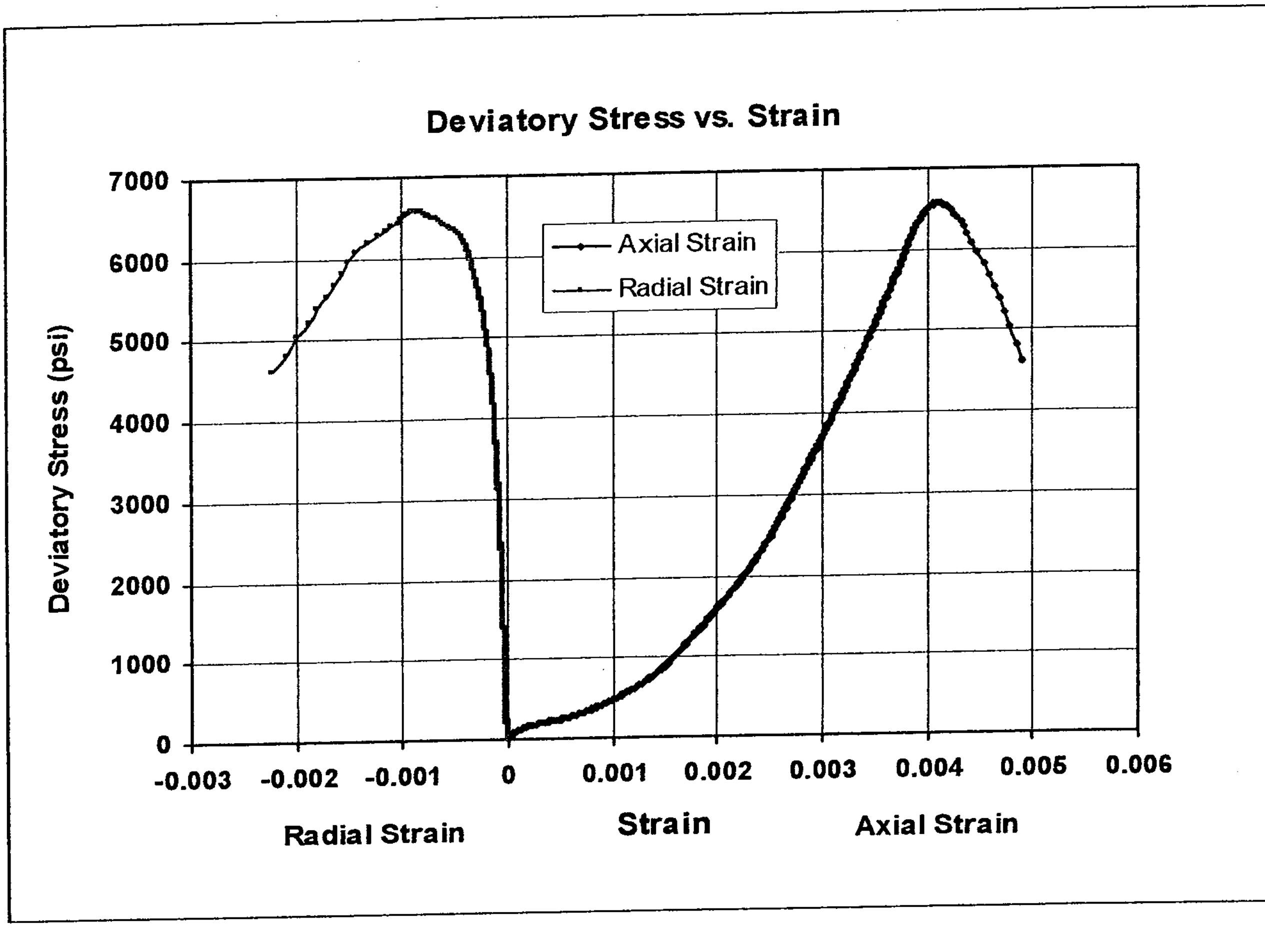
This report reviews the result of the triaxial compressive tests performed on limestone core plugs from PF001153.0003/Westport IW1, GHI Field of Port St. Lucie, Florida for Youngquist Brothers, Inc.

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 2.38×10^6 psi to 3.71×10^6 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.

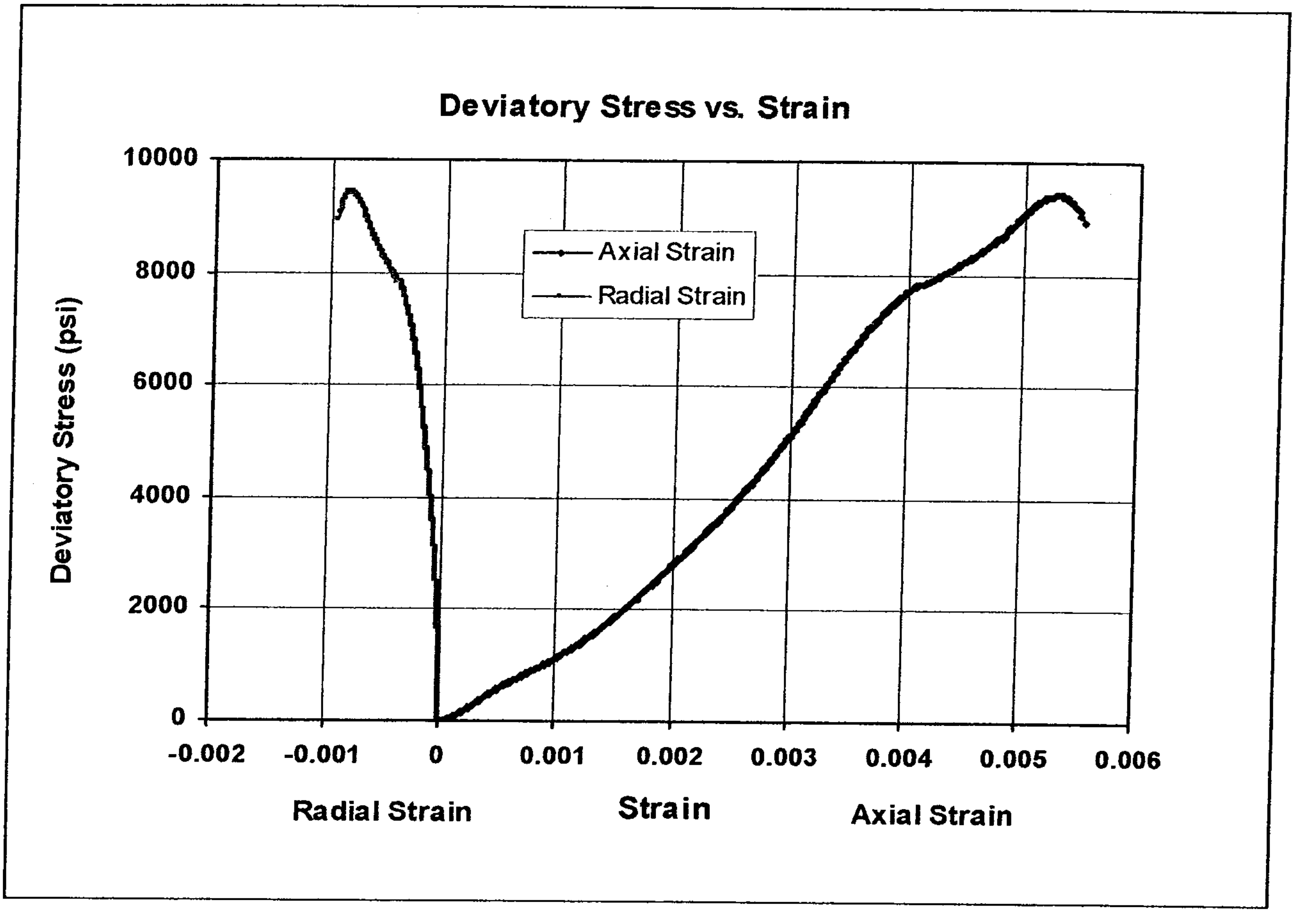
Table 1. Results of triaxial compressive tests, static Young's modulus, and static Poisson's ratio measured for samples from PF001153.0003/Westport IW1.

Sample Number	Depth (ft)	Confining Pressure (psi)	Bulk Density (gm/cm^3)	Compressive Strength (psi)	Young's Modulus (10^6 psi)	Poisson's 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



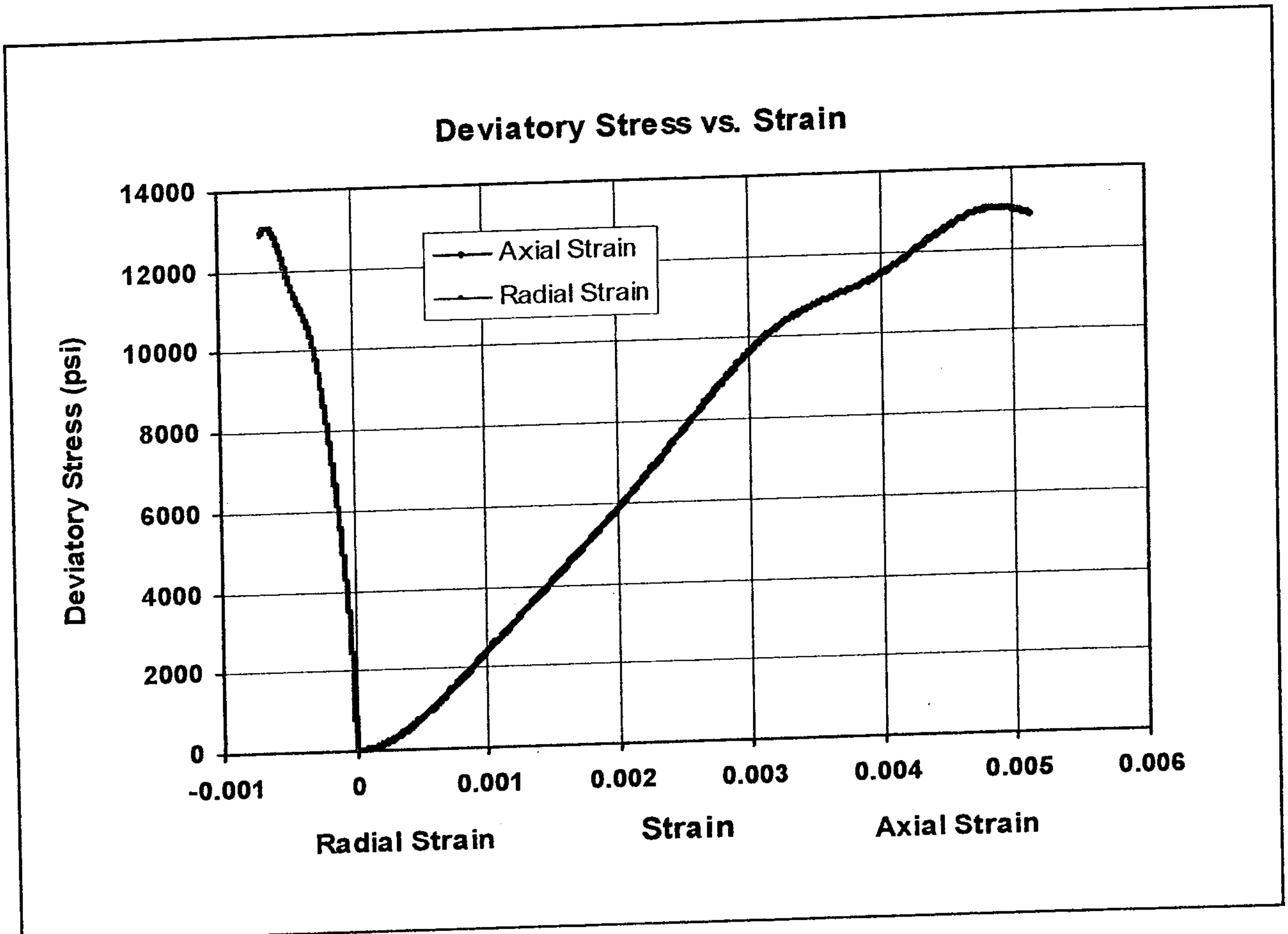
Sample	1V
Core/Depth (ft)	1854.3-1855.0
Diameter (in)	0.9995
Length (in)	2.0682
Mass (g)	70.56
Saturation Fluid	Formation Brine
Sample Density (g/cc)	2.65
Confining Pressure (psi)	1000
Pore Pressure (psi)	0
Static Young's Modulus ($X10^6$ psi)	2.49
Static Poisson's Ratio	0.11
Compressive Strength (psi)	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
Diameter (in)	0.9964
Length (in)	2.1068
Mass (g)	70.36
Saturation Fluid	Formation Brine
Sample Density (g/cc)	2.61
Confining Pressure (psi)	1000
Pore Pressure (psi)	0
Static Young's Modulus ($X10^6$ psi)	2.38
Static Poisson's Ratio	0.12
Compressive Strength (psi)	9083

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



Sample	3V
Core/Depth (ft)	1857.7-1858.8
Diameter (in)	1.0008
Length (in)	2.0616
Mass (g)	69.08
Saturation Fluid	Formation Brine
Sample Density (g/cc)	2.60
Confining Pressure (psi)	1000
Pore Pressure (psi)	0
Static Young's Modulus ($X10^6$ psi)	3.71
Static Poisson's Ratio	0.14
Compressive Strength (psi)	14033

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

Core Lab
RESERVOIR OPTIMIZATION

Core Petrophysics Division
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

CLE

Core Lab
RESERVOIR OPTIMIZATION

Core Petrophysics Division
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

Michael R. Long

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:

$$\textbf{Porosity} = \textbf{Pore Volume} / (\textbf{Pore Volume} + \textbf{Grain Volume}) \times 100$$

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:

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

where:

Q	= Gas Flow Rate (cc/sec)
μ	= Gas Viscosity (centipoise)
L	= 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 Number	Sample ID	Depth ft	Porosity %	Permeability Kair mD	Hydraulic Conductivity cm/sec	Bulk Density g/cm3	Grain Density g/cm3	Description
				HORIZONTAL SAMPLES				
1H	Core 1	1854.3 - 1855.0	10.71	152	1.46E-04	2.539	2.826	Dol lt tan vf xln slmy foss vug
2H	Core 1	1855.4 - 1856.9	9.46	.050	4.79E-08	2.602	2.827	Dol lt tan vf xln slmy vug
3H	Core 1	1857.7 - 1858.5	10.18	.042	4.04E-08	2.561	2.834	Dol lt tan vf xln slmy vug
4H	Core 2	2273.5 - 2274.7	1.86	.001	7.88E-10	2.694	2.711	Dol brn vf xln vug
5H	Core 2	2276.8 - 2277.7	8.75	.311	2.99E-07	2.585	2.805	Dol brn vf xln vug
6H	Core 2	2282.5 - 2283.2	17.14	36.5	3.51E-05	2.301	2.782	Dol lt brn vf xln vug
7H	Core 3	2343.2 - 2343.7	24.15	99.2	9.53E-05	2.148	2.807	Dol tan vf xln pp vug
8H	Core 3	2346.4 - 2347.0	18.43	75.6	7.26E-05	2.317	2.815	Dol tan vf xln 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	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 xln
12H	Core 4B	2544.4 - 2545.0	22.85	1.92	1.85E-06	2.126	2.717	Chk bu vf xln
13H	Core 5	2604.8 - 2605.6	24.30	5.51	5.30E-06	2.050	2.686	Chk wh vf xln vfoss
14H	Core 5	2609.0 - 2609.5	25.02	7.78	7.47E-06	2.028	2.690	Chk wh vf xln vfoss
15H	Core 5	2612.9 - 2613.6	19.20	.401	3.85E-07	2.197	2.693	Chk bu vf xln
16H	Core 6	2681.7 - 2682.2	13.80	23.9	2.30E-05	2.349	2.698	Chk wh vf xln vfoss vug
17H	Core 6	2685.2 - 2685.4	24.81	1177	1.13E-03	1.988	2.695	Chk wh vf xln vfoss vug
18H	Core 6	2687.9 - 2688.7	18.69	149	1.43E-04	2.209	2.707	Chk wh vf xln vfoss vug
19H	Core 7	2765.5 - 2765.8	18.62	1.11	1.07E-06	2.214	2.702	Chk wh vf xln vfoss vug
20H	Core 7	2766.4 - 2766.8	25.91	757	7.27E-04	1.997	2.701	Chk wh vf xln vfoss vug
21H	Core 7	2766.8 - 2767.2	23.84	47.0	4.52E-05	2.056	2.704	Chk wh vf xln vfoss vug
22H	Core 8	2892.7 - 2893.2	14.70	.301	2.89E-07	2.334	2.709	Chk wh vf xln vfoss vug
23H	Core 8	2894.1 - 2894.4	20.52	1.11	1.07E-06	2.181	2.714	Chk wh vf xln vfoss vug
24H	Core 8	2896.2 - 2896.7	14.52	36.0	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 ft	Porosity %	Permeability Kair mD	Hydraulic Conductivity cm/sec	Bulk Density g/cm3	Grain Density g/cm3	Description
				VERTICAL SAMPLES				
1V	Core 1	1854.3 - 1855.0	9.67	1.85	1.78E-06	2.588	2.835	Dol lt tan vf xln slmy foss vug
2V	Core 1	1855.4 - 1856.9	10.74	22.6	2.17E-05	2.528	2.817	Dol lt tan vf xln slmy vug
3V	Core 1	1857.7 - 1858.5	11.16	.030	2.91E-08	2.540	2.831	Dol lt tan vf xln slmy vug
4V	Core 2	2273.5 - 2274.7	0.22	< .001		2.714	2.720	Dol brn vf xln vug
5V	Core 2	2276.8 - 2277.7	0.32	< .001		2.714	2.723	Dol brn vf xln vug
6V	Core 2	2282.5 - 2283.2	13.89	.575	5.53E-07	2.408	2.773	Dol lt brn vf xln vug
7V	Core 3	2343.2 - 2343.7	24.10	81.6	7.84E-05	2.146	2.806	Dol tan vf xln pp vug
8V	Core 3	2346.4 - 2347.0	23.24	108	1.04E-04	2.182	2.813	Dol tan vf xln vug
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 xln
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 xln 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	Chk wh vf xln vfoss vug
17V	Core 6	2685.2 - 2685.4	18.44	35.3	3.39E-05	2.228	2.701	Chk wh vf xln vfoss vug
18V	Core 6	2687.9 - 2688.7	18.39	25.2	2.42E-05	2.229	2.707	Chk wh vf xln vfoss vug
19V	Core 7	2765.5 - 2765.8	22.24	7.16	6.88E-06	2.116	2.695	Chk wh vf xln vfoss vug
20V	Core 7	2766.4 - 2766.8	20.33	24.4	2.35E-05	2.171	2.702	Chk wh vf xln vfoss vug
21V	Core 7	2766.8 - 2767.2	19.57	3.60	3.46E-06	2.195	2.705	Chk wh vf xln vfoss vug
22V	Core 8	2892.7 - 2893.2	16.31	.260	2.50E-07	2.297	2.712	Chk wh vf xln vfoss vug
23V	Core 8	2894.1 - 2894.4	18.71	.610	5.86E-07	2.234	2.708	Chk wh vf xln vfoss vug
24V	Core 8	2896.2 - 2896.7	13.88	.156	1.50E-07	2.357	2.700	Chk wh vf xln vfoss vug

Note: Hydraulic conductivity is a calculated value.

City of Port St. Lucie, Westport Injection Well System

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 1

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

Depth feet bpl		Length Recovered	RPM	WOB	Core Description
From	To	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

ARCADIS

City of Port St. Lucie, Westport Injection Well System

CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 1

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

Depth feet bpl		Length Recovered	RPM	WOB	Core Description
From	To	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

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Sample/ Core Log Form

Well **IW 1** Project/No. **Reese, Macon & Assoc. / PF001153.0003** Page 1 of 1

Site Location Port St. LucieWestport Injection Well System Drilling Started 4/5/2003 Drilling Completed 4/5/2003

Total Depth Drilled 13.5 Feet Hole Diameter 8 inches Type of Sample/ Coring Device coring barrel

Length and Diameter of Coring Device 35.24 feet long, 4-inch I.D., 8.5-inch O.D. Sampling Interval **1846.5-1860.0**

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used water Drilling Method reverse air

Drilling Contractor Youngquist Bros.,Inc. Driller P. Shand

Hammer Weight N/A Hammer Drop N/A

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	**Sample/Core Description**
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 wiyhin 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.

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

ARCADIS

Sample/ Core Log Form

Well **IW 1** Project/No. **Reese, Macon & Assoc. / PF001153.0003** Page 1 of 1

Site Location: Port St. LucieWestport Injection Well System

Drilling Started: 3/14/2003 Drilling Completed: 3/15/2003

Total Depth Drilled: 13.5 Feet Hole Diameter: 8 inches

Type of Sample/ Coring Device: coring barrel

Length and Diameter of Coring Device: 34.6 feet long, 4-inch I.D.

Sampling Interval: **1846.5-1860.0**

Land-Surface Elev. ______ feet ☐ Surveyed ☐ Estimated Datum ______

Drilling Fluid Used: water Drilling Method: reverse air

Drilling Contractor: Youngquist Bros.,Inc. Driller: P. Shand

Hammer Weight: N/A Hammer Drop: N/A

Sample/Core Depth (feet below land surface) From	To	Core Recovery (feet)	Time/Hydraulic Pressure or Blows per 6 Inches	**Sample/Core Description**
1850.0	1853.2	3.2	WOB=7K	Dolomitic limestone, pale yellowish brown (10YR 6/2) to grayish orange (10YR 7/4), fine crystalline, vuggy, few
			RPM=20	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	WOB=8K	Dolomite, pale yellowish gray (10YR 6/2), some medium gray (N5) and medium dark gray (N4), kryptocrustalline,
			RPM=24	very few vugs (mostly in top section), solid, massive, extremly hard.
1858.4	1860.0	1.6	WOB=8K	Dolomite, moderate yellowish brown (10YR 5/4), little dark yellowish brown (10YR 4/2), fine crystalline, some
			RPM=40	sucrosic with numerous vugs partially filled with calcareous material, very hard.

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City of Port St. Lucie, Westport Injection Well System

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 2

Total Length Drilled (feet):	13	**Date Completed:**	4/6/2003
Core Barrel Length (feet):	13.6	**Sampling Interval (feet bpl):**	2272.0-2285.0
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth feet bpl		Length Recovered	RPM	WOB	Core Description
From	To	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).

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City of Port St. Lucie, Westport Injection Well System

CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 2

Total Length Drilled (feet):	13.0	**Date Completed:**	4/6/2003
Core Barrel Length (feet):	13.6	**Sampling Interval (feet bpl):**	2272 - 2285
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth feet bpl		**Length Recovered**	**RPM**	**WOB**	**Core Description**
From	**To**	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.

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City of Port St. Lucie, Westport Injection Well System

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 3

Total Length Drilled (feet):	13.5	**Date Completed:**	4/7/2003
Core Barrel Length (feet):	13.6	**Sampling Interval (feet bpl):**	2341.5-2355.0
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth feet bpl		Length Recovered	RPM	WOB	Core Description
From	To	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	8000	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

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City of Port St. Lucie, Westport Injection Well System

CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 3

Total Length Drilled (feet):	13.5	**Date Completed:**	4/7/2003
Core Barrel Length (feet):	13.6	**Sampling Interval (feet bpl):**	2341.5-2355.0
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth feet bpl		Length Recovered	RPM	WOB	Core Description
From	To	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%

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City of Port St. Lucie Westport Injection Well System
CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 4 A

Total Length Drilled (feet):	6.6	**Date Completed:**	4/9/2003- 4/10/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2529.0-2535.6
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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%

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City of Port St. Lucie Westport Injection Well System

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 4 A

Total Length Drilled (feet):	6.6	**Date Completed:**	4/9/2003- 4/10/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2529.0-2535.6
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
2529.0	2535.6	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%

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City of Port St. Lucie Westport Injection Well System

CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 4 B

Total Length Drilled (feet):	13.7	**Date Completed:**	4/11/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2536.5- 2550.2
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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%

ARCADIS

City of Port St. Lucie Westport Injection Well System

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 4 B

Total Length Drilled (feet):	13.7	**Date Completed:**	4/11/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2536.5- 2550.2
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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):	16	**Date Completed:**	4/12/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2602.0-2618.0
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl) From	Depth (feet bpl) To	Length Recovered (feet)	RPM	WOB	Core Description
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

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City of Port St. Lucie, Westport Injection Well System

CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 5

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

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 6

Total Length Drilled (feet):	13.7	**Date Completed:**	4/13/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2681.0-2694.8
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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

ARCADIS

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

Injection Well No. 1
Core Sample No. 6

Total Length Drilled (feet):	13.7	**Date Completed:**	4/13/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2681.0- 2694.8
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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

City of Port St. Lucie, Westport Injection Well System

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 7

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

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
2764.2	2769.0	4.8	14	5	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

City of Port St. Lucie, Westport Injection Well System

CORE LOG INVENTORY

Injection Well No. 1
Core Sample No. 7

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

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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%

CORE LOG SUMMARY

Injection Well No. 1
Core Sample No. 8

Total Length Drilled (feet):	13	**Date Completed:**	4/19/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2890-2903
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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):	13	**Date Completed:**	4/19/2003
Core Barrel Length (feet):	36.5	**Sampling Interval (feet bpl):**	2890-2903
Core Barrel Diameter ID (inches):	4	**Hole Diameter (inches):**	8.5
Drilling Fluid Used:	water		

Depth (feet bpl)		Length Recovered (feet)	RPM	WOB	Core Description
From	To				
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%

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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 (^{226}Ra, pCi/L)
radium-228 (^{228}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 (^{226}Ra, pCi/L)
radium-228 (^{228}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

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

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

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.

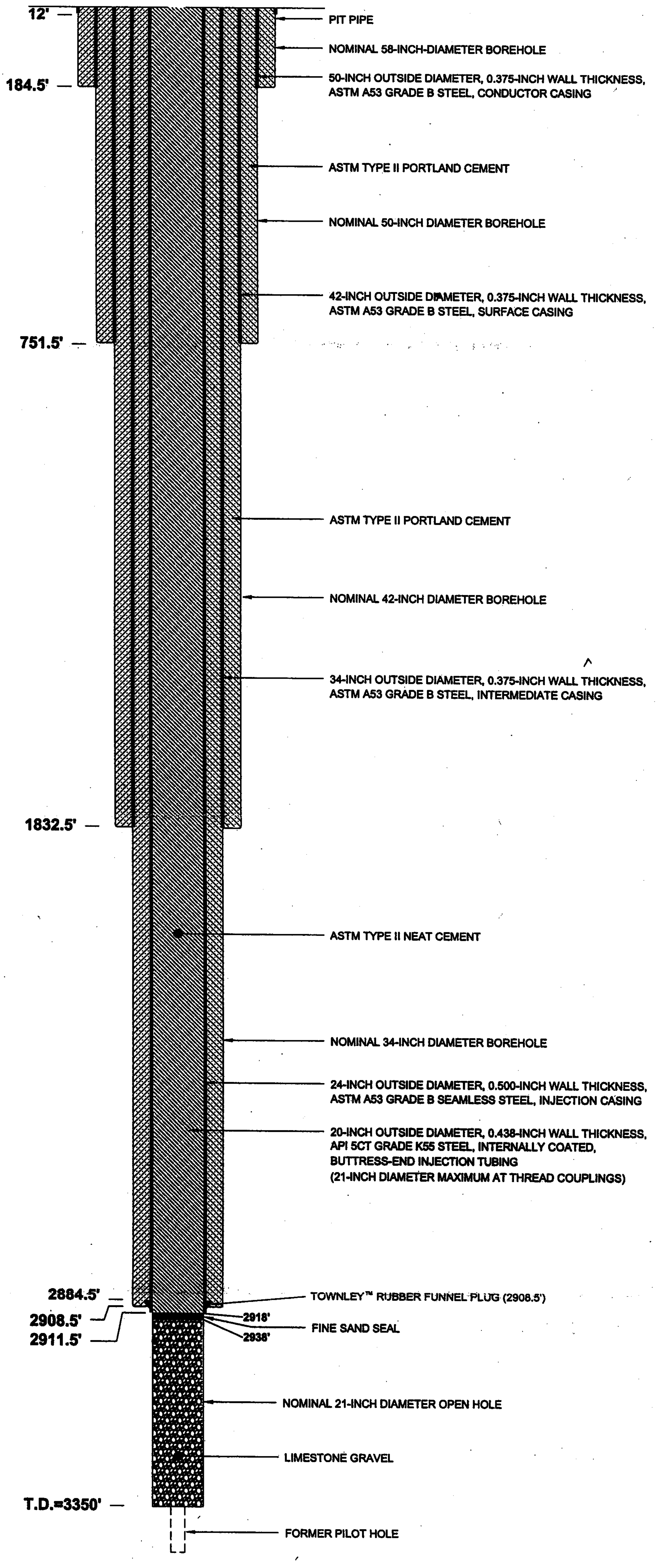
The Contractor first will pull the injection tubing from the final casing. The rig will be equipped with a calibrated weight indicator, certified as calibrated within the previous 3-month period, to be used to monitor the pulling weight on the tubing. A copy of the calibration certificate will be provided 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.

DATE: 28JUL03	PRJCT NO: RF001212.0001.PF001	FILE: RMA\111902	DRAWING: 0111902-IW1	PM: M.WALDRON	PO: T.TESSIER	DRFT: B.OLIVA



Drawing not to scale

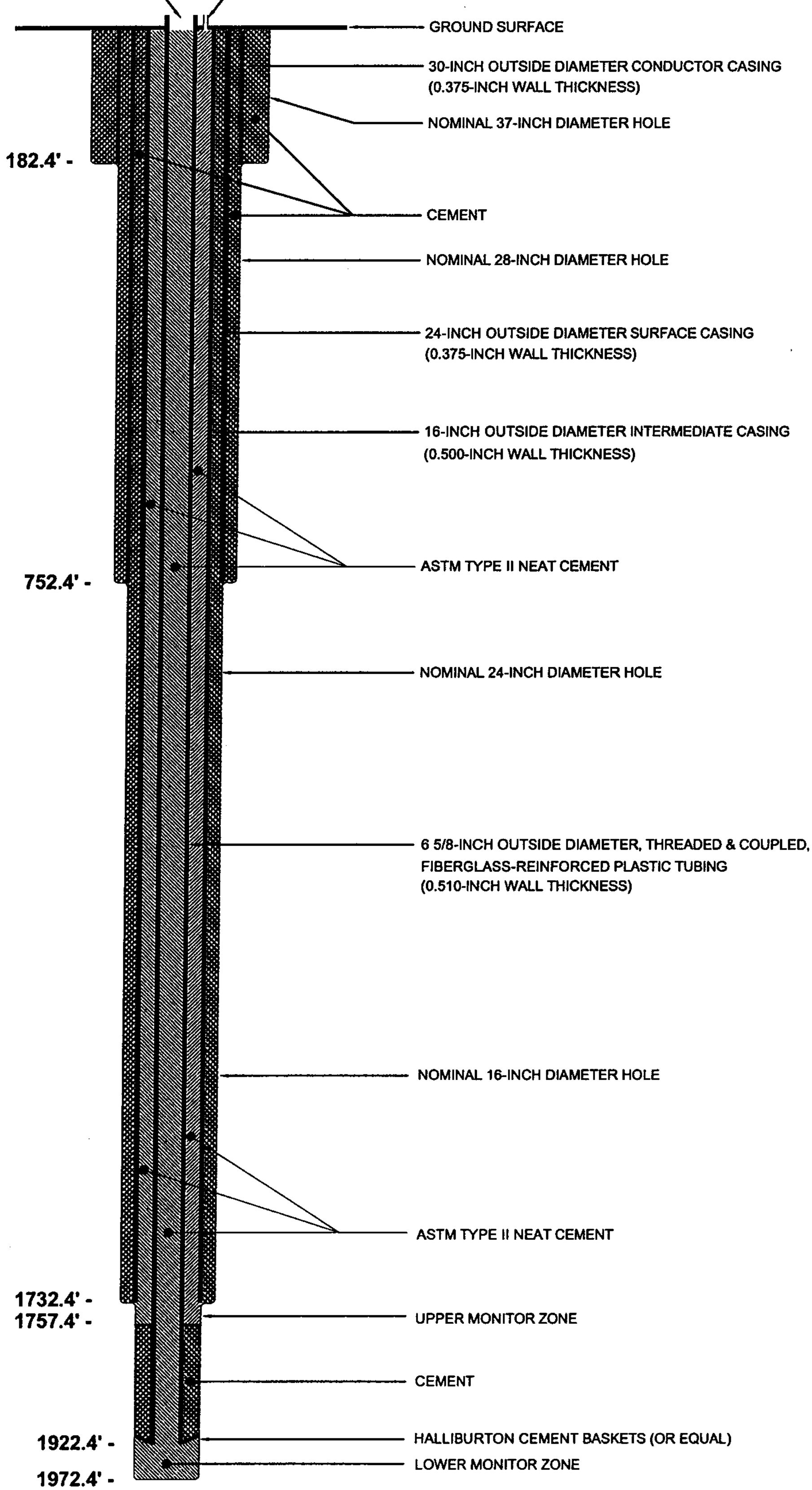
ARCADIS
712 U.S. HIGHWAY ONE, SUITE 200
NORTH PALM BEACH, FLORIDA 33408
Tel: 561.881.0077 Fax: 561.881.0012

NO.	DATE	REVISION DESCRIPTION	CHKD.

PLUGGING AND ABANDONMENT DETAILS OF INJECTION WELL NO. 1

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

FIGURE



DRAWING NOT TO SCALE

DRFT: B.OLIVA | PO: T.TESSIER | PM: M.WALDRON | DRAWING: 0111902-DMW | FILE: RMA\111902 | PRJCT NO: RF001121.0001.PF001 | DATE: 29JUL03

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NORTH PALM BEACH, FLORIDA 33408
Tel: 561.881.0077 Fax: 561.881.0012

PLUGGING AND ABANDONMENT DETAILS
DUAL-ZONE DEEP MONITOR WELL MW1

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

FIGURE

**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	Cost
	Mobilization	1		$50,000	$50,000
	Remove Tubing	1		$175,000	$175,000
	MIT Program	1		$50,000	$50,000
	* Fill Open Hole	41	cubic yards	$75	$3,075
	** Fill Casing	8,450	cubic feet	$16	$135,200
	Demobilization	1		$10,000	$10,000
	Contingency				$50,412
INJECTION WELL TOTAL:					$473,687

Deep Monitor Well MW1	Tasks	Number of Units	**Units	Unit Price	Cost
	Mobilization	1		$15,000	$15,000
	Lower Monitor Zone	370	cubic feet	$16	$5,920
	Upper Monitor Zone				
	* *Cement Open Hole	65	cubic feet	$100	$6,500
	**Cement Annulus	2870	cubic feet	$16	$45,920
	Demobilization	1		$7,500	$7,500
	Contingency				$50,412
DEEP MONITOR WELL TOTAL:					$131,252
INJECTION WELL SYSTEM TOTAL:					$604,939

* 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

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Appendix F

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

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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

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

Flowmeter Total-Start (gal) :	51220	**Open Hole Total Depth (feet bpl) :**	3450
Flowmeter Total- End (gal) :	55470	**Packer Depth Interval (feet bpl):**	2880.0-2897.7
Average Test Pumping Rate (gpm) :	8.8	**Pump Setting Depth (feet bpl):**	240
Development Duration (min):	699	**Transducer Depth (feet bpl):**	220
Static DTW Before Test (feet bmp):	18.84		

Date	Time	Elapsed Time (min)	Pump Rate (gpm)	Total Volume (gal)	Depth to Water (feet bmp)	Temp. (°C)	Conductivity (umhos/cm)	Chlorides (mg/L)	pH	Comments
Development										
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	na	25.9	52000	17500	na	
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	
4/25/03	13:29	699	8.5	7115	205	na	na	na	na	Begin post- development recovery.
Pumping Test										
4/25/03	18:55:51	0	20	0	na	na	na	na	na	Pump-on, start test.
4/25/03	19:40	45	8.7	392	na	26.1	50800	17500	7.09	
4/25/03	20:00	65	8.7	566	na	26.2	50800	17000	7.2	Flowmeter: 51986
4/25/03	20:30	95	8.6	824	na	26.5	51000	17000	7.27	Flowmeter: 52200
4/25/03	21:00	125	8.5	1079	na	26.0	50500	17000	7.24	Flowmeter: 52500
4/25/03	22:00	185	8.4	1583	189.2	25.8	49600	17000	7.29	Hermit Reading: 189.4 ft bpl
4/25/03	23:00	245	8.5	2093	189.17	24.8	49800	16500	7.36	Hermit: 189.38 ft bpl, Packer: 403 psi
4/26/03	0:00	305	8.4	2597	na	25.2	48800	17000	7.2	
4/26/03	1:30	395	8.5	3362	na	25.3	49700	17000	7.4	
4/26/03	2:05	430	8.5	3659	188.97	25.9	50100	16500	7.43	Packer: 400 psi
4/26/03	2:30	455	8.5	3990	189.01	25.2	49500	16500	7.44	Collect lab. lample.
4/26/03	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
"gal" denotes gallons
"gpm" denotes gallons per minute
"min" denotes minutes
"feet bpl" denotes feet below pad level
"feet bmp" denotes feet below measuring point (pipe flange), 7.1 feet above the pad
"°C" denotes degrees celcius
"umhos/cm" denotes micromhos per centimeter
"mg/L" denotes milligrams per liter
"psi" denotes pressure in pounds per square inch
"na" denotes data not available
Static depth to water (DTW) is measured just prior to pumping test startup

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

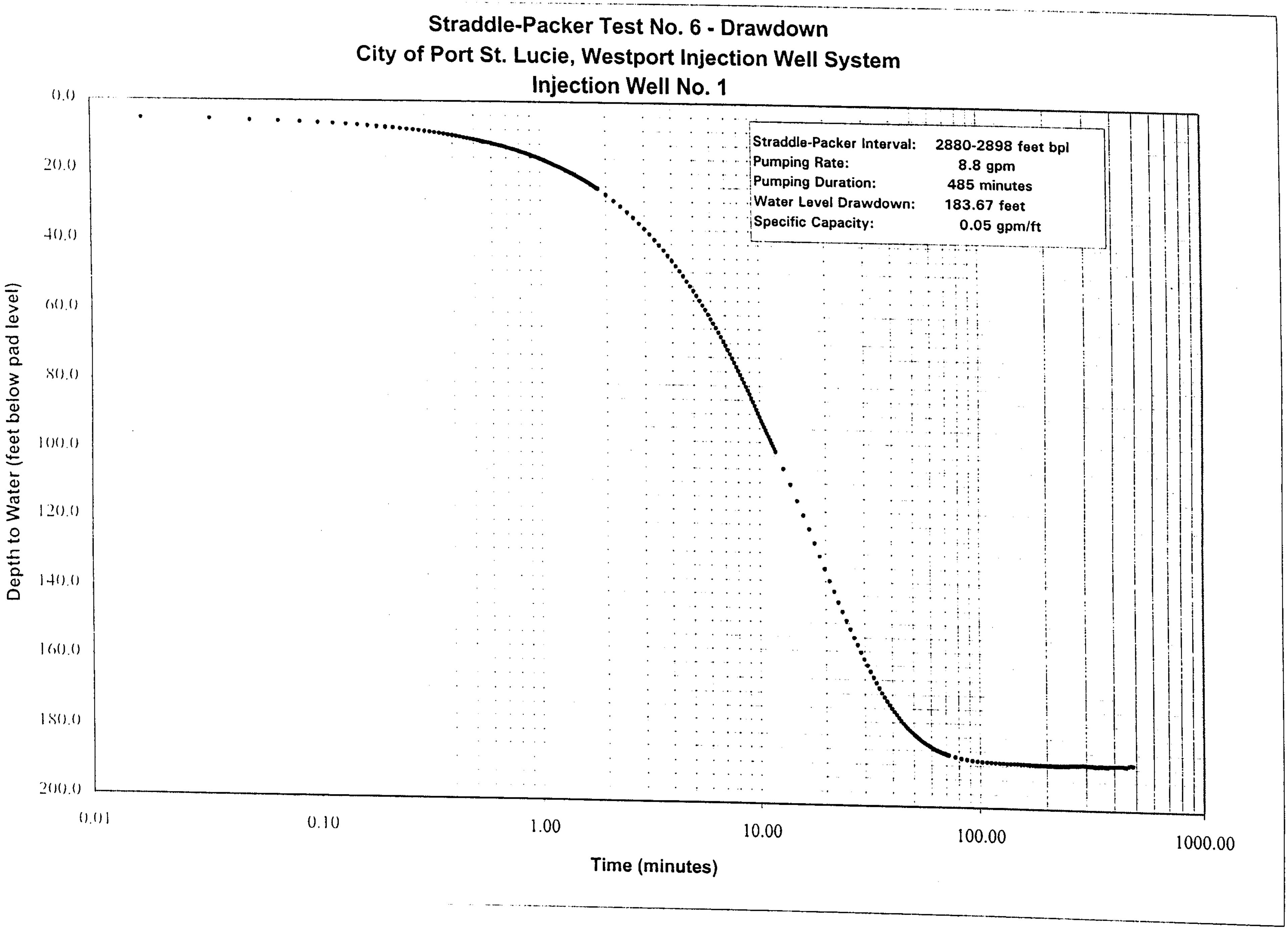
Packer Depth Interval:	2880-2898 feet bpl	**Static Water Level:**	3.65 feet below pad level
Start of Logging:	4/25/2003 18:55	**Start of Pumping:**	18:55:51
End of Logging:	4/26/2003 2:57	**End of Pumping:**	3:02:48
Pumping Rate:	8.8 gpm	**Pumping Duration:**	483 minutes

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 (start of pump)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Drawdown (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	9.71	6.06
04/25/03	18:56:19	0.42	203.11	9.89	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	6.78


Straddle-Packer Test No. 6 - Drawdown
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1
Straddle-Packer Interval: 2880-2898 feet bpl
Pumping Rate: 8.8 gpm
Pumping Duration: 485 minutes
Water Level Drawdown: 183.67 feet
Specific Capacity: 0.05 gpm/ft
Depth to Water (feet below pad level)
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
0.01
0.10
1.00
10.00
100.00
1000.00
Time (minutes)

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

0.050000108	= 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]}
100.0002161	**= effective transmissivity of fully penetrating well, gpd/ft**

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 ft**

168.2996363	**= time until the effect of casing storage dissipates, minutes (Papadopulos-Cooper, 1967)**
364.2547009	**= time until the effect of casing storage dissipates, minutes (Schafer, 1978 in 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

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

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

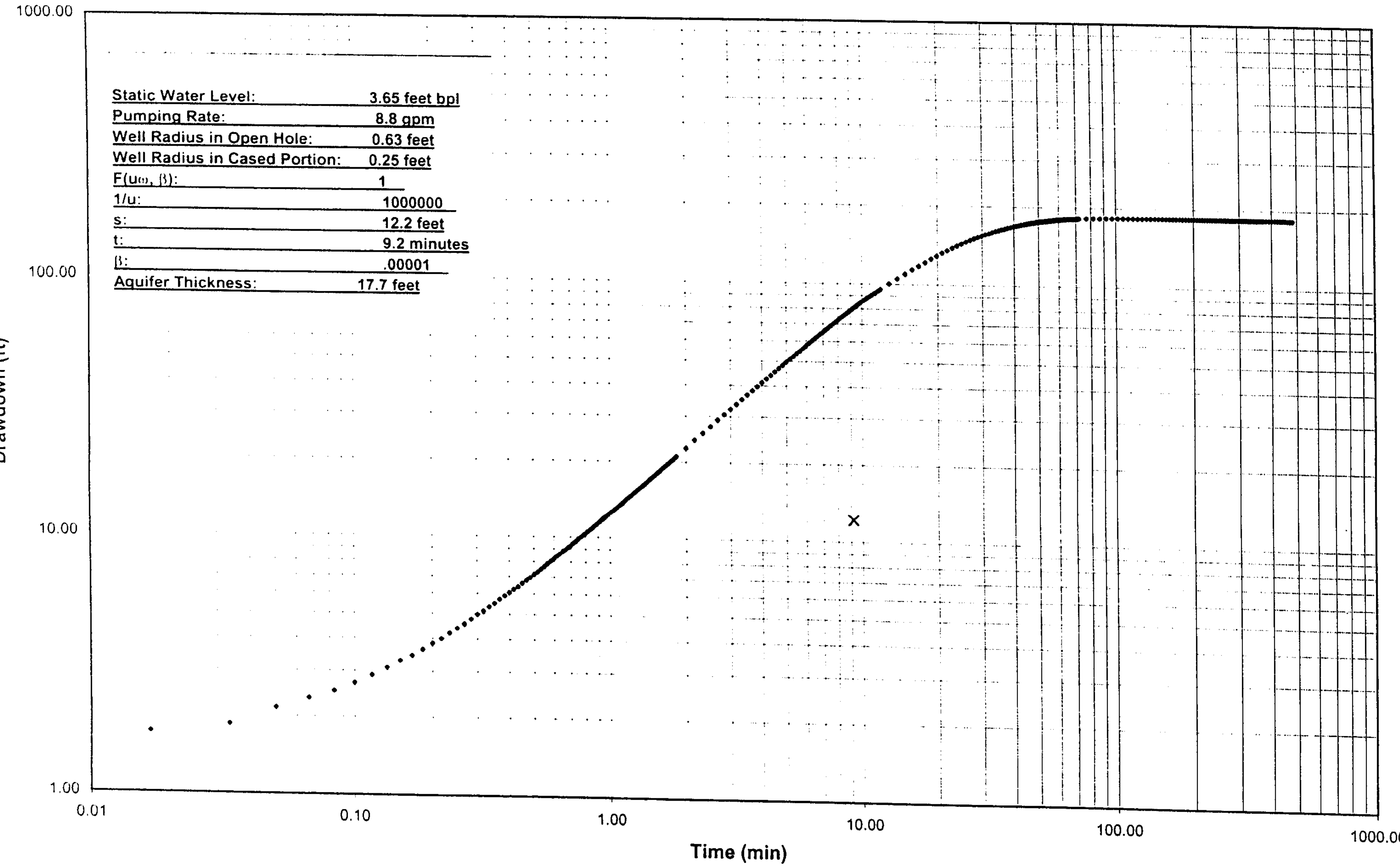
7.11413E-07	= Storage Coefficient from 1/u value, dimensionless
1.5747E-06	= Storage Coefficient from B value, dimensionless

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.

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.

17.7	= effective aquifer thickness, feet		
0.624229512	= permeability or hydraulic conductivity, ft/day		
4.669236751	= permeability or hydraulic conductivity, gpd/sq ft		
0.000220214	= permeability or hydraulic conductivity, cm/sec		

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



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

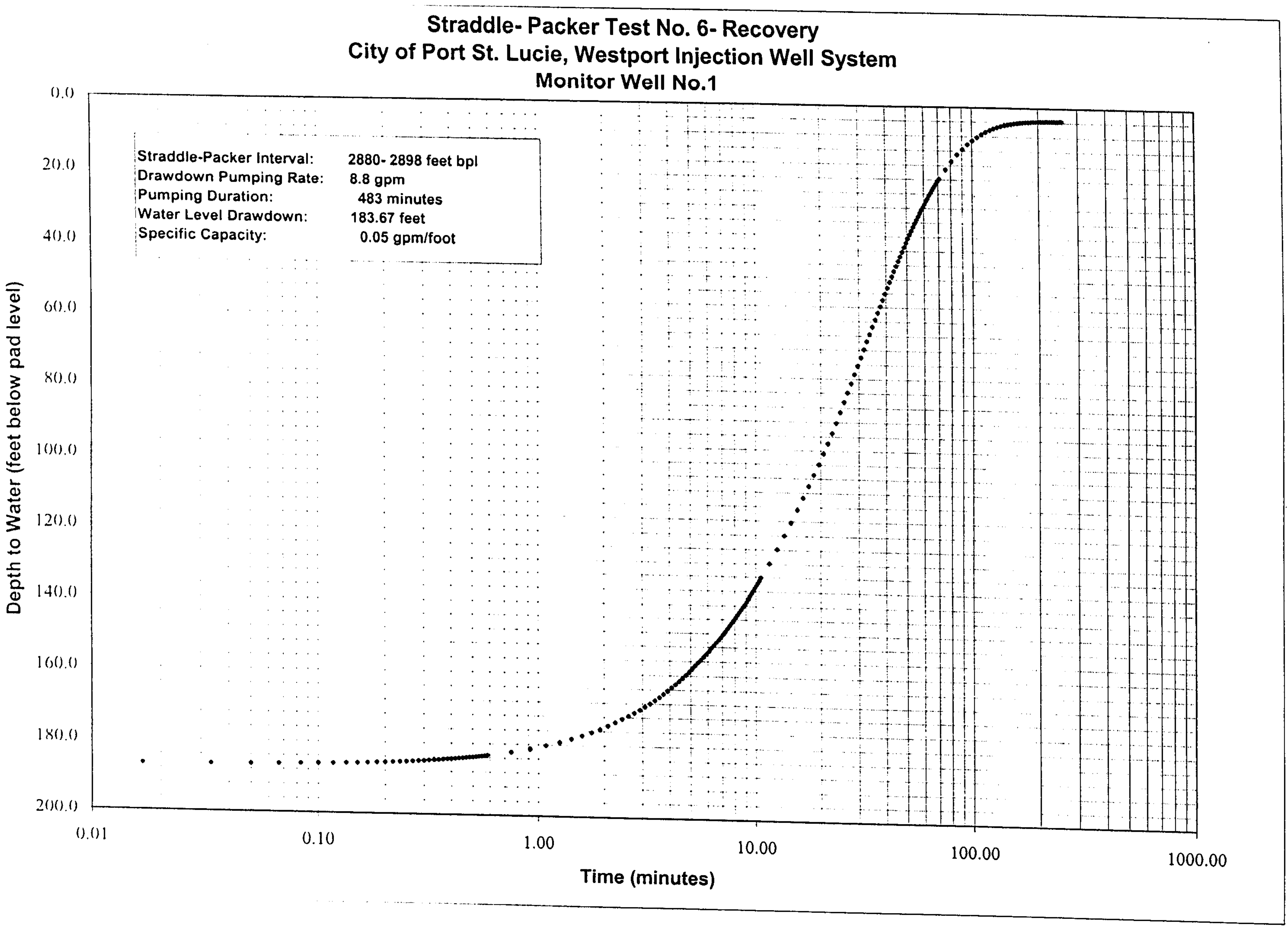
Packer Depth Interval:	2880-2898 feet bpl	**Assumed Stabilized DTW:**	187.32 feet bpl
Start of Logging:	4/26/03 3:01:00	**Start of Pumping:**	4/25/03 18:55:55
End of Logging:	4/26/03 7:18:00	**Pumping Duration:**	483 minutes
Pumping Rate:	8.8 gpm	**Total Test Time:**	737 minutes

Data collected with Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\PT6REC.DAT

Note: Double line indicates end of pumping

Date	Time	Minutes (end of pump)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Calculated 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
4/26/03	3:02:03		26.12	186.88	0.44


Straddle- Packer Test No. 6- Recovery
City of Port St. Lucie, Westport Injection Well System
Monitor Well No.1
Straddle-Packer Interval: 2880- 2898 feet bpl
Drawdown Pumping Rate: 8.8 gpm
Pumping Duration: 483 minutes
Water Level Drawdown: 183.67 feet
Specific Capacity: 0.05 gpm/foot
Depth to Water (feet below pad level)
0.0
20.0
40.0
60.0
80.0
100.0
120.0
140.0
160.0
180.0
200.0
0.01
0.10
1.00
10.00
100.00
1000.00
Time (minutes)

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, gpm/ft
1	= ratio of screen length to full aquifer thickness (decimal)
0.25	= 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 1500 for unconfined to 2250 for classic confined; 1750 is good for most semi-unconfined to
	leaky aquifers [Sheahan, 1970]}
100.0002	**= effective transmissivity of fully penetrating well, gpd/ft**

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 ft**

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

Port St. Lucie, Westport Injection Well System, Packer Test 6 Recovery
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

10	= 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	

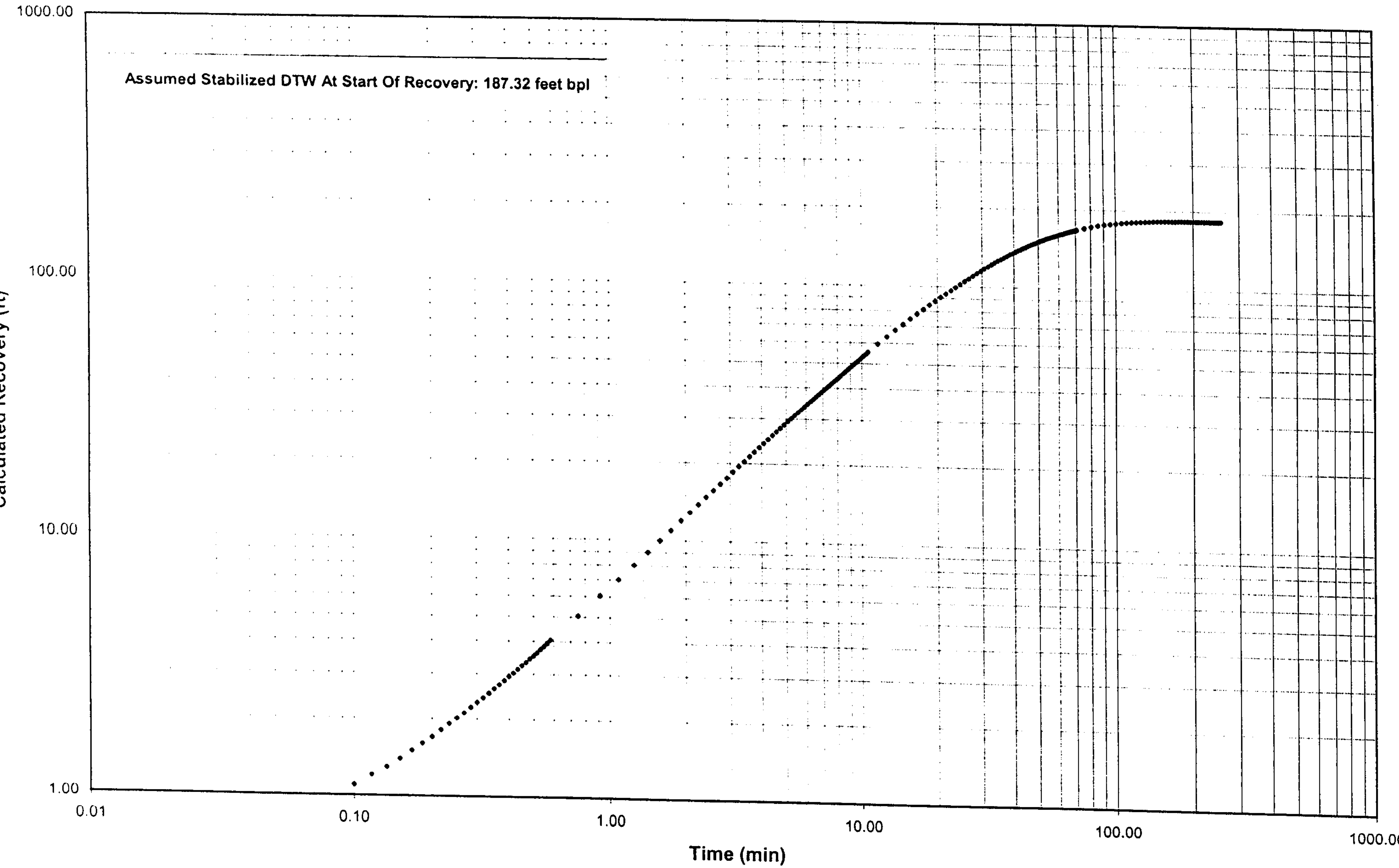
9.98427E-07	= Storage Coefficient from 1/u value, dimensionless
1.5747E-06	= Storage Coefficient from B value, dimensionless

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.

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.

17.7	= effective aquifer thickness, feet		
0.634633337	= permeability or hydraulic conductivity, ft/day		
4.747057364	= permeability or hydraulic conductivity, gpd/sq ft		
0.000223885	= permeability or hydraulic conductivity, cm/sec		

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



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ARCADIS

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. 7

Start day/ time: 5/3/2003 6:18:47
End day/time: 5/3/2003 14:23:47

Flowmeter Total-Start (gal) :	778136	Open Hole Total Depth (feet bpl) :	3450
lowmeter Total- End (gal) :	794190	Packer Depth Interval (feet bpl):	2830.0-2880.7
.verage Test Pumping Rate (gpm) :	33.1	Pump Setting Depth (feet bpl):	240
Development Duration (min):	389 min	Transducer Depth (feet bpl):	220
tatic DTW Before Test (feet bmp):	20.40		

Date	Time	Elapsed Time (min)	Pump Rate (gpm)	Total Volume (gal)	Depth to Water (feet bmp)	Temp. (^{o}C)	Conductivity (umhos/cm)	Chlorides (mg/L)	pH	Comments
Development										
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.
5/2/03	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	186	28.0	5150	99.24	25.1	49200	19000	6.92	
5/3/03	0:20	230	32.0	6558	99.63	25.0	49100	19500	6.96	
5/3/03	0:52	262	32.0	7582	99.88	25.0	49500	19000	7.01	Pkr. Press.: 425 psi (Annulus Transd.: 20.181)
5/3/03	1:35	305	32.0	8958	100.01	25.0	50000	19000	7.00	Pkr. Press.: 425 psi (Annulus Transd.: 20.183)
5/3/03	1:55	325	32.0	9598	100.02	25.1	49900	19500	7.03	
5/3/03	2:23	353	32.0	10494	100.08	25.2	50100	19500	7.04	Pkr.Press.: 420 psi
5/3/03	2:59	389	32.0	11646	99.94	25.1	50000	19500	7.09	Pump off. Start Recovery
'umping Test										
5/3/02	6:17:30	0	36	0	20.40	na	na	na	na	Pump on, 8-hr test begin. Pckr.Press.: 410 psi
5/3/02	6:50	32	33.0	1060	na	24.9	49400	18500	na	Packers pressure: 405 psi.
5/3/02	8:18	120	33.0	5074	na	25.6	50600	18500	7.08	
5/3/02	10:18	240	33.0	9024	119	27.0	51200	18500	6.9	Packers pressure: 403 psi.
5/3/02	12:18	240	33.0	24650	na	27.2	51400	19000	na	
5/3/02	14:05	467	33.0	27100	na	27.3	51200	19000	6.93	Collect lab. water sample.
5/3/02	14:23	485	33.0	27700	120	na	na	na	na	Pump- off, begin recovery.

..pproximately 4890 gallons in one pipe and packer zone volume
"gal" denotes gallons
"gpm" denotes gallons per minute
nin" denotes minutes
eet bpl" denotes feet below pad level
.eet bmp" denotes feet below measuring point (pipe flange), 8.2 feet above the pad
"°C" denotes degrees celcius
"umhos/cm" denotes micromhos per centimeter
ng/L" denotes milligrams per liter
ısi" 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

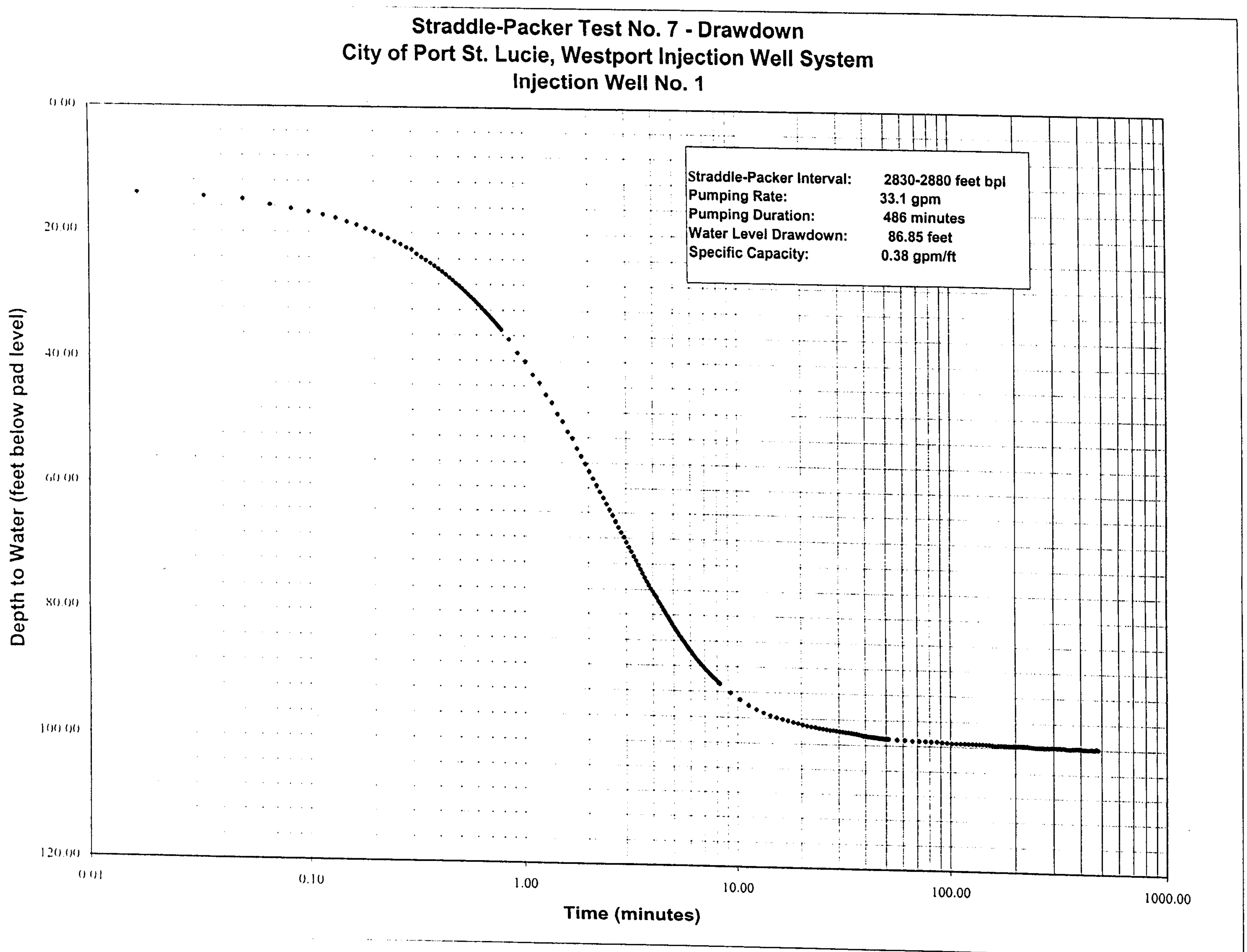
Data Collected Using Aquastar Data Logger (ARCADIS)

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 (from start of pumping)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Drawdown (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	6:17:16		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 Interval: 2830-2880 feet bpl
Pumping Rate: 33.1 gpm
Pumping Duration: 486 minutes
Water Level Drawdown: 86.85 feet
Specific Capacity: 0.38 gpm/ft
Depth to Water (feet below pad level)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
0.01
0.10
1.00
10.00
100.00
1000.00
Time (minutes)

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
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])
760.0009771	= effective transmissivity of fully penetrating well, gpd/ft

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

15.20001954	= hydraulic conductivity, gpd/sqft

22.14470837	= time until the effect of casing storage dissipates, minutes (Papadopulos-Cooper, 1967)
47.92829207	= time until the effect of casing storage dissipates, minutes (Schafer, 1978 in Driscoll, 1986)

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

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

1	= 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

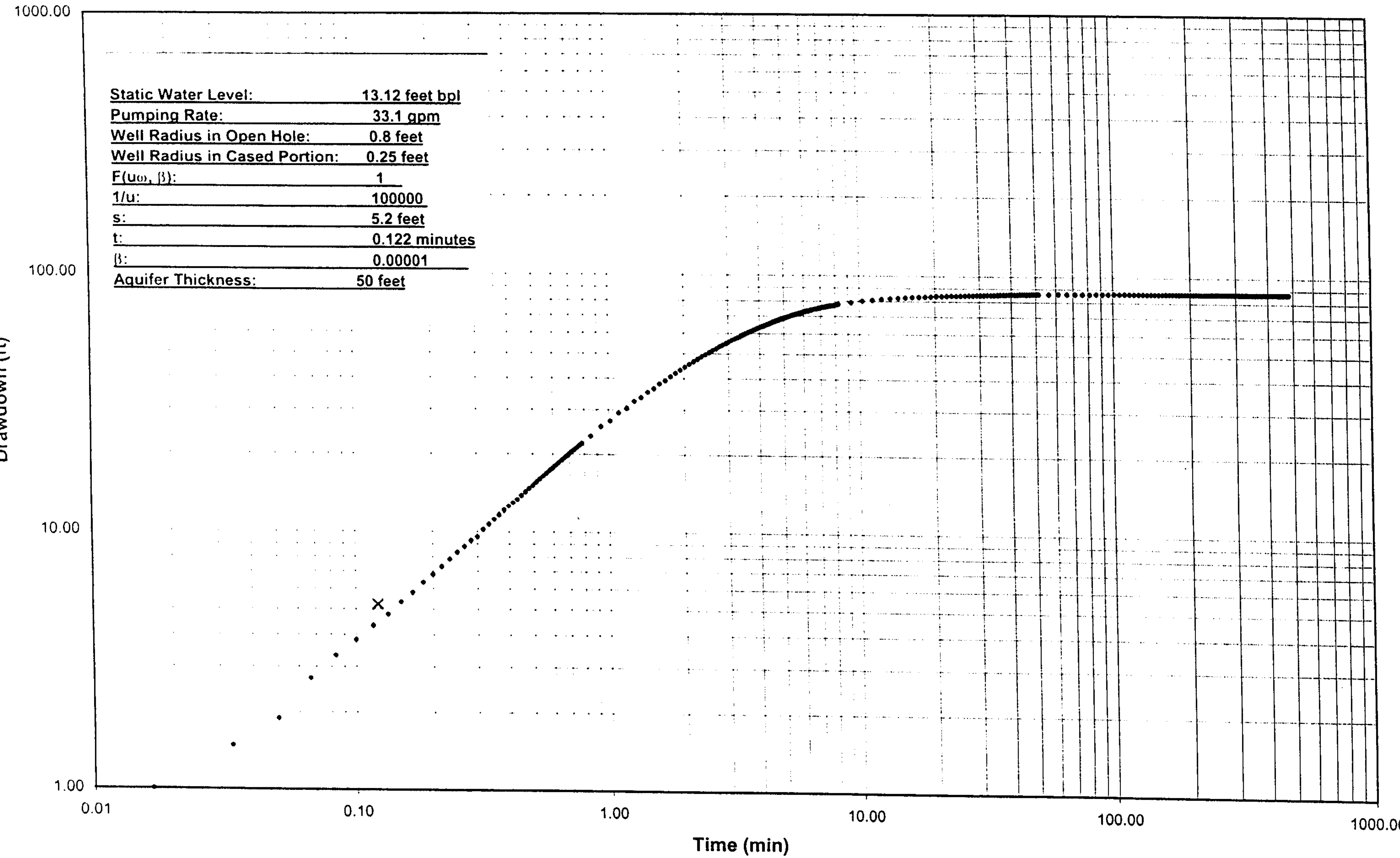
5.16294E-07	= Storage Coefficient from 1/u value, dimensionless
9.76563E-07	= Storage Coefficient from B value, dimensionless

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.

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.

50.7	= effective aquifer thickness, feet
1.923142267	= permeability or hydraulic conductivity, ft/day
14.38510416	= permeability or hydraulic conductivity, gpd/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 - Drawdown



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Straddle-Packer Test No. 7 - Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No.1

Packer Depth Interval:	2830-2880 feet bpl	**Assumed Stabilized DTW:**	99.97 feet bpl
Start of Logging:	5/3/03 14:23:10	**Start of Pumping:**	5/3/03 6:17:57
End of Logging:	5/3/03 18:05:11	**Pumping Duration:**	486 minutes
Pumping Rate:	33.1 gpm	**Total Test Time:**	703 minutes

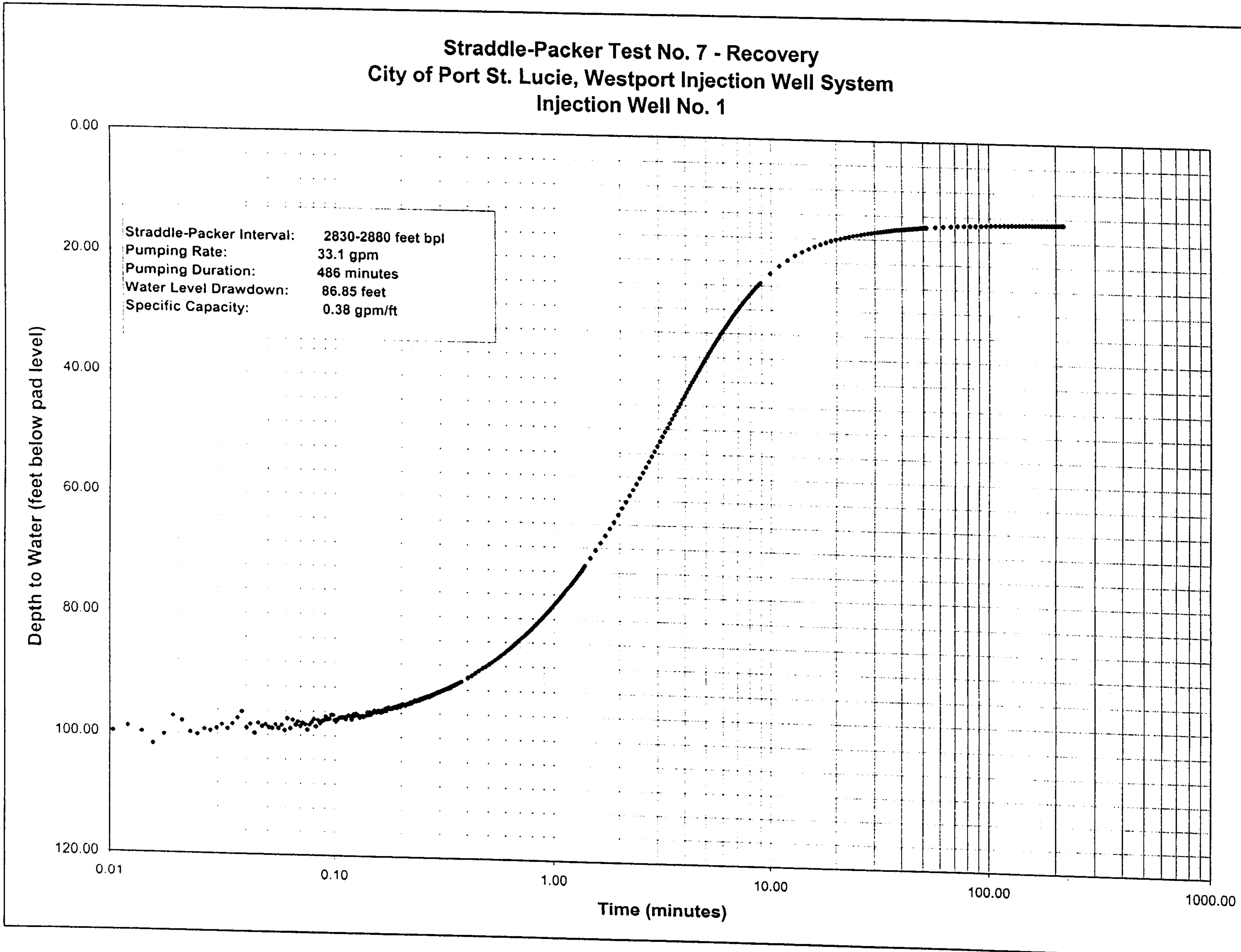
Data Collected Using Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\WESTPORT\PT7REC.DAT

Note: Bold number indicates assumed stabilized depth to water

Double line indicates end of pumping

Date	Time	Minutes (from start of pumping)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Calculated 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
05/03/03	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	14:23:13		120.03	99.97	0.00
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		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		120.08	99.92	0.05
05/03/03	14:23:13		120.05	99.95	0.02
05/03/03	14:23:13		120.10	99.90	0.07
05/03/03	14:23:14		120.08	99.92	0.05
05/03/03	14:23:14		120.07	99.93	0.04
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 No. 7 - Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1
Straddle-Packer Interval: 2830-2880 feet bpl
Pumping Rate: 33.1 gpm
Pumping Duration: 486 minutes
Water Level Drawdown: 86.85 feet
Specific Capacity: 0.38 gpm/ft
Depth to Water (feet below pad level)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
0.01
0.10
1.00
10.00
100.00
1000.00
Time (minutes)

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 well, gpm/ft
1	= ratio of screen length to full aquifer thickness (decimal)
0.25	= radius of pumped well, feet
50.7	= thickness of aquifer, feet

0.38	= 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])
760.001	= effective transmissivity of fully penetrating well, gpd/ft

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, gpd/sq ft

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

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

10	= F(u, β)
1000000	= 1/u
52	= s, feet
1.7	= t, time, minutes
0.00001	= β

97.50331295	= Transmissivity, sq ft/day
729.3247809	= Transmissivity, gpd/ft

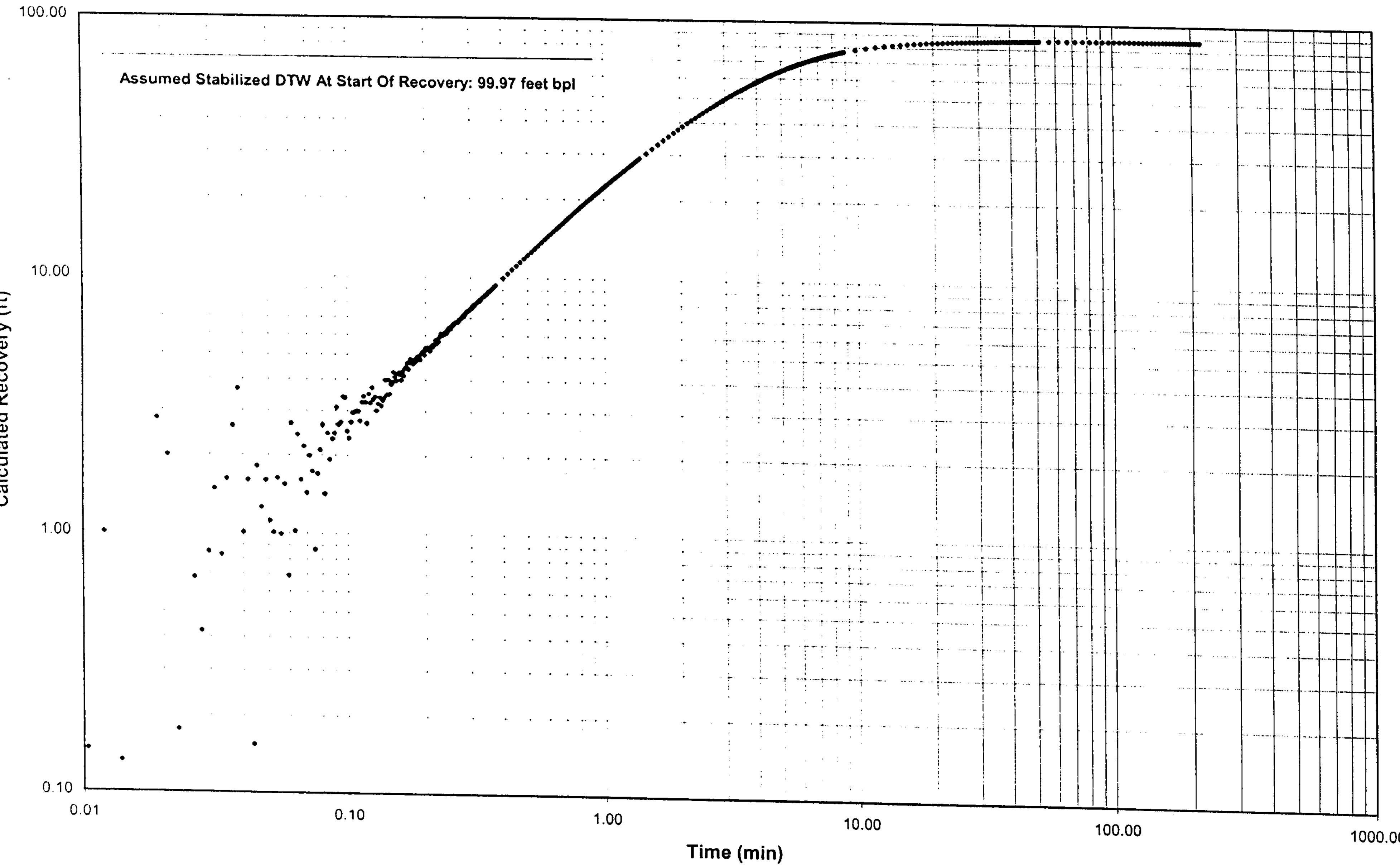
7.19425E-07	= Storage Coefficient from 1/u value, dimensionless
9.76563E-07	= Storage Coefficient from β value, dimensionless

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.

50.7	= effective aquifer thickness, feet
1.923142267	= permeability or hydraulic conductivity, ft/day
14.38510416	= permeability or hydraulic conductivity, gpd/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



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ARCADIS

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. 8

Start day/ time: 4/27/2003 9:53:20
End day/time: 4/27/2003 17:54:20

Flowmeter Total-Start (gal) :	60630	Open Hole Total Depth (feet bpl) :	3450
lowmeter Total- End (gal) :	63800	Packer Depth Interval (feet bpl):	2636.0- 2653.7
verage Test Pumping Rate (gpm) :	6.6	Pump Setting Depth (feet bpl):	240
Development Duration (min):	766	Transducer Depth (feet bpl):	220
atic DTW Before Test (feet bmp):	19.22		

Date	Time	Elapsed Time (min)	Pump Rate (gpm)	Total Volume (gal)	Depth to Water (feet bmp)	Temp. (^oC)	Conductivity (umhos/cm)	Chlorides (mg/L)	pH	Comments
Development										
'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	
'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	na	na	na	na	Hermit Reading: 193.9 ft bpl
'/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	
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.
Pumping Test										
'/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.

roximately 4,110 gallons in one pipe and packer zone volume
" l" denotes gallons
"gpm" denotes gallons per minute
"min" denotes minutes
"feet bpl" denotes feet below pad level
" t bmp" denotes feet below measuring point (pipe flange). 7 1 feet above the pad
" ' denotes degrees celcius
"umhos/cm" denotes micromhos per centimeter
"mg/L" denotes milligrams per liter
"psi" denotes pressure in pounds per square inch
" ' denotes data not available
S ic 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

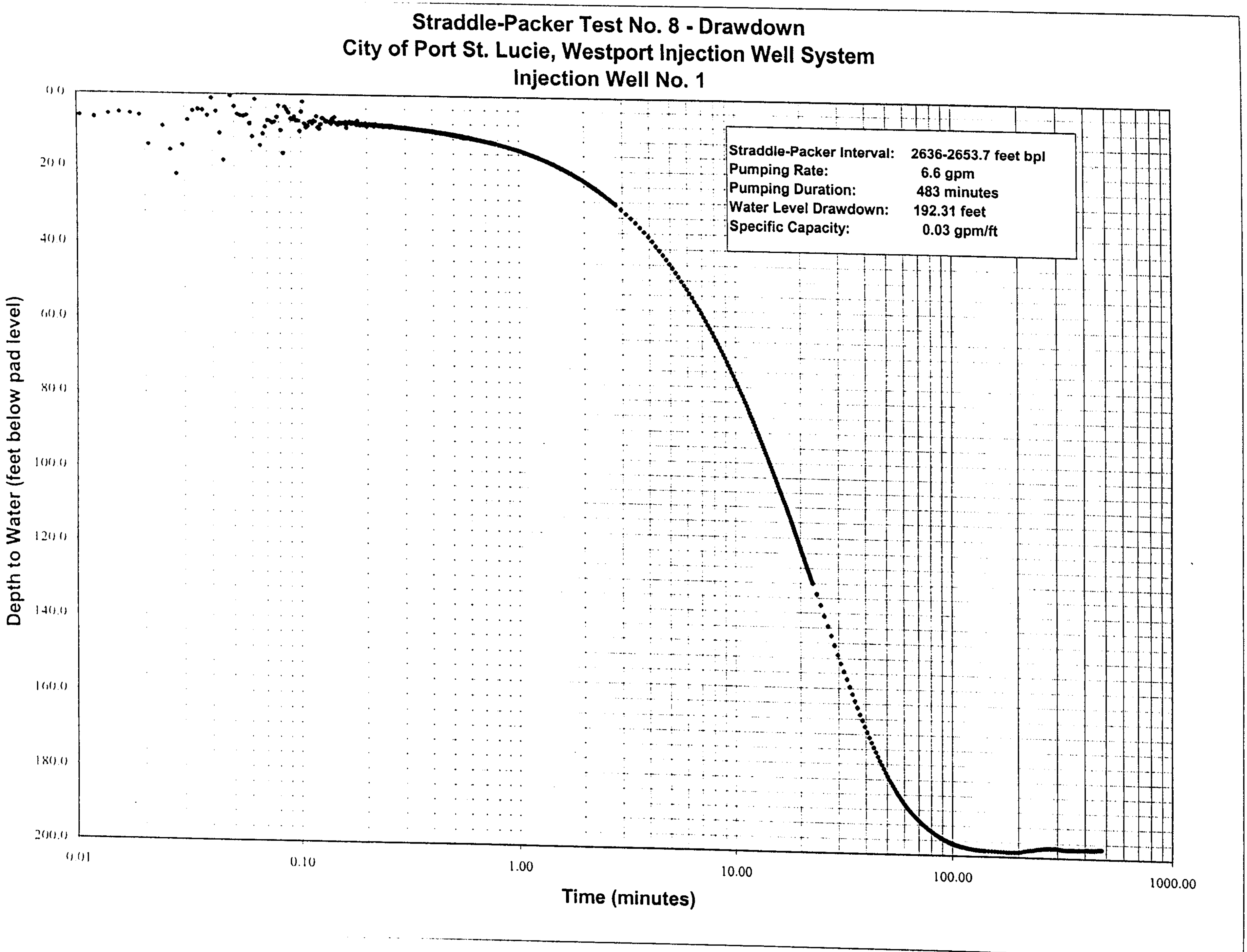
Packer Depth Interval:	2636-2653.7 feet bpl	**Static Water Level:**	6.41 feet bpl
Start of Logging:	4/27/03 9:56:15	**Start of Pumping:**	4/27/03 9:56:30
End of Logging:	4/27/03 17:52:20	**End of Pumping:**	4/27/03 17:59:23
Pumping Rate:	6.6 gpm	**Pumping Duration:**	483 minutes

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 (from start of pumping)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Drawdown (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
04/27/03	9:56:19		208.58	6.42	0.01
04/27/03	9:56:19		208.58	6.42	0.01
04/27/03	9:56:19		208.59	6.41	0.00



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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)
Drawdown Data

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 penetrating well, gpd/ft**

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

3.841816211	**= hydraulic conductivity, gpd/sq ft**

247.4994652	**= time until the effect of casing storage dissipates, minutes (Papadopulos-Cooper, 1967)**
535.6686778	**= time until the effect of casing storage dissipates, minutes (Schafer, 1978 in Driscoll, 1986)**

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

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

1	= F(*u*, *B*)
100000	= 1/*u*
12.6	= s, feet
0.88	= t, time, minutes
0.00001	= *B*

8.023578623	= Transmissivity, sq ft/day
60.0163681	= Transmissivity, gpd/ft

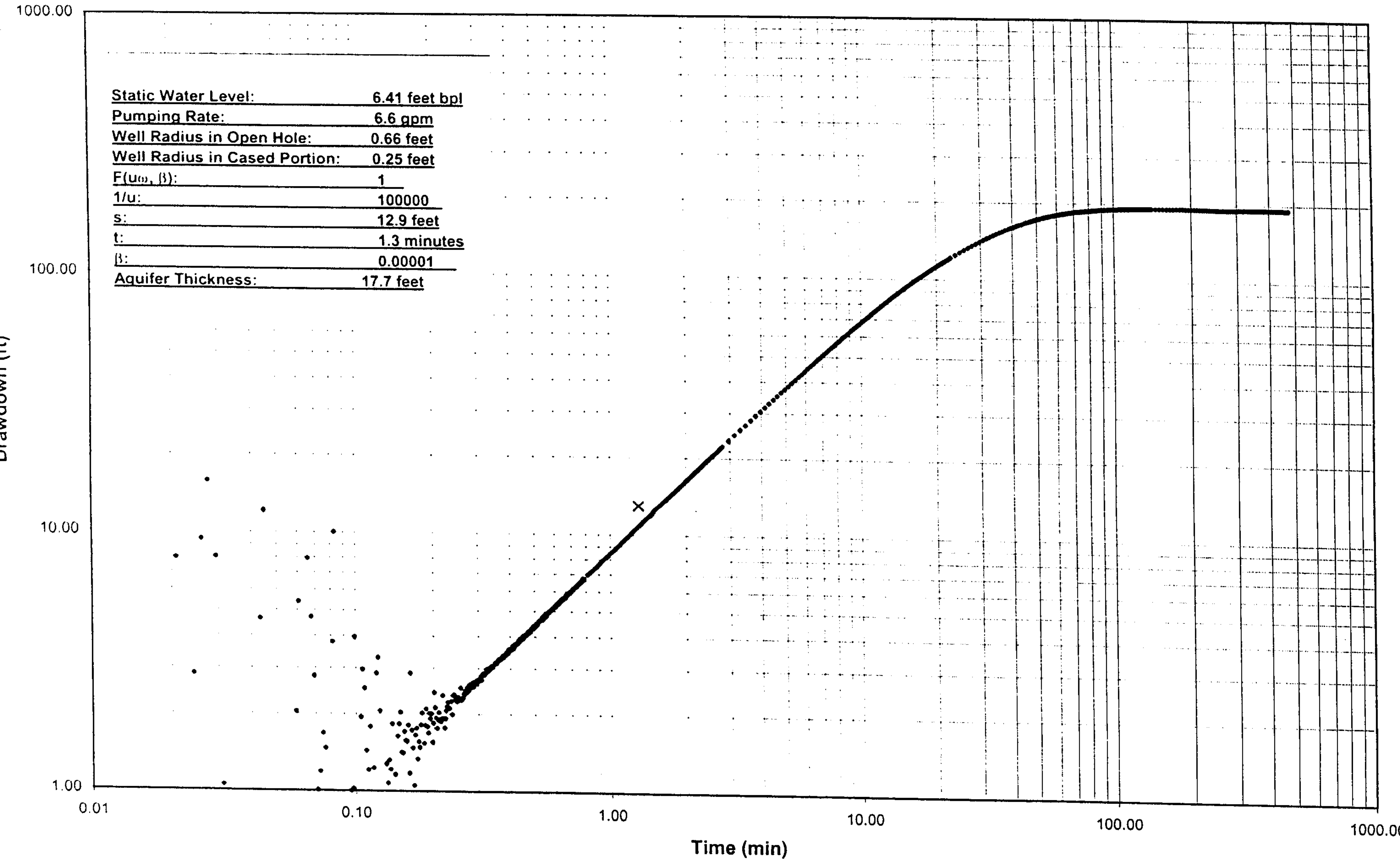
4.50257E-07	= Storage Coefficient from 1/u value, dimensionless
1.4348E-06	= Storage Coefficient from B value, dimensionless

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.

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.

17.7	= effective aquifer thickness, feet
0.453309527	= permeability or hydraulic conductivity, ft/day
3.39075526	= permeability or hydraulic conductivity, gpd/sq ft
0.000159918	= 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



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Straddle-Packer Test No. 8 - Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1

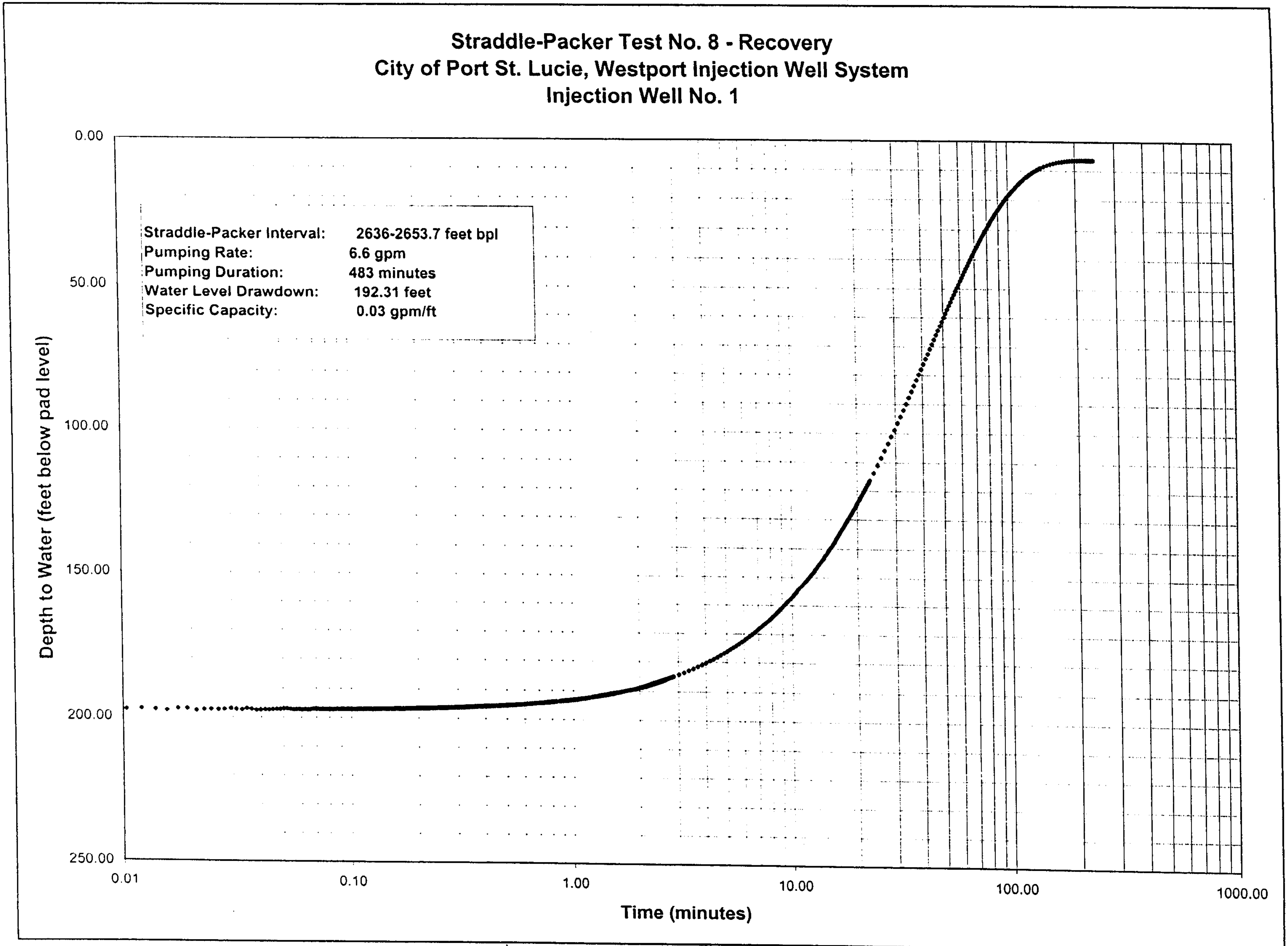
Packer Depth Interval:	2636-2653.7 feet bpl	**Assumed Stabilized DTW:**	198.72 feet bpl
Start of Logging:	4/27/03 17:59:11	**Start of Pumping:**	4/27/03 9:56:30
End of Logging:	4/27/03 22:00:14	**Pumping Duration:**	483 minutes
Pumping Rate:	6.6 gpm	**Total Test Time:**	724 minutes

Data collected with Aquastar Data Logger (ARCADIS)

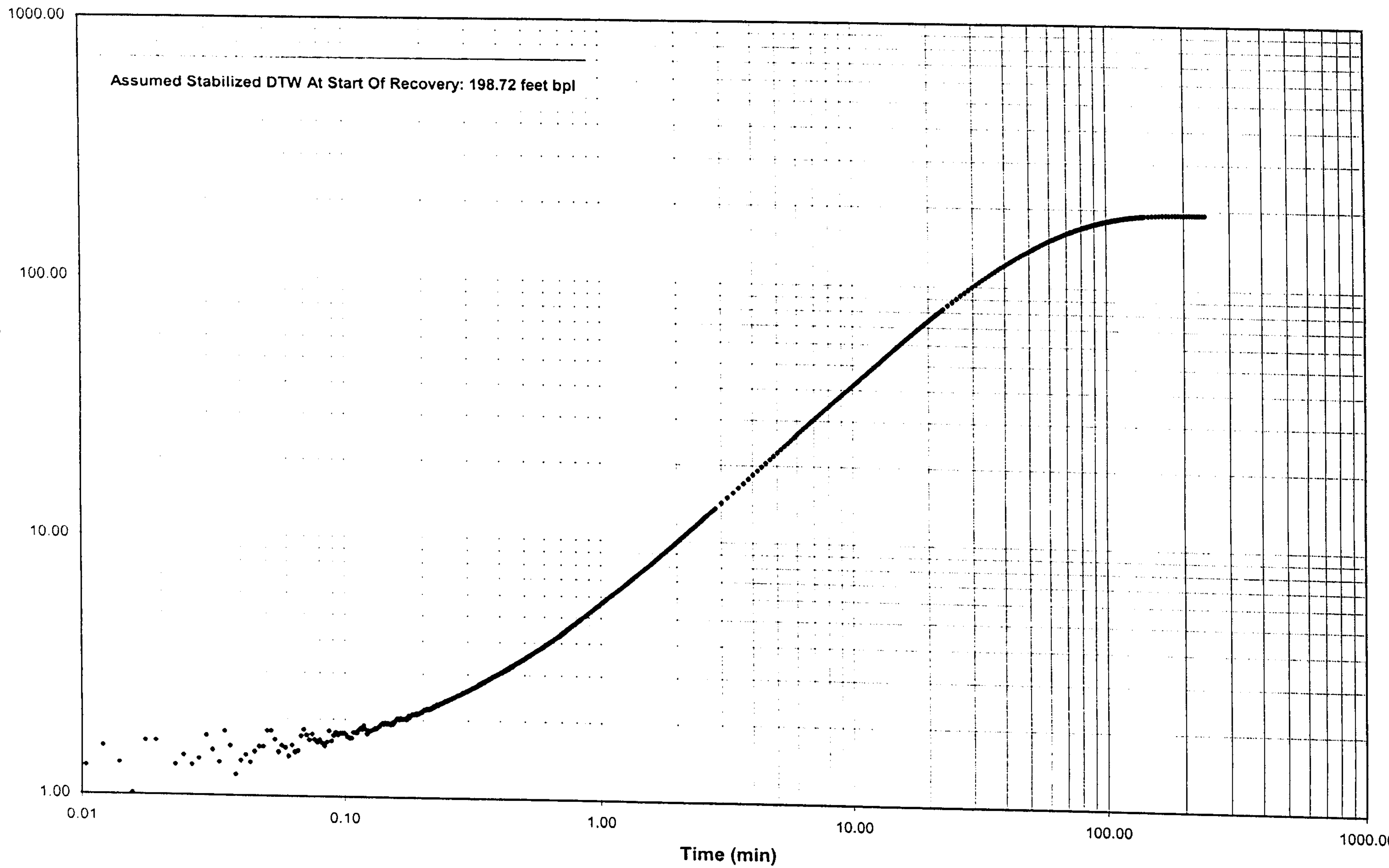
Source File: C:\AQUA4\PT4REC.DAT

Note: Double line indicates end of pumping

Date	Time	Minutes (end of pump)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Calculated 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
4/27/03	17:59:15		17.58	197.42	1.30
4/27/03	17:59:15		17.57	197.43	1.29
4/27/03	17:59:15		17.60	197.40	1.32


Straddle-Packer Test No. 8 - Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1
Straddle-Packer Interval: 2636-2653.7 feet bpl
Pumping Rate: 6.6 gpm
Pumping Duration: 483 minutes
Water Level Drawdown: 192.31 feet
Specific Capacity: 0.03 gpm/ft
Depth to Water (feet below pad level)
0.00
50.00
100.00
150.00
200.00
250.00
0.01
0.10
1.00
10.00
100.00
1000.00
Time (minutes)

Injection Well No.1, Port St. Lucie
Port St. Lucie, Westport Injection Well System
Straddle-Packer Test No. 8 - Recovery



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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 aquifer thickness (decimal)
0.25	= radius of pumped well, feet
17.7	= thickness of aquifer, feet

0.034	= 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]}
68.00015	= effective transmissivity of fully penetrating well, gpd/ft

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

3.841816	= hydraulic conductivity, gpd/sq ft

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

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
0.66	= well radius in open portion of hole, feet
0.25	= well radius in cased portion of hole, feet

ENTER MATCH POINTS

1	= F(u, B)
100000	= 1/u
12.2	= s, feet
2.1	= t, time, minutes
0.00001	= B

8.286646775	= Transmissivity, sq ft/day
61.98411787	= Transmissivity, gpd/ft

1.10971E-06	= 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.

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.

17.7	= effective aquifer thickness, feet
0.468172134	= permeability or hydraulic conductivity, ft/day
3.501927564	= permeability or hydraulic conductivity, gpd/sq ft
0.000165161	= permeability or hydraulic conductivity, cm/sec

ARCADIS

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. 9

Start day/ time: 4/28/2003 2:56:40
End day/time: 4/29/2003 19:17:13

Flowmeter Total-Start (gal) :	63810	Open Hole Total Depth (feet bpl) :	3450
"'owmeter Total- End (gal) :	64205	Packer Depth Interval (feet bpl):	2580-2597.7
ɪerage Test Pumping Rate (gpm) :	2.0	Pump Setting Depth (feet bpl):	232
Development Duration (min):	na	Transducer Depth (feet bpl):	214
atic DTW Before Test (feet bmp):	19.21		

Date	Time	Elapsed Time (min)	Pump Rate (gpm)	Total Volume (gal)	Depth to Water (feet bpl)	Temp. (°C)	Cond. (umhos/cm)	Chlorides (mg/L)	pH	Comments
Development										
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
4/28/03	11:20		na	na	na	na	na	na	na	Water still below transducers
‘/28/03	11:21		6.0	na	na	na	na	na	na	Fill drill pipe to 14.85 ft bpl (w/potable water)
28/03	14:55									Water level stable at 19.67 feet bpl
..28/03	15:15									Begin logging for pump test, pump started at 2.5 gpm
impinġ Test										
28/03	15:15	0.0	2.5	0	18.63	na	na	na	na	Begin pump test
4/28/03	15:18	3.0	2.0	7.5	28.48	26.1	36100	13000	6.51	
4/28/03	15:25	10.0	2.0	21.5	na	26.1	36100	13000	6.51	
ʒ8/03	15:30	15.0	2.0	32	50.29	26.7	19920	8000	6.85	
ʒ8/03	15:46	31.0	2.1	66	70.1	26.6	2280	1500	7.18	
4/28/03	16:20	65	1.9	131	110.7	26.6	3480	1000	7.14	
4/28/03	17:06	111	1.5	200	158.2	26.8	5600	1750	6.61	
!8/03	17:32	137	na	na	179.88	na	na	na	na	
!8/03	17:55	160	na	na	197.82	na	na	na	na	
4/28/03	17:58	163	na	na	na	26.3	8400	na	6.59	Collect lab samples.
''8/03	18:00	165	na	na	na	na	na	na	na	Pump off. Start recovery.

A..roximately 3,978 gallons in one pipe and packer zone volume
"gal" denotes gallons
"gpm" denotes gallons per minute
"r " denotes minutes
"f : bpl" denotes feet below pad level
"f : bmp" denotes feet below measuring point (pipe flange), about 8 feet above the pad
"°C" denotes degrees celcius
"umhos/cm" denotes micromhos per centimeter
"r L" denotes milligrams per liter
"ɪ denotes pressure in pounds per square inch
"r 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
Injection Well No. 1

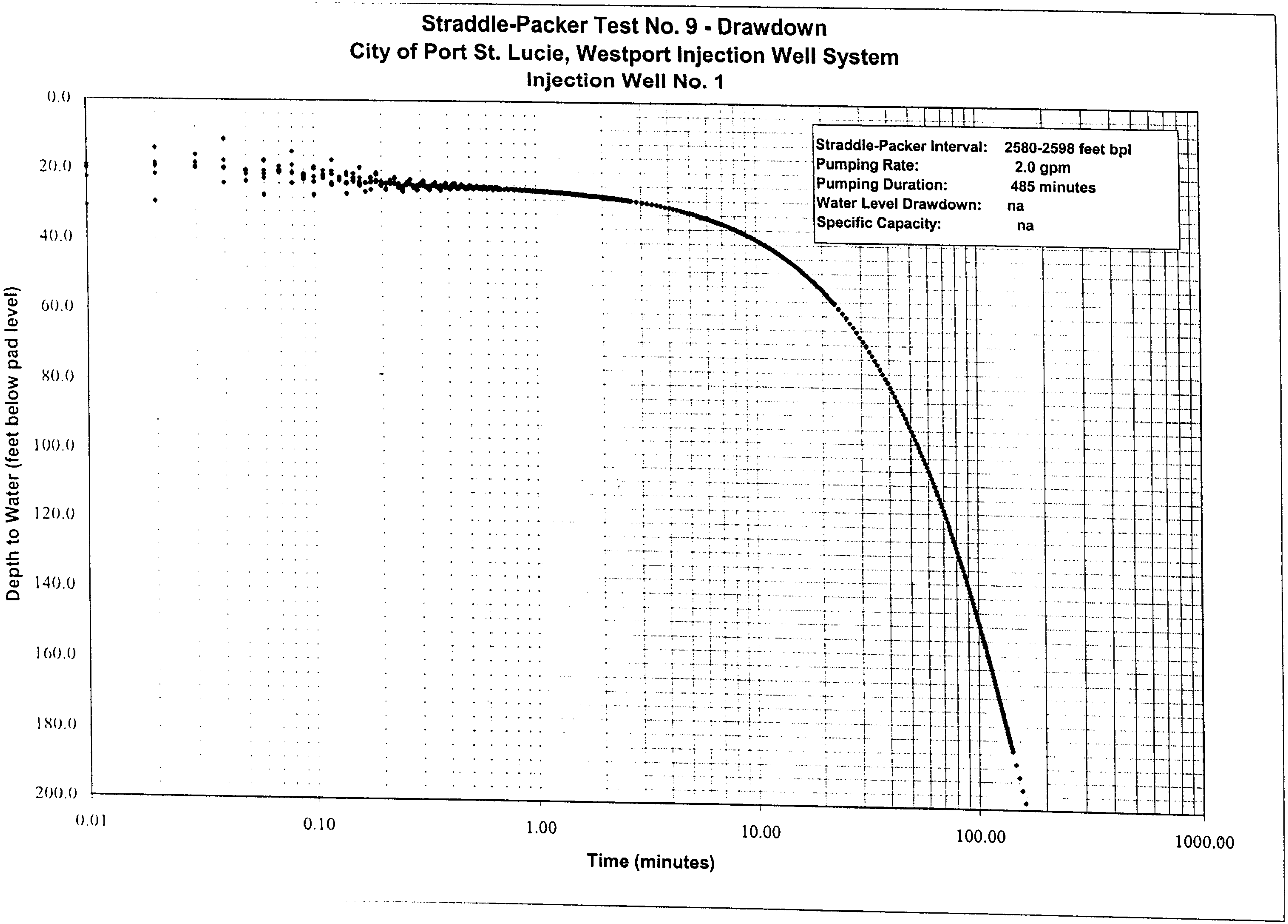
Packer Depth Interval:	2580-2598 feet bpl	**Static Water Level:**	18.71 feet bpl
Start of Logging:	4/28/03 15:17:00	**Start of Pumping:**	4/28/03 15:17:00
End of Logging:	4/28/03 18:03:00	**End of Pumping:**	4/28/03 18:06:31
Pumping Rate:	2.0 gpm	**Pumping Duration:**	169 minutes

Data Collected Using Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\WESTPORT\PT9DD.DAT

Note: Double line indicates the start of pump

Date	Time	Minutes (from start of pumping)	Water Level (feet above transducer)	Depth to Water (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
04/28/03	15:17:34		195.29	18.71
04/28/03	15:17:34		195.28	18.72
04/28/03	15:17:34		195.28	18.72
04/28/03	15:17:34		195.27	18.73
04/28/03	15:17:34		195.28	18.72



g:\project\eesemacon\pf001153.0003\MW Packer Tests\Test #4\9DD.xls\chart

Straddle-Packer Test No. 9 - Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1

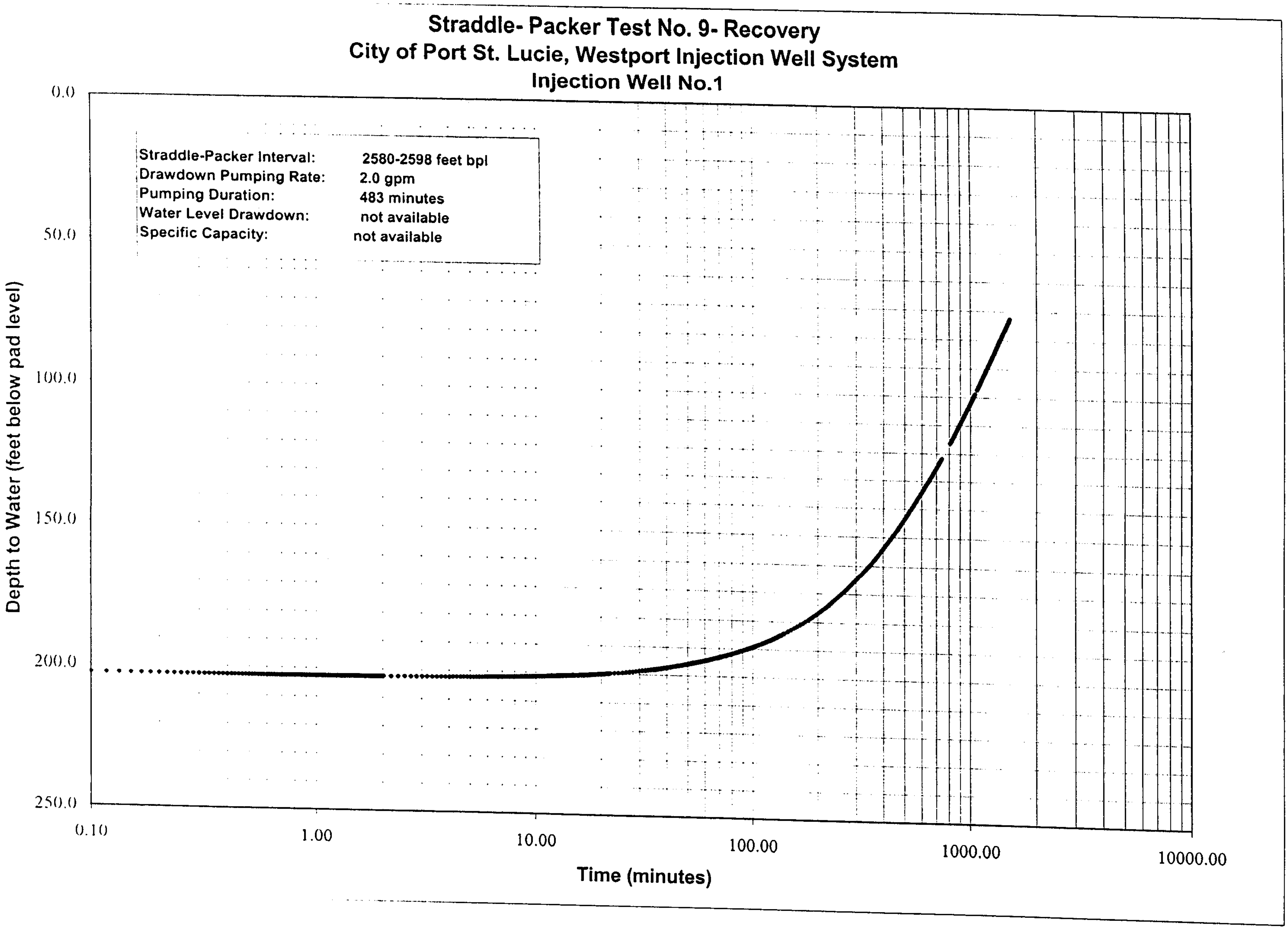
Packer Depth Interval:	2580-2597.7 feet bpl	**Assumed Stabilized DTW:**	12.11 feet bpl
Start of Logging:	4/28/03 18:05:00	**Start of Pumping:**	4/28/03 15:15:00
End of Logging:	4/29/03 19:16:00	**Pumping Duration:**	165 minutes
Pumping Rate:	2.0 gpm	**Total Test Time:**	28 hrs

Data collected with Aquastar Data Logger (ARCADIS)

Source File: C:\AQUA4\PT4REC.DAT

Note: Double line indicates end of pumping

Date	Time	Minutes (end of pump)	Water Level (feet above transducer)	Depth to Water (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
4/28/03	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



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ARCADIS

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. 10

Start day/ time:	4/30/2003	9:36:30
End day/time:	4/30/2003	18:18:30

Flowmeter Total-Start (gal) :	66700	Open Hole Total Depth (feet bpl) :	3450
owmeter Total- End (gal) :	68070	Packer Depth Interval (feet bpl):	2217.0- 2234.7
,,verage Test Pumping Rate (gpm) :	2.6	Pump Setting Depth (feet bpl):	240
Development Duration (min):	1070	Transducer Depth (feet bpl):	220
atic DTW Before Test (feet bmp):	14.15		

Date	Time	Elapsed Time (min)	Pump Rate (gpm)	Total Volume (gal)	Depth to Water (feet bmp)	Temp. (^{o}C)	Conductivity (umhos/cm)	Chlorides (mg/L)	pH	Comments
Development										
'30/03	0:32	0	50.0	0	16.58	na	na	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	n	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
"·umping 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
"gal" denotes gallons
" n" denotes gallons per minute
" 1" denotes minutes
"...t bpl" denotes feet below pad level
"feet bmp" denotes feet below measuring point (pipe flange), 6.0 feet above the pad.
"°C" denotes degrees celcius
" hos/cm" denotes micromhos per centimeter
" /L" denotes milligrams per liter
"., " denotes pressure in pounds per square inch
"na" denotes data not available
Static depth to water (DTW) is measured just prior to pumping test startup

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

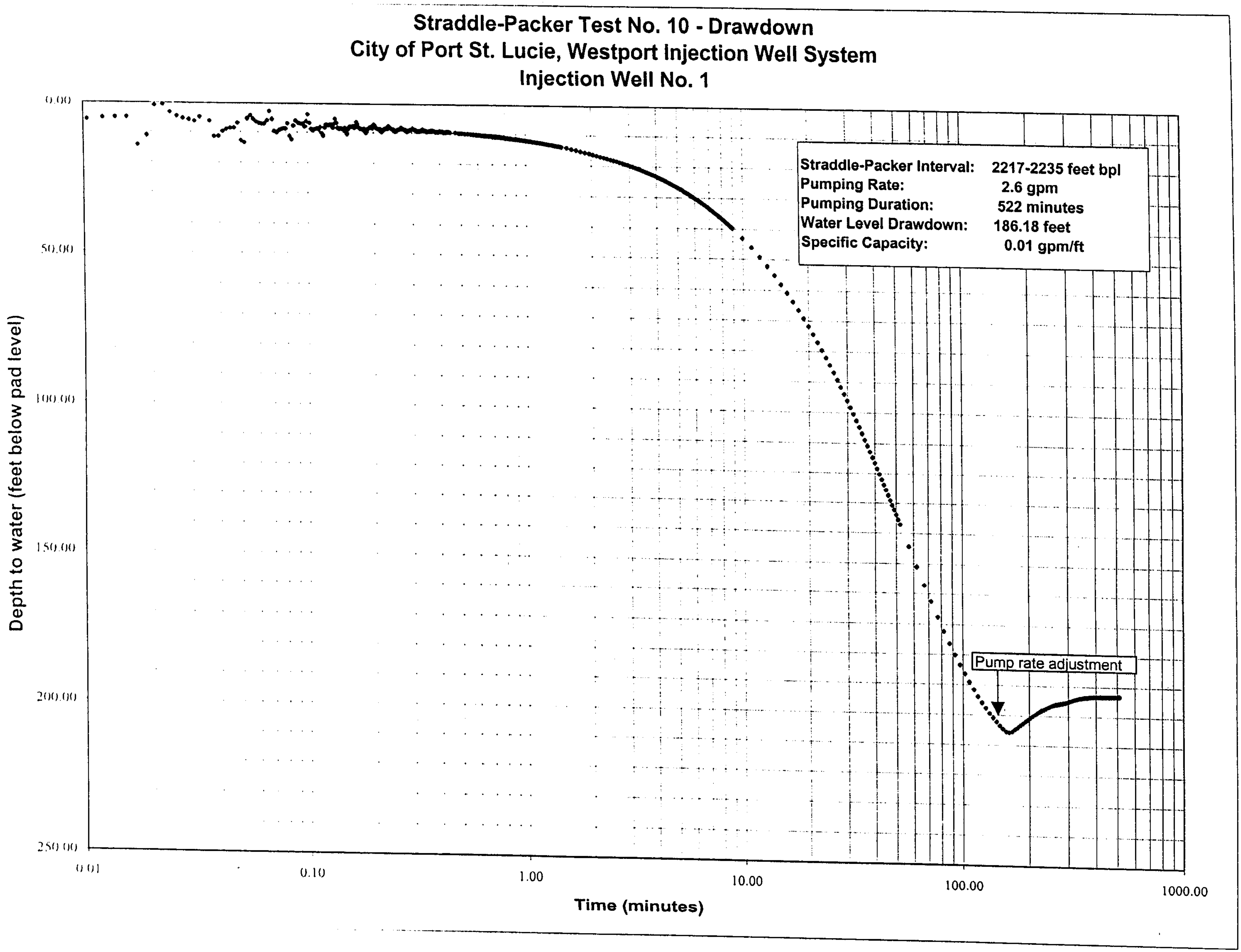
Data Collected Using Aquastar Data Logger (ARCADIS)

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 (from start of pumping)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Drawdown (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	0.01
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	7.19	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
05/01/03	9:37:24		212.81	7.19	0.02
05/01/03	9:37:24		212.81	7.19	0.02
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 Interval: 2217-2235 feet bpl
Pumping Rate: 2.6 gpm
Pumping Duration: 522 minutes
Water Level Drawdown: 186.18 feet
Specific Capacity: 0.01 gpm/ft
Pump rate adjustment
Depth to water (feet below pad level)
0.00
50.00
100.00
150.00
200.00
250.00
0.01
0.10
1.00
10.00
100.00
1000.00
Time (minutes)

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	
0.014	= 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

0.01400003	= 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	**= effective transmissivity of fully penetrating well, gpd/ft**

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

1.581924322	**= hydraulic conductivity, gpd/sq ft**

601.0701298	**= time until the effect of casing storage dissipates, minutes (Papadopulos-Cooper, 1967)**
1300.909646	**= time until the effect of casing storage dissipates, minutes (Schafer, 1978 in Driscoll, 1986)**

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

Port St. Lucie, Westport Injection Well System, Packer Test 10 Drawdown
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

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

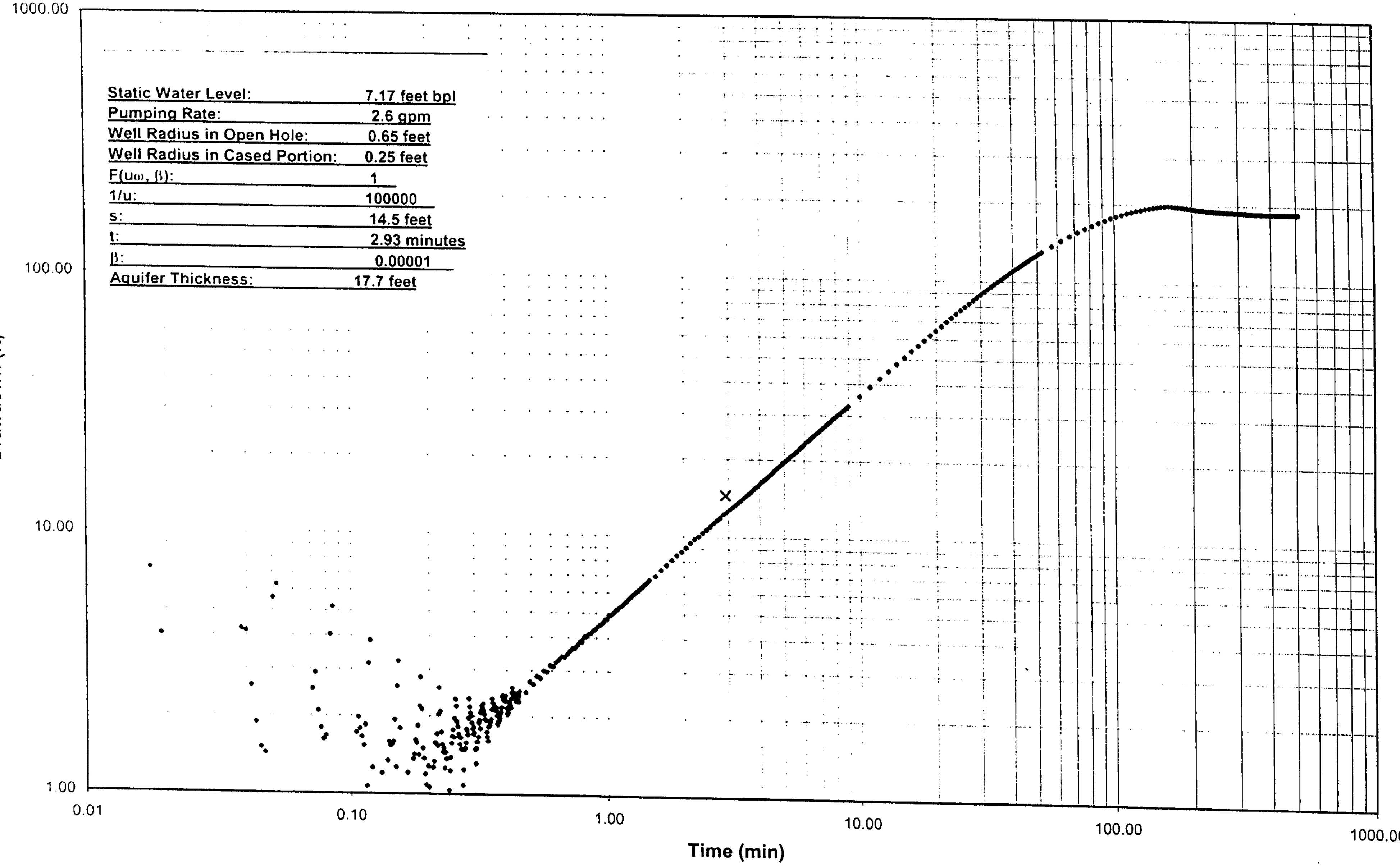
5.29101E-07	= Storage Coefficient from 1/u value, dimensionless
1.47929E-06	= Storage Coefficient from B value, dimensionless

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.

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.

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

Injection Well No.1, Port St. Lucie
Port St. Lucie, Westport Injection Well System
Straddle-Packer Test No. 10 - Drawdown



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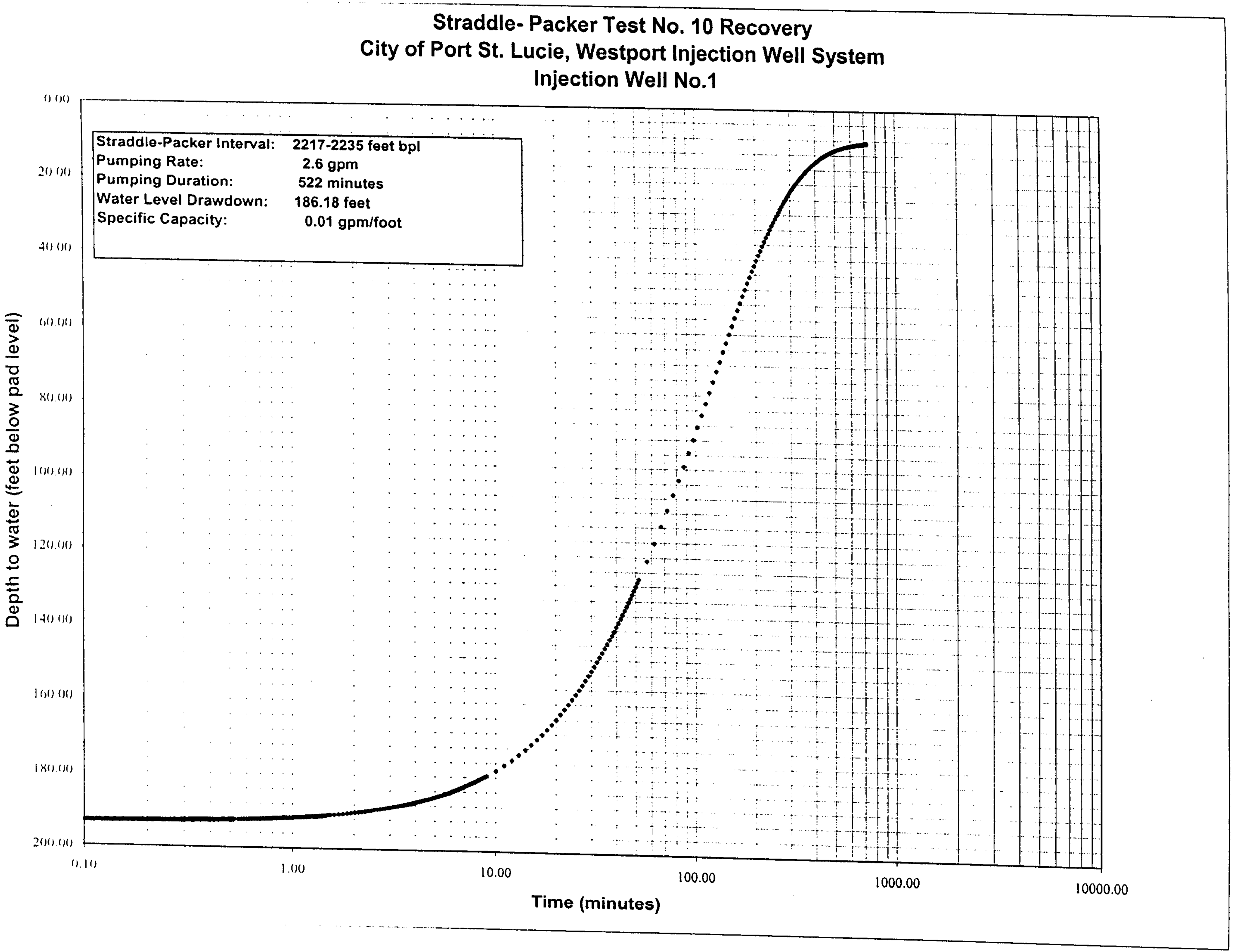
Straddle-Packer Test No. 10 - Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No. 1

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 (end of pump)	Water Level (feet above transducer)	Depth to Water (feet bpl)	Calculated 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


Straddle- Packer Test No. 10 Recovery
City of Port St. Lucie, Westport Injection Well System
Injection Well No.1
Straddle-Packer Interval: 2217-2235 feet bpl
Pumping Rate: 2.6 gpm
Pumping Duration: 522 minutes
Water Level Drawdown: 186.18 feet
Specific Capacity: 0.01 gpm/foot
Depth to water (feet below pad level)
0.00
20.00
40.00
60.00
80.00
100.00
120.00
140.00
160.00
180.00
200.00
0.10
1.00
10.00
100.00
1000.00
10000.00
Time (minutes)

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 aquifer 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
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]}
28.00006	[redacted]

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

1.581924	[redacted]

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

1	= F(u, B)
100000	= 1/u
12.3	= s, feet
5.25	= t, time, minutes
0.00001	= β

3.237896473	= Transmissivity, sq ft/day
24.21946562	= Transmissivity, gpd/ft

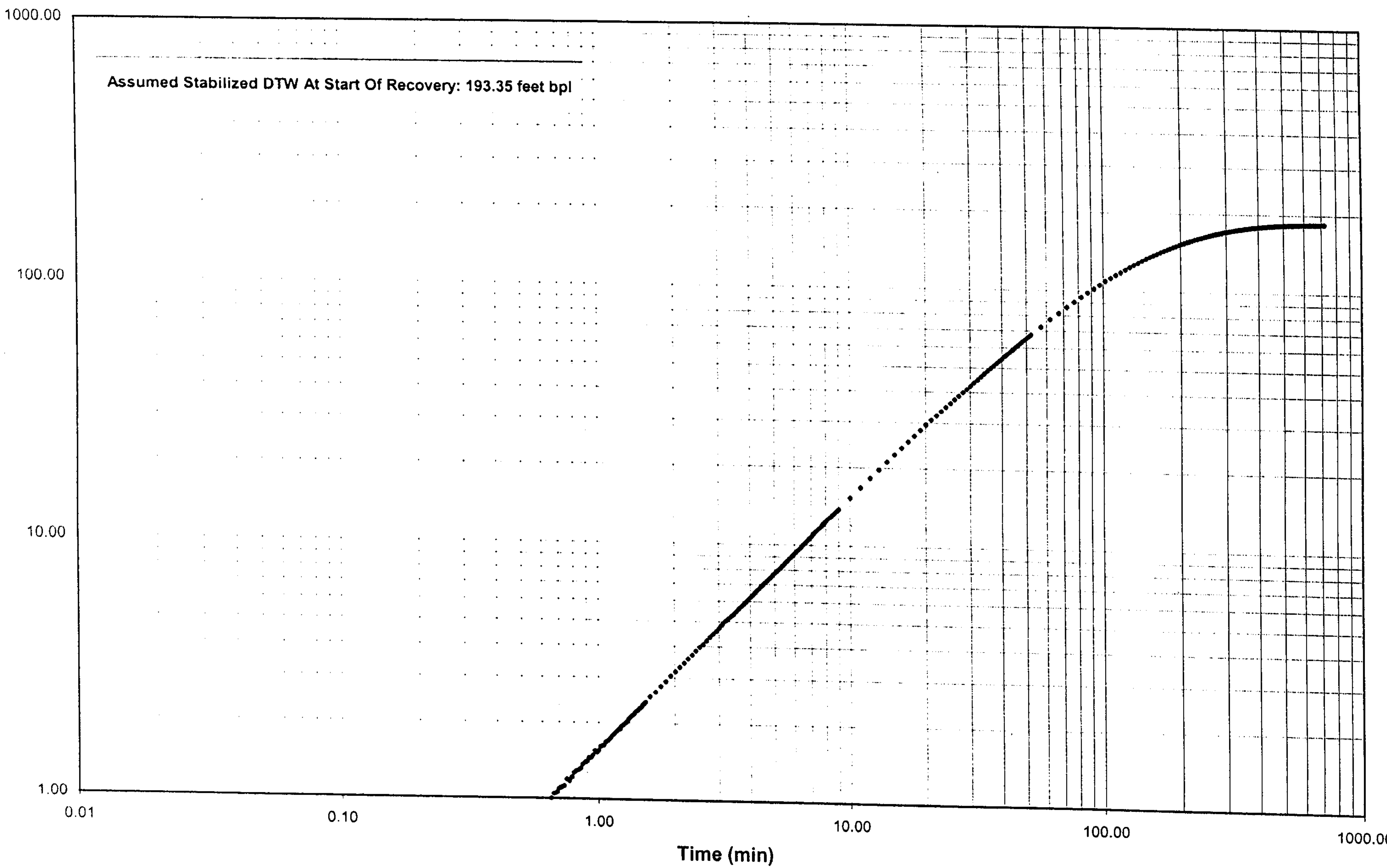
1.11762E-06	= Storage Coefficient from 1/u value, dimensionless
1.47929E-06	= Storage Coefficient from β value, dimensionless

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.

17.7	= effective aquifer thickness, feet
0.182932004	= permeability or hydraulic conductivity, ft/day
1.368331391	= permeability or hydraulic conductivity, gpd/sq 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



g:\project\reesemacon\pl001153 0003\MW Packer Tests\Test#5\PT10REC.XLS\Rec Log-log

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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 Packer™ 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-Packer™) 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-Packer™. 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 Packer™ 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 Packer™. 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

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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.

7-21-03

Michael J. Waldron, PG

KELI

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
SN/ID/Asset # 8064187
Bar Code # N/A
Specifications: +/-0.25% FS
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

I.D. #		Cal. Date	Cal. Due
391	EATON UPS 3000BAA PRESSURE INDICATOR	12/06/2002	12/06/2003

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

Range	Nominal	Pre-Cal	Post-Cal	Low Limit	High Limit
160 PSI	30	30.0	30.0	29.6	30.4
	60	60.0	60.0	59.6	60.4
	90	89.9	89.9	89.6	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 Rcvd. 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

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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
2305	55	154.1
2310	60	154.1

Note: "McDaniel" test gauge calibrated February 3, 2003, Serial # IC118.

I, Michael J. Waldron, certify that the above data is true and accurate.

7-24-03

Michael J. Waldron, PG

KELI

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

I.D. #		Cal. Date	Cal. Due
609	DRESSER PTE-1 PRESSURE CALIBRATOR	07/13/2002	07/13/2003
610	DRESSER HSQ-2 PRESSURE TRANSDUCER	07/13/2002	07/13/2003

Quality Assurance

KELI

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
	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
Specifications: +/-.25% In-House: Y Cal. Date: 02/03/2003 Cal. Due: 02/03/2004
Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

I.D. #	Standards Used	Cal. Date	Cal. Due
609	DRESSER PTE-1 PRESSURE CALIBRATOR	07/13/2002	07/13/2003
611	DRESSER HSQ-2 PRESSURE TRANSDUCER	07/13/2002	07/13/2003

Quality Assurance

5251 West 21st Lane · Hialeah, FL 33016 ● Ph (305) 822-5792 Fax (305) 362-3125

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 # IC118.

I, Michael J. Waldron, certify that the above data is true and accurate.

7-21-03

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

I.D. #		Cal. Date	Cal. Due
609	DRESSER PTE-1 PRESSURE CALIBRATOR	07/13/2002	07/13/2003
610	DRESSER HSQ-2 PRESSURE TRANSDUCER	07/13/2002	07/13/2003

Quality Assurance

KELI

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
	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
Specifications: +/-.25% In-House: Y Cal. Date: 02/03/2003 Cal. Due: 02/03/2004
Remarks: PERFORMED ROUTINE CALIBRATION/CERTIFICATION

I.D #	Standards Used	Cal. Date	Cal. Due
609	DRESSER PTE-1 PRESSURE CALIBRATOR	07/13/2002	07/13/2003
[illegible]	DRESSER HSQ-2 PRESSURE TRANSDUCER	07/13/2002	07/13/2003

Quality Assurance

[illegible] West 21st Lane Hialeah, Fl 33016 ● Ph (305) 822-[illegible] Fax [illegible]

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

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 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	U	200.7	0.0030	mg/L	06/28/03	APR
Cadmium	U	200.7	0.0040	mg/L	06/28/03	APR
Chromium	U	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	U	200.7	0.010	mg/L	06/28/03	APR
Silver	U	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	U	200.8	0.0010	mg/L	07/01/03	APR
Lead	U	200.8	0.00020	mg/L	07/01/03	APR
Selenium	0.010	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

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U = Analyte Not Detected
DL = Detection Limit

Envirodyne Inc.

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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

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	CMM
1,2-Dibromoethane (EDB)	U	504.1	0.020	μg/L	06/28/03	CMM
Benzo(a)pyrene	U	525.2	0.20	μg/L	07/02/03	SPH
Di(2-ethylhexyl)adipate	U	525.2	1.0	μg/L	07/02/03	SPH
Di(2-ethylhexyl)phthalate	U	525.2	1.0	μg/L	07/02/03	SPH
Carbofuran	U	531.1	1.0	μg/L	06/26/03	MLD
Oxamyl (Vydate)	U	531.1	1.0	μg/L	06/26/03	MLD
Glyphosate	U	547	40	μg/L	06/28/03	E86515
Endothall	U	548.1	50	μg/L	07/02/03	E86515
Diquat	U	549	1.44	μg/L	07/08/03	E86515
Biochemical Oxygen Demand	2.0	405.1	2.0	mg/L	06/25/03	JGT
Chloride	2400	SM4500CL-B	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	U	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

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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

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	U	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 Sampled: 06/24/03 14:20 Total Coliform Date & Time Analyzed: 06/25/03 18:03					
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	U	351-350	0.50 mg/L	06/30/03	JMJ
Phosphorus, Total	U	365.4	0.010 mg/L	06/30/03	JMJ

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

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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

Date of Analysis: 06/29/03
Date of Extraction: 06/26/03

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

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

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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: 06/29/03
Date of Extraction: 06/26/03

508 ORGANOHALIDE PESTICIDES 62-550.310(2)(c) FAC

PARAMETER	RESULT	DL	UNITS	ANALYST
Chlordane	U	0.50	µg/L	CMM
Endrin	U	0.10	µg/L	CMM
Heptachlor	U	0.10	µg/L	CMM
Heptachlor epoxide	U	0.10	µg/L	CMM
Hexachlorobenzene	U	0.10	µg/L	CMM
Lindane	U	0.10	µg/L	CMM
Methoxychlor	U	0.20	µg/L	CMM
Toxaphene	U	1.0	µg/L	CMM
PCB 1016	U	0.20	µg/L	CMM
PCB 1221	U	0.20	µg/L	CMM
PCB 1240	U	0.20	µg/L	CMM
PCB 1242	U	0.20	µg/L	CMM
PCB 1248	U	0.20	µg/L	CMM
PCB 1254	U	0.20	µg/L	CMM
PCB 1260	U	0.20	µg/L	CMM

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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DL = Detection Limit

Envirodyne Inc.

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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: 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	U	1.0	µg/L	CMM
Hexachlorocyclopentadiene	U	0.10	µg/L	CMM
Simazine	U	1.0	µg/L	CMM

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Laboratory Certification No. E86188

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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: 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	CMM
Dinoseb	U	0.50	µg/L	CMM
Pentachlorophenol	U	0.50	µg/L	CMM
Picloram	U	0.50	µg/L	CMM
2,4-D	U	0.50	µg/L	CMM
2,4,5-TP (Silvex)	U	0.10	µg/L	CMM

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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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

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	U	0.5	µg/L	EMH
Bromodichloromethane	U	0.5	µg/L	EMH
Bromoform	U	0.5	µg/L	EMH
Bromomethane	U	0.5	µg/L	EMH
Chloroethane	U	0.5	µg/L	EMH
Chloroform	U	0.5	µg/L	EMH
Chloromethane	U	0.5	µg/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	U	0.5	µg/L	EMH
Dichlorodifluoromethane	U	0.5	µg/L	EMH
1,1-Dichloroethane	U	0.5	µg/L	EMH
2,2-Dichloropropane	U	0.5	µg/L	EMH
1,1-Dichloropropylene	U	0.5	µg/L	EMH
1,3-Dichloropropane	U	0.5	µg/L	EMH
1,3-Dichloropropene	U	0.5	µg/L	EMH
Methyl tert-butyl-ether (MTBE)	U	0.5	µg/L	EMH
1,1,1,2-Tetrachloroethane	U	0.5	µg/L	EMH
1,1,2,2-Tetrachloroethane	U	0.5	µg/L	EMH
Trichlorofluoromethane	U	0.5	µg/L	EMH
1,2,3-Trichloropropane	U	0.5	µg/L	EMH

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U=Analyte Not Detected
DL=Detection Limit

Envirodyne Inc.

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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: 06/27/03

524.2 TRIHALOMETHANES (THM'S)

PARAMETER	RESULT	DL	UNITS	ANALYST
Bromodichloromethane	U	0.5	µg/L	EMH
Bromoform	U	0.5	µg/L	EMH
Chloroform	U	0.5	µg/L	EMH
Dibromochloromethane	U	0.5	µg/L	EMH
Total Trihalomethanes	U	0.5	µg/L	EMH

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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DL=Detection Limit

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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

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 VOLATILE ORGANIC COMPOUNDS (62-550)

PARAMETER	RESULT	DL	UNITS	ANALYST
Benzene	U	0.5	µg/L	EMH
Carbon tetrachloride	U	0.5	µg/L	EMH
Chlorobenzene	U	0.5	µg/L	EMH
1,2-Dichlorobenzene	U	0.5	µg/L	EMH
1,4-Dichlorobenzene	U	0.5	µg/L	EMH
1,2-Dichloroethane	U	0.5	µg/L	EMH
1,1-Dichloroethene	U	0.5	µg/L	EMH
cis-1,2-Dichloroethene	U	0.5	µg/L	EMH
trans-1,2-Dichloroethene	U	0.5	µg/L	EMH
Dichloromethane	U	0.5	µg/L	EMH
1,2-Dichloropropane	U	0.5	µg/L	EMH
Ethylbenzene	U	0.5	µg/L	EMH
Styrene	U	0.5	µg/L	EMH
Tetrachloroethylene	U	0.5	µg/L	EMH
Toluene	U	0.5	µg/L	EMH
1,2,4-Trichlorobenzene	U	0.5	µg/L	EMH
1,1,1-Trichloroethane	U	0.5	µg/L	EMH
1,1,2-Trichloroethane	U	0.5	µg/L	EMH
Trichloroethylene	U	0.5	µg/L	EMH
Vinyl chloride	U	0.5	µg/L	EMH
Xylenes, Total	U	0.5	µg/L	EMH

Analysis Performed in Accordance with E.P.A. Methods
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QA/QC Review
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DL=Detection Limit

Envirodyne Inc.

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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: 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	µg/L	MLD
Aldicarb sulfoxide	U	1.0	µg/L	MLD
Carbaryl	U	1.0	µg/L	MLD
3-Hydroxycarbofuran	U	1.0	µg/L	MLD
Methomyl	U	1.0	µg/L	MLD

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Port St. Lucie, FL

SAMPLE ID: MW-1 UMZ

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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	U	1.0	µg/L	SPH
2-Chlorophenol	U	1.0	µg/L	SPH
Di-n-butylphthalate	U	1.0	µg/L	SPH
Diethylphthalate	U	1.0	µg/L	SPH
Dimethylphthalate	U	1.0	µg/L	SPH
Di-n-octyl phthalate	U	1.0	µg/L	SPH
2,4-Dinitrotoluene	U	1.0	µg/L	SPH
Isophorone	U	1.0	µg/L	SPH
2-Methyl-4,6-dinitrophenol	U	1.0	µg/L	SPH
Phenol	U	1.0	µg/L	SPH
2,4,6-Trichlorophenol	U	1.0	µg/L	SPH

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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

Date of Analysis: 06/29/03
Date of Extraction: 06/27/03

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

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.

Michael Antoumis
Project Manager

John Taylor
Quality Assurance Officer

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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ARCADIS GERAGHTY & MILLER

Laboratory Task Order No./P.O. No. N/A

CHAIN-OF-CUSTODY RECORD

Project Number/Name PF-001153.0003/RMA WESTPORT

Project Location Port St. Lucie, FL.

Laboratory Envirodyne

Project Manager M. Waldron

Sampler(s)/Affiliation L. Kwapinski

ANALYSIS / METHOD / SIZE

See attached list.

Log # 2003 06 454

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID							Remarks	Total
MW1 LMZ	L	06/24/03 14:00		~~Primary & secondary Drinking Water Stds.~~							
MW1 UMZ	L	06/24/03 14:20									

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers 2 sets

Relinquished by: L. Kwapinski	Organization: ARCADIS	Date 06/25/03	Time 08:30	Seal Intact? Yes No N/A
Received by: Ray K[illegible]	Organization: Envirodyne	Date 6/25/03	Time 12:01	
Relinquished by: Ray [illegible]	Organization: Envirodyne	Date 6/25/03	Time 1540	Seal Intact? Yes No N/A
Received by: Bala Manoharan	Organization: Envirodyne	Date 6/25/03	Time 1540	

Special Instructions/Remarks: Samples iced. TAT 3 WEEKS.

Delivery Method: ☐ In Person ☐ Common Carrier ______ SPECIFY ☒ Lab Courier ☐ Other ______ SPECIFY

AG 05-0597

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CERTIFICATE OF ANALYSIS

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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	U	200.7	0.010	mg/L	06/28/03	APR
Barium	0.075	200.7	0.010	mg/L	06/28/03	APR
Beryllium	U	200.7	0.0030	mg/L	06/28/03	APR
Cadmium	U	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	U	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

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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	RESULT	METHOD	DL UNITS	DATE	ANALYST
Dibromochloropropane (DBCP)	U	504.1	0.020 µg/L	06/28/03	CMM
1,2-Dibromoethane (EDB)	U	504.1	0.020 µg/L	06/28/03	CMM
Benzo(a)pyrene	U	525.2	0.20 µg/L	07/02/03	SPH
Di(2-ethylhexyl)adipate	U	525.2	1.0 µg/L	07/02/03	SPH
Di(2-ethylhexyl)phthalate	U	525.2	1.0 µg/L	07/02/03	SPH
Carbofuran	U	531.1	1.0 µg/L	06/26/03	MLD
Oxamyl (Vydate)	U	531.1	1.0 µg/L	06/26/03	MLD
Glyphosate	U	547	40 µg/L	06/28/03	E86515
Endothall	U	548.1	50 µg/L	07/02/03	E86515
Diquat	U	549	1.44 µg/L	07/08/03	E86515
Biochemical Oxygen Demand	8.1	405.1	2.0 mg/L	06/25/03	JGT
Chloride	15000	SM4500CL-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-C	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

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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	RESULT	METHOD	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	U	353.2	0.020 mg/L	06/25/03	JGT
Nitrate-Nitrite, as Nitrogen	U	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	U	351-350	0.50 mg/L	06/30/03	JMJ
Phosphorus, Total	0.093	365.4	0.010 mg/L	06/30/03	JMJ

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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: 06/26/03

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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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: 06/26/03

508 ORGANOHALIDE PESTICIDES 62-550.310(2)(c) FAC

PARAMETER	RESULT	DL	UNITS	ANALYST
Chlordane	U	0.50	µg/L	CMM
Endrin	U	0.10	µg/L	CMM
Heptachlor	U	0.10	µg/L	CMM
Heptachlor epoxide	U	0.10	µg/L	CMM
Hexachlorobenzene	U	0.10	µg/L	CMM
Lindane	U	0.10	µg/L	CMM
Methoxychlor	U	0.20	µg/L	CMM
Toxaphene	U	1.0	µg/L	CMM
PCB 1016	U	0.20	µg/L	CMM
PCB 1221	U	0.20	µg/L	CMM
PCB 1240	U	0.20	µg/L	CMM
PCB 1242	U	0.20	µg/L	CMM
PCB 1248	U	0.20	µg/L	CMM
PCB 1254	U	0.20	µg/L	CMM
PCB 1260	U	0.20	µg/L	CMM

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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: 06/26/03

508.1 CHLORINATED PESTICIDES (62-550 FAC)

PARAMETER	RESULT	DL	UNITS	ANALYST
Alachlor	U	0.10	µg/L	CMM
Atrazine	U	1.0	µg/L	CMM
Hexachlorocyclopentadiene	U	0.10	µg/L	CMM
Simazine	U	1.0	µg/L	CMM

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SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03
Received on: 06/25/03

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	CMM
Dinoseb	U	0.50	µg/L	CMM
Pentachlorophenol	U	0.50	µg/L	CMM
Picloram	U	0.50	µg/L	CMM
2,4-D	U	0.50	µg/L	CMM
2,4,5-TP (Silvex)	U	0.10	µg/L	CMM

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SAMPLE ID: MW-1 LMZ

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	U	0.5	µg/L	EMH
Bromodichloromethane	U	0.5	µg/L	EMH
Bromoform	U	0.5	µg/L	EMH
Bromomethane	U	0.5	µg/L	EMH
Chloroethane	U	0.5	µg/L	EMH
Chloroform	U	0.5	µg/L	EMH
Chloromethane	U	0.5	µg/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	U	0.5	µg/L	EMH
Dichlorodifluoromethane	U	0.5	µg/L	EMH
1,1-Dichloroethane	U	0.5	µg/L	EMH
2,2-Dichloropropane	U	0.5	µg/L	EMH
1,1-Dichloropropylene	U	0.5	µg/L	EMH
1,3-Dichloropropane	U	0.5	µg/L	EMH
1,3-Dichloropropene	U	0.5	µg/L	EMH
Methyl tert-butyl-ether (MTBE)	U	0.5	µg/L	EMH
1,1,1,2-Tetrachloroethane	U	0.5	µg/L	EMH
1,1,2,2-Tetrachloroethane	U	0.5	µg/L	EMH
Trichlorofluoromethane	U	0.5	µg/L	EMH
1,2,3-Trichloropropane	U	0.5	µg/L	EMH

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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: 06/27/03

524.2 TRIHALOMETHANES (THM'S)

PARAMETER	RESULT	DL	UNITS	ANALYST
Bromodichloromethane	U	0.5	µg/L	EMH
Bromoform	U	0.5	µg/L	EMH
Chloroform	U	0.5	µg/L	EMH
Dibromochloromethane	U	0.5	µg/L	EMH
Total Trihalomethanes	U	0.5	µg/L	EMH

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SAMPLE ID: MW-1 LMZ

Collected by: Lech Kwapinski

Collected on: 06/24/03
Received on: 06/25/03

Date of Analysis: 06/27/03

524.2 VOLATILE ORGANIC COMPOUNDS (62-550)

PARAMETER	RESULT	DL	UNITS	ANALYST
Benzene	U	0.5	µg/L	EMH
Carbon tetrachloride	U	0.5	µg/L	EMH
Chlorobenzene	U	0.5	µg/L	EMH
1,2-Dichlorobenzene	U	0.5	µg/L	EMH
1,4-Dichlorobenzene	U	0.5	µg/L	EMH
1,2-Dichloroethane	U	0.5	µg/L	EMH
1,1-Dichloroethene	U	0.5	µg/L	EMH
cis-1,2-Dichloroethene	U	0.5	µg/L	EMH
trans-1,2-Dichloroethene	U	0.5	µg/L	EMH
Dichloromethane	U	0.5	µg/L	EMH
1,2-Dichloropropane	U	0.5	µg/L	EMH
Ethylbenzene	U	0.5	µg/L	EMH
Styrene	U	0.5	µg/L	EMH
Tetrachloroethylene	U	0.5	µg/L	EMH
Toluene	U	0.5	µg/L	EMH
1,2,4-Trichlorobenzene	U	0.5	µg/L	EMH
1,1,1-Trichloroethane	U	0.5	µg/L	EMH
1,1,2-Trichloroethane	U	0.5	µg/L	EMH
Trichloroethylene	U	0.5	µg/L	EMH
Vinyl chloride	U	0.5	µg/L	EMH
Xylenes, Total	U	0.5	µg/L	EMH

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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: 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	µg/L	MLD
Aldicarb sulfoxide	U	1.0	µg/L	MLD
Carbaryl	U	1.0	µg/L	MLD
3-Hydroxycarbofuran	U	1.0	µg/L	MLD
Methomyl	U	1.0	µg/L	MLD

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U=Analyte Not Detected
DL=Detection Limit

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 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: 06/29/03
Date of Extraction: 06/27/03

625 GROUP III UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL	UNITS	ANALYST
Butyl benzyl phthalate	U	1.0	µg/L	SPH
2-Chlorophenol	U	1.0	µg/L	SPH
Di-n-butylphthalate	U	1.0	µg/L	SPH
Diethylphthalate	U	1.0	µg/L	SPH
Dimethylphthalate	U	1.0	µg/L	SPH
Di-n-octyl phthalate	30	1.0	µg/L	SPH
2,4-Dinitrotoluene	U	1.0	µg/L	SPH
Isophorone	U	1.0	µg/L	SPH
2-Methyl-4,6-dinitrophenol	U	1.0	µg/L	SPH
Phenol	U	1.0	µg/L	SPH
2,4,6-Trichlorophenol	U	1.0	µg/L	SPH

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CERTIFICATE OF ANALYSIS

ARCADIS
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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

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 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

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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DL = Detection Limit

ARCADIS GERAGHTY & MILLER

Laboratory Task Order No./P.O. No. N/A

CHAIN-OF-CUSTODY RECORD

Project Number/Name PF001153.0003/RMA WESTPORT

Project Location Port St. Lucie, FL.

Laboratory Envirodyne

Project Manager M. Waldron

Sampler(s)/Affiliation L. Kwapinski

ANALYSIS / METHOD / SIZE

See attached list.

Log # 2003 06454

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID							Remarks	Total
MW1 LMZ	L	06/24/03 14:00		~~Primary & secondary Drinking Water Stds.~~							
MW1 UMZ	L	06/24/03 14:20									

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 2 sets

Relinquished by: L. Kwapinski	Organization: ARCADIS	Date 06/25/03	Time 08:30	Seal Intact? Yes No N/A
Received by: Ray [illegible]	Organization: Envirodyne	Date 6/25/03	Time 12:01	
Relinquished by: Ray [illegible]	Organization: Envirody	Date 6/25/03	Time 1540	Seal Intact? Yes No N/A
Received by: Bala Manoharan	Organization: Envirodyne	Date 6/25/03	Time 1540	

Special Instructions/Remarks: Samples iced. TAT 3 WEEKS.

Delivery Method: ☐ In Person ☐ Common Carrier ______ SPECIFY ☒ Lab Courier ☐ Other ______ SPECIFY

AG 05-0597

ARCADIS GERAGHTY & MILLER

Laboratory Task Order No./P.O. No. ______

CHAIN-OF-CUSTODY RECORD

Project Number/Name CITY OF PORT ST. LUCIE / DF001153.0003

Project Location PORT ST. LUCIE, FLORIDA

Laboratory ENVIRODYNE

Project Manager MIKE WALDRON

Sampler(s)/Affiliation SALLY DURALL

Log # 200306299

ANALYSIS / METHOD / SIZE

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	504.1 EDB & DBCP 40mL VIAL $Na_2S_2O_3$	531.1 PESTICIDES 40mL VIAL $ClCH_2COOH$	547 40mL VIAL NON PRESERVATIVE	524.2 VOCs & THMs 40mL VIAL NONE	TOTAL COLIFORM 100mL COLI BOTTLE $Na_2S_2O_3$	ODOR, COLOR 16oz GLASS JAR - GLASS ODOR BOTTLE NONE	Remarks	Total
JW1 I.Z.	L	06/16/03 09:39		2	2	2	2	1	1		10

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers: SEE PG 4

Relinquished by: [signature]	Organization: Arcadis G+M	Date 6/17/03	Time 16:07	Seal Intact? Yes No N/A
Received by: [signature]	Organization: Envirodyne	Date 6/17/03	Time 16:07	
Relinquished by: [signature]	Organization: Envirodyne	Date 6/17/03	Time 18:10	Seal Intact? Yes No N/A
Received by: Bala Manoharan	Organization: Envirodyne	Date 6/17/03	Time 1810	

Special Instructions/Remarks: * 2 WEEK TURNAROUND

Delivery Method: ☐ In Person ☐ Common Carrier ______ (SPECIFY) ☒ Lab Courier ☐ Other ______ (SPECIFY)

ARCADIS GERAGHTY & MILLER

Laboratory Task Order No./P.O. No. ____________

CHAIN-OF-CUSTODY RECORD

Project Number/Name CITY OF PSL / PF001153.0003

Project Location PORT ST. LUCIE, FL

Laboratory ENVIRODYNE

Project Manager MIKE WALDRON

Sampler(s)/Affiliation SALLY DUVALL

Log # 2003 06299

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	508.1 CHLORINATED PEST. 1L AMBER NONE	508 ORGANOHALIDES 1L AMBER NONE	515.1 HERBICIDES 1L AMBER NONE	548.1 1L AMBER NONE	625 1L AMBER NONE	525.2 ORGANICS 1L AMBER NONE	EXTRA AMBER LITER 1L AMBER NONE	Remarks	Total
IW1 I.Z.	L	06/16/03 09:39		1	1	1	1	1	1	1		7

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers: SEE PG 4

Relinquished by: [signature]	Organization: ARCADIS G&M	Date ~~6/17/03~~	Time 1507	Seal Intact? Yes No N/A
Received by: [signature]	Organization: PS Envirodyne	Date 6/17/03	Time 16:07	
Relinquished by: [signature]	Organization: Envirodyne	Date 6/17/03	Time 18:10	Seal Intact? Yes No N/A
Received by: Bala Manoharan	Organization: Envirodyne Inc	Date 6/17/03	Time 1810	

Special Instructions/Remarks: 2 WEEK TURNAROUND

Delivery Method: ☐ In Person ☐ Common Carrier ________ SPECIFY ☒ Lab Courier ☐ Other ________ SPECIFY

AG 05-0597

ARCADIS GERAGHTY & MILLER

Laboratory Task Order No./P.O. No. ____

CHAIN-OF-CUSTODY RECORD

Project Number/Name CITY OF PSL / FP001153.0003

Project Location PORT ST. LUCIE, FL

Laboratory ENVIRODYNE, INC

Project Manager MIKE WALDRON

Sampler(s)/Affiliation SALLY DURALE

Log # 200306299

ANALYSIS / METHOD / SIZE

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	WET CHEM UNPRES 1L PLASTIC NONE	RADIUM 228 1L PLASTIC HNO3	RADIUM 226 1L PLASTIC HNO3	GROSS ALPHA 1L PLASTIC HNO3	549.1 DIQUAT 1L PLASTIC H2SO4	WET CHEM PRES 1L PLASTIC H2SO4	Remarks	Total
IWI I.Z.	L	06/16/03 09:39		2	1	1	1	1	1		7

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers ~~SEE PG.~~ 4

Relinquished by: [signature]	Organization: Arcadis	Date 6/17/03	Time 1607	Seal Intact? Yes No N/A
Received by: Randy K Pitt	Organization: Envirodyne	Date 6/17/03	Time 1607	
Relinquished by: Randy K Pitt	Organization: Envirodyne	Date 6/17/03	Time 1810	Seal Intact? Yes No N/A
Received by: Bala Manoharan	Organization: Envirodyne Inc	Date 6/17/03	Time 1810	

4 P8

Special Instructions/Remarks: 2 WEEK TURN AROUND

Delivery Method: ☐ In Person ☐ Common Carrier ____ SPECIFY ☒ Lab Courier ☐ Other ____ SPECIFY

AG 05-0597

ARCADIS GERAGHTY & MILLER

Laboratory Task Order No./P.O. No.

CHAIN-OF-CUSTODY RECORD

Project Number/Name CITY OF PSL / PF001153.0003

Project Location PORT ST. LUCIE, FL

Laboratory ENVIRODYNE

Project Manager MIKE WALDRON

Sampler(s)/Affiliation SALLY DURALL

Log # 2003 06299

ANALYSIS / METHOD / SIZE

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	CYANIDE / TOTAL 500mL PLASTIC NaOH	1° 12° METALS 250mL PLASTIC HNO3					Remarks	Total
IW1 I.Z.	L	6/16/03 09:39		1	1						2

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/ Containers 26

Relinquished by: [signature]	Organization: ARCADIS G&M	Date 06/17/03	Time 1607	Seal Intact? Yes No N/A
Received by: [signature]	Organization: Envirodyne	Date 06/17/03	Time 1607	
Relinquished by: [signature]	Organization: Envirodyne	Date 6/17/03	Time 1810	Seal Intact? Yes No N/A
Received by: Bola Envirodyne	Organization:	Date 6/17/03	Time 1810	

Special Instructions/Remarks: 2 WEEK TURNAROUND

Delivery Method: ☐ In Person ☐ Common Carrier ________ SPECIFY ☒ Lab Courier ☐ Other ________ SPECIFY

AG 05-0597

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 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	U	200.7	0.0030	mg/L	06/18/03	KYT
Cadmium	U	200.7	0.0040	mg/L	06/18/03	KYT
Chromium	U	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	U	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	U	200.8	0.00030	mg/L	06/19/03	APR
Mercury	U	245.1	0.00003	mg/L	06/19/03	KYT

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

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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

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	CMM
1,2-Dibromoethane (EDB)	U	504.1	0.020 µg/L	06/20/03	CMM
Benzo(a)pyrene	U	525.2	0.20 µg/L	06/24/03	SPH
Di(2-ethylhexyl)adipate	U	525.2	1.0 µg/L	06/24/03	SPH
Di(2-ethylhexyl)phthalate	16	525.2	1.0 µg/L	06/24/03	SPH
Carbofuran	U	531.1	1.0 µg/L	06/18/03	MLD
Oxamyl (Vydate)	U	531.1	1.0 µg/L	06/18/03	MLD
Glyphosate	U	547	40 µg/L	06/27/03	E86515
Endothall	U	548.1	50 µg/L	06/27/03	E86515
Diquat	U	549	1.44 µg/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	SM450OF-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

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July 11, 2003
Report: 2003/06299
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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
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 Sampled: 06/16/03 09:39					
Total Coliform Date & Time Analyzed: 06/17/03 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	U	351-350	0.50 mg/L	06/20/03	JMJ
Phosphorus, Total	0.15	365.4	0.010 mg/L	06/20/03	JMJ

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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

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03
Received on: 06/17/03

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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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: 06/23/03
Date of Extraction: 06/19/03

508 ORGANOHALIDE PESTICIDES 62-550.310(2)(c) FAC

PARAMETER	RESULT	DL	UNITS	ANALYST
Chlordane	U	0.50	µg/L	CMM
Endrin	U	0.10	µg/L	CMM
Heptachlor	U	0.10	µg/L	CMM
Heptachlor epoxide	U	0.10	µg/L	CMM
Hexachlorobenzene	U	0.10	µg/L	CMM
Lindane	U	0.10	µg/L	CMM
Methoxychlor	U	0.20	µg/L	CMM
Toxaphene	U	1.0	µg/L	CMM
PCB 1016	U	0.20	µg/L	CMM
PCB 1221	U	0.20	µg/L	CMM
PCB 1240	U	0.20	µg/L	CMM
PCB 1242	U	0.20	µg/L	CMM
PCB 1248	U	0.20	µg/L	CMM
PCB 1254	U	0.20	µg/L	CMM
PCB 1260	U	0.20	µg/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

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03
Received on: 06/17/03

Date of Analysis: 06/24/03
Date of Extraction: 06/19/03

508.1 CHLORINATED PESTICIDES (62-550 FAC)

PARAMETER	RESULT	DL	UNITS	ANALYST
Alachlor	U	0.10	µg/L	CMM
Atrazine	U	1.0	µg/L	CMM
Hexachlorocyclopentadiene	U	0.10	µg/L	CMM
Simazine	U	1.0	µg/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

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03
Received on: 06/17/03

Date of Analysis: 06/22/03
Date of Extraction: 06/22/03

515.1 HERBICIDES (62-550 FAC)

PARAMETER	RESULT	DL	UNITS	ANALYST
Dalapon	U	0.50	µg/L	CMM
Dinoseb	U	0.50	µg/L	CMM
Pentachlorophenol	U	0.50	µg/L	CMM
Picloram	U	0.50	µg/L	CMM
2,4-D	U	0.50	µg/L	CMM
2,4,5-TP (Silvex)	U	0.10	µg/L	CMM

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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 GROUP II UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL	UNITS	ANALYST
Bromobenzene	U	0.5	µg/L	EMH
Bromodichloromethane	U	0.5	µg/L	EMH
Bromoform	U	0.5	µg/L	EMH
Bromomethane	U	0.5	µg/L	EMH
Chloroethane	U	0.5	µg/L	EMH
Chloroform	U	0.5	µg/L	EMH
Chloromethane	U	0.5	µg/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	U	0.5	µg/L	EMH
Dichlorodifluoromethane	U	0.5	µg/L	EMH
1,1-Dichloroethane	U	0.5	µg/L	EMH
2,2-Dichloropropane	U	0.5	µg/L	EMH
1,1-Dichloropropylene	U	0.5	µg/L	EMH
1,3-Dichloropropane	U	0.5	µg/L	EMH
1,3-Dichloropropene	U	0.5	µg/L	EMH
Methyl tert-butyl-ether (MTBE)	U	0.5	µg/L	EMH
1,1,1,2-Tetrachloroethane	U	0.5	µg/L	EMH
1,1,2,2-Tetrachloroethane	U	0.5	µg/L	EMH
Trichlorofluoromethane	U	0.5	µg/L	EMH
1,2,3-Trichloropropane	U	0.5	µg/L	EMH

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U=Analyte Not Detected
DL=Detection Limit

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 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	U	0.50	µg/L	EMH
Bromoform	U	0.50	µg/L	EMH
Chloroform	U	0.50	µg/L	EMH
Dibromochloromethane	U	0.50	µg/L	EMH
Total Trihalomethanes	U	0.50	µg/L	EMH

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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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 VOLATILE ORGANIC COMPOUNDS (62-550)

PARAMETER	RESULT	DL	UNITS	ANALYST
Benzene	U	0.5	µg/L	EMH
Carbon tetrachloride	U	0.5	µg/L	EMH
Chlorobenzene	U	0.5	µg/L	EMH
1,2-Dichlorobenzene	U	0.5	µg/L	EMH
1,4-Dichlorobenzene	U	0.5	µg/L	EMH
1,2-Dichloroethane	U	0.5	µg/L	EMH
1,1-Dichloroethene	U	0.5	µg/L	EMH
cis-1,2-Dichloroethene	U	0.5	µg/L	EMH
trans-1,2-Dichloroethene	U	0.5	µg/L	EMH
Dichloromethane	U	0.5	µg/L	EMH
1,2-Dichloropropane	U	0.5	µg/L	EMH
Ethylbenzene	U	0.5	µg/L	EMH
Styrene	U	0.5	µg/L	EMH
Tetrachloroethylene	U	0.5	µg/L	EMH
Toluene	U	0.5	µg/L	EMH
1,2,4-Trichlorobenzene	U	0.5	µg/L	EMH
1,1,1-Trichloroethane	U	0.5	µg/L	EMH
1,1,2-Trichloroethane	U	0.5	µg/L	EMH
Trichloroethylene	U	0.5	µg/L	EMH
Vinyl chloride	U	0.5	µg/L	EMH
Xylenes, Total	U	0.5	µg/L	EMH

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

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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

SAMPLE ID: IW1IZ (Water)

Collected by: Sally Durall

Collected on: 06/16/03
Received on: 06/17/03

Date of Analysis: 06/18/03

531.1 GROUP I UNREGULATED ORGANIC PESTICIDES

PARAMETER	RESULT	DL	UNITS	ANALYST
Aldicarb	U	1.0	µg/L	MLD
Aldicarb sulfone	U	1.0	µg/L	MLD
Aldicarb sulfoxide	U	1.0	µg/L	MLD
Carbaryl	U	1.0	µg/L	MLD
3-Hydroxycarbofuran	U	1.0	µg/L	MLD
Methomyl	U	1.0	µg/L	MLD

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
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DL = Detection Limit

Envirodyne Inc.

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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
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: 06/21/03
Date of Extraction: 06/19/03

625 GROUP III UNREGULATED ORGANIC CONTAMINANTS

PARAMETER	RESULT	DL	UNITS	ANALYST
Butyl benzyl phthalate	U	1.0	μg/L	SPH
2-Chlorophenol	U	1.0	μg/L	SPH
Di-n-butylphthalate	U	1.0	μg/L	SPH
Diethylphthalate	U	1.0	μg/L	SPH
Dimethylphthalate	U	1.0	μg/L	SPH
Di-n-octyl phthalate	U	1.0	μg/L	SPH
2,4-Dinitrotoluene	U	1.0	μg/L	SPH
Isophorone	U	1.0	μg/L	SPH
2-Methyl-4,6-dinitrophenol	U	1.0	μg/L	SPH
Phenol	U	1.0	μg/L	SPH
2,4,6-Trichlorophenol	U	1.0	μg/L	SPH

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U = Analyte Not Detected
DL = Detection Limit

Envirodyne Inc.

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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
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: 06/21/03
Date of Extraction: 06/19/03

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

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.

Michael Pentecost

Project Manager

John Taylor

Quality Assurance Officer

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U = Analyte Not Detected
DL = Detection Limit

WP 1° & 2°
Revised Report
6/03/03

USBiosystems

Post-it® Fax Note 7671	Date 6/3 # of pages ▸ 9
To Jim Macon	From Brad Macek
Co./Dept. Reese, Macon	Co. City of PSL
Phone #	Phone #
Fax # 561-433-8011	Fax # 772-873-6405

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

Date: 06/02/2003
Log #: L70735-1

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

Parameter	Results	Units	Method	MDL	Extr. Date	Analysis Date	Analyst
Radiochemical Analysis 62-550.310(5) (PWS033)							
Gross Alpha	<2.1+/-1.	pCi/l	9(0.0	2.1	12/17 00:00	12/18 00:00	SU
Radium 226	0.2+/-0.1	pCi/l	9(3.1	0.20	12/17 00:00	12/24 00:00	SU
Radium 228	<1.0+/-0.	pCi/l	Ra-05	1.0	12/17 00:00	12/24 00:00	SU
Inorganic Analysis 62-550.310(1) (PWS030)							
Arsenic	U	mg/l	2(0.7	0.0036	12/19 00:00	12/19 00:00	SU
Barium	U	mg/l	2(0.7	0.00010	12/26 08:00	12/27 12:38	SB
Cadmium	U	mg/l	2(0.7	0.00022	12/26 08:00	12/27 12:38	SB
Chromium	U	mg/l	2(0.7	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
Fluoride	0.55	mg/l	300.0	0.066	12/13 07:33	12/13 07:33	MG
Lead	U	mg/l	SM3113B	0.0050	12/17 10:30	12/18 18:03	VR
Mercury	U	mg/l	245.1	0.000004	12/30 11:00	12/31 12:04	LL
Nickel	U	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	U	mg/l	300.0	0.016	12/13 07:33	12/13 07:33	MG
Selenium	U	mg/l	SM3113B	0.0041	12/17 10:30	12/26 22:23	VR
Sodium	88	mg/l	200.7	0.13	12/26 08:00	12/26 08:00	EB
Antimony	U	mg/l	SM3113B	0.0074	12/17 10:30	12/19 17:18	VR
Beryllium	U	mg/l	200.7	0.00025	12/26 08:00	12/27 12:38	SB
Thallium	U	mg/l	200.9	0.0027	12/17 10:30	12/28 15:58	EB
Trihalomethane Analysis 62-550.310(2)(a) (PWS027)							
Total THM's	0.0047	mg/l	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
Surrogate Recoveries:							
4-Bromofluorobenzene	95.0	%	524.2	70-130	12/24 21:35	12/24 21:35	BL
1,2-Dichlorobenzene-d4	95.0	%	524.2	70-130	12/24 21:35	12/24 21:35	BL

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

Date: 06/02/2003
Log #: L70735-1

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

Parameter	Results	Units	Method	MDL	Extr. Date	Analysis Date	Analyst
Volatile Organic Analysis 62-550.310(2)(b) (PWS028)							
1,2,4-Trichlorobenzene	U	ug/l	524.2	0.20	12/24 21:35	12/24 21:35	BL
cis-1,2-Dichloroethylene	U	ug/l	524.2	0.50	12/24 21:35	12/24 21:35	BL
Total Xylenes	U	ug/l	524.2	0.59	12/24 21:35	12/24 21:35	BL
Dichloromethane	U	ug/l	524.2	0.50	12/24 21:35	12/24 21:35	BL
o-Dichlorobenzene	U	ug/l	524.2	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	U	ug/l	524.2	0.13	12/24 21:35	12/24 21:35	BL
1,1-Dichloroethylene	U	ug/l	524.2	0.50	12/24 21:35	12/24 21:35	BL
trans-1,2-Dichloroethylene	U	ug/l	524.2	0.14	12/24 21:35	12/24 21:35	BL
1,2-Dichloroethane	U	ug/l	524.2	0.092	12/24 21:35	12/24 21:35	BL
1,1,1-Trichloroethane	U	ug/l	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	U	ug/l	524.2	0.50	12/24 21:35	12/24 21:35	BL
1,1,2-Trichloroethane	U	ug/l	524.2	0.12	12/24 21:35	12/24 21:35	BL
Tetrachloroethylene	U	ug/l	524.2	0.16	12/24 21:35	12/24 21:35	BL
Monochlorobenzene	U	ug/l	524.2	0.10	12/24 21:35	12/24 21:35	BL
Benzene	U	ug/l	524.2	0.12	12/24 21:35	12/24 21:35	BL
Toluene	U	ug/l	524.2	0.11	12/24 21:35	12/24 21:35	BL
Ethylbenzene	U	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	BL
Dilution Factor	1.0		524.2	n/e	12/24 21:35	12/24 21:35	BL
Surrogate Recoveries:							
4-Bromofluorobenzene	95.0	%	524.2	70-130	12/24 21:35	12/24 21:35	BL
1,2-Dichlorobenzene-d4	95.0	%	524.2	70-130	12/24 21:35	12/24 21:35	BL
Subcontracted Services							
Subcontract Lab 1	E83033		RADS	n/e			SU
Subcontract Lab 2	E83079		PPDW/As	n/e			SU
Subcontract Lab 3	E87634		1613	n/e			SU
Secondary Chemical Analysis 62-550.320 (PWS031)							
Aluminum	U	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/l	200.7	0.050	12/26 08:00	12/27 12:38	SB
Manganese	U	mg/l	200.7	0.010	12/26 08:00	12/27 12:38	SB
Silver	U	mg/l	200.7	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
Zinc	0.062	mg/l	200.7	0.020	12/26 08:00	12/27 12:38	SB

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

Date: 06/02/2003
Log #: L70735-1

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

Parameter	Results	Units	Method	MDL	Extr. Date	Analysis Date	Analyst
Secondary Chemical Analysis 62-550.320 (PWS031) (continued)							
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	OC
pH	7.05	pH Units	150.1	1.0	12/18 14:34	12/18 14:34	PR
TDS	420	mg/l	160.1	7.4	12/13 16:10	12/13 16:10	OC
MBAS	0.16	mg/l	425.1	0.10	12/13 10:00	12/13 10:00	IG
Pesticide/PCB Chemical Analysis 62-550.310(2)(c) (PWS029)							
Endrin	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Lindane	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Methoxychlor	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Toxaphene	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Dalapon	U	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
Endothall	U	ug/l	548.1	1.0	12/18 00:00	12/18 00:00	SU
Glyphosate	U	ug/l	547	1.0	12/23 00:00	12/23 00:00	SU
Bis(2-Ethylhexyl)Adipate	U	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	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Bis(2-Ethylhexyl)Phthalate	U	ug/l	525.2	1.0	12/18 00:00	12/18 00:00	SU
Picloram	U	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
Dinoseb	U	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
Hexachlorocyclopentadiene	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Carbofuran	U	ug/l	531.1	1.0	12/18 00:00	12/18 00:00	SU
Atrazine	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Alachlor	U	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	SU
Heptachlor	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Heptachlor Epoxide	U	ug/l	508.1	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	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Benzo(a)pyrene	U	ug/l	525.2	1.0	12/18 00:00	12/18 00:00	SU
Pentachlorophenol	U	ug/l	515.1	1.0	12/19 00:00	12/19 00:00	SU
PCB	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Dibromochloropropane	U	ug/l	504.1	0.020	12/16 11:00	12/17 00:15	FO
Ethylene Dibromide	U	ug/l	504.1	0.020	12/16 11:00	12/17 00:15	FO
Chlordane	U	ug/l	508.1	1.0	12/24 00:00	12/24 00:00	SU
Dilution Factor	1.0			n/a	12/16 11:00	12/17 00:15	FO

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

Date: 06/02/2003
Log #: L70735-1

Sample Description:

EPA-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

Parameter	Results	Units	Method	MDL	Extr. Date	Analysis Date	Analyst
Unregulated Group I Analysis	62-550.405(c) (PWS035)						
Carbaryl	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Methomyl	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Aldicarb Sulfoxide	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Aldicarb Sulfone	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Aldicarb	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
3-Hydroxycarbofuran	U	ug/l	531.1	2.0	12/17 00:00	12/18 00:00	SU
Dilution 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.
Flags: CPR-Pb/Cu rule; ND-non detect(RL estimated); NFL-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
FLDEP 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
SUB DOH# 86122,86109,E86048
SC CERT# 96031001
USACE
VA CERT# 00395

DOH# E86240
ADEM ID# 40850
TN CERT# 02985
GA CERT# 917
USDA Soil Permit# S-35240

NC CERT# 444
IL CERT# 200020

Respectfully submitted,

LouAnn Jones
Project Manager

USBIOSYSTEMS

CHAIN OF CUSTODY RECORD

Log # 70136 /TN

SHORT-HOLD

Quote:

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival?	/		
Received ON WET ICE? Temp 3	/		
PROPER PRESERVATIVES indicated?	/		
Received WITHIN HOLDING TIME?	/		
CUSTODY SEALS INTACT?	/		
VOLATILES rec'd W/OUT HEADSPACE?	/		
PROPER CONTAINERS used?	/		

Company Name: City of Port ST Lucie PO#

Address: 900 OGDEN LANE

City: PORT ST. Lucie State: FL Zip: 34983

Attn: Wes Upham Fax#

Project Name: Westport Annual PRIM/SEC Proj#

Sampler Name/Signature

Phone# 772-344-4252

Matrix Codes*

SD	Solid Waste	OL	Oil
GW	Ground Water	SL	Sludge
EFF	Effluent	SO	Soil Sediment
AFW	Analyte Free H_2O	AQ	Aqueous
WW	Waste Water	NA	Nonaqueous
DW	Drinking Water	PE	Petroleum
SU	Surface Water	O	Other (Please Specify)

Pres/Codes

A. None	G. $Na_2S_2O_3$
B. HNO_3	H. $NaHSO_4$
C. H_2SO_4	I. Ice
D. NaOH	J. MCAA
E. HCL	O. Other
F. MeOH	

17

Parameters: 3-WP; 7-WP; GA A; PRI SEC Met GS B; CL F NO2 NO3 COLOR MBAS PH SO4 TDS CN A; NO2+NO3 C; 505, 506, 507, 508, 515, 550, 525 G; Odor; DIOXIN ABS A; 547/548 G; 504 524 G; 531

#	Sample	Date	Time	Matrix Code		3-WP	7-WP										REMARKS
1	EFA-1	11-11-02	11:15	WW		X	X										29455 ① AL04088 0/4 ② 32 P ON
2	~~EFA-1~~																
3																	
4																	
5																	
6																	
7																	
8																	
9																	
0																	

Y/N | Date required | Y ✓ N | None ✓ 1 ___ 2 ___ 3 ___ Other | Y N CP

		Relinquished by	Date	Time	Received by	Date	Time
156, 131 295 121		E Pruitt	11/21/02	0750	J Pragoo	11/15/02	14:00
		J Pragoo	12-11-02	16:00	C Plasse	12/12/02	1410
#							

3231 N.W. 7th Avenue
Boca Raton, FL 33431
888-862-LABS
561-447-7373
888-456-4846 Fax
561-447-6136 Fax

C.O.C. # 46825

ORIGINAL

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 NAME: City of Port St. Lucie Utility Systems SYSTEM ID#: PWS-4560954 SYSTEM PHONE #: (561) 873-6400
ADDRESS: 900 S.E. Ogden Lane, Port St. Lucie, Florida 34983 COUNTY: St. Lucie DEP DISTRICT: S.E.

COLLECTOR: JP COLLECTOR PHONE#: (561) 873-6400
SAMPLE SITE (Locally or Subdivision): Port St. Lucie, Florida
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 [ ] TNTC or C
[ ] Raw

ANALYSIS METHOD: MF MTF MMO-MUG PA

Coll. Time	Location Id	Sample Point (Specific Address)	Cl2 Resid.	Plate #	Sample Number	Non Coliform	*Total Coliform	Confirm Total	Confirm Fecal
10:28	2377	WESTPORT WWTP GFA-1	0.0	3	9932	2	A		

Into Incubator
Date: 5/29/2003
Time: 13:21
Tech: GS

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 C - Confluent Growth TA - Turbid, Absence of gas or acid
A - Coliforms are absent TNTC - Too numerous to count

NAME AND ADDRESS OF PERSON/FIRM TO RECEIVE REPORT:

INTERPRETATIONS -
REMARKS BY PROGRAM REVIEWER

[ ]
[X] SATISFACTORY
[ ] INCOMPLETE COLLECTION INFORMATION
[ ] REPEAT SAMPLES
[ ] REPLACEMENT SAMPLES

RECEIVED
MAY 30 2003
UTILITY ENGINEERING DIVISION

REVIEWING OFFICIAL: Gary Smith
TITLE: Laboratory Director

City of Port St. Lucie Utility Systems Department

Laboratory Sample Data Entry Form

Main Menu | New Record

SPWWTP Laboratory
1615 Sunshine Ave
Port St. Lucie, Fla 34952
772-344-4252

Sample# : 29710 | Site : WP | Location : EFF-1 | Date Collected: 2/27/2003

Sample Chain of Custody

Sample#:	29710
Site :	WP
Loc :	EFF-1
Type :	C
Code:	
Collected By:	JRP
Date:	2/27/2003
Time:	1005
Trans. By:	JRP
Rcvd. By:	JRP
Date :	2/27/2003
Time :	1120

SP Lab Group: 2240

Ext Lab Grps

Lab	CAS#	Contam Id#	Ext. Lab Id#	Contaminant	Data Qual.	Result	Fecal Result	Units
SPWWTP		7		Specific Conductance		620		μmho/cm
SPWWTP		8		Temperature		25		°C
USBIOSYS	7664-41-7	100		Nitrogen - Ammonia		34		mg/L as N
USBIOSYS		105		BioChemical Oxygen		3.2		mg/L
USBIOSYS		106		Chemical Oxygen		50		mg/L
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
USBIOSYS		129		Nitrogen-Total Kjeldahl		36		mg/L as N
USBIOSYS		1925		pH		7.55		SU
USBIOSYS		2064		2,3,7,8-TCDD (Dioxin) -	U	0		mg/L
USBIOSYS		3022		Chloroethane	U	0.3		mg/L
USBIOSYS		3023		Chloroform		3		mg/L
USBIOSYS		3024		Anthracene	U	0.98		mg/L
USBIOSYS		3025		Butylbenzylphthalate	U	1.6		mg/L
USBIOSYS		3026		Dimethylphthalate	U	0.86		mg/L
USBIOSYS		3027		Naphthalene	U	0.75		mg/L
USBIOSYS		3028		Phenanthrene	U	1		mg/L
USBIOSYS		3029		Aldrin	U	0.012		mg/L
USBIOSYS		3030		Dieldrin	U	0.0072		mg/L
USBIOSYS		3031		2-Chlorophenol	U	4.7		mg/L
USBIOSYS		3033		2,4,6-Trichlorophenol	U	4.8		mg/L

These test results meet all requirements of the NELAC Standards

W/P Minimum Criteria for IW Permitting

USBIOSYSTEMS

RECEIVED

MAR 25 2003

UTILITY ENGINEERING DIVISION

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

Page: Page 1 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. Date	Analysis Date	Analyst
Total Toxic Organics (Volatiles)							
Chloroethane	U	ug/l	624	0.30	03/04 17:49	03/04 17:49	BL
Chloroform	3.0	ug/l	624	0.12	03/04 17:49	03/04 17:49	BL
Dilution Factor	1.0		624	n/e	03/04 17:49	03/04 17:49	BL
Surrogate Recoveries:							
Dibromofluoromethane	150	%	624	52-155	03/04 17:49	03/04 17:49	BL
Toluene-D8	127	%	624	47-154	03/04 17:49	03/04 17:49	BL
4-Bromofluorobenzene	93.0	%	624	36-138	03/04 17:49	03/04 17:49	BL
Total Toxic Organics (Semivolatiles)							
N-Nitrosodimethylamine	U	ug/l	625	1.2	03/04 08:00	03/05 09:26	LN
Phenol	U	ug/l	625	5.2	03/04 08:00	03/05 09:26	LN
Bis(2-Chloroethyl) Ether	U	ug/l	625	0.75	03/04 08:00	03/05 09:26	LN
2-Chlorophenol	U	ug/l	625	4.7	03/04 08:00	03/05 09:26	LN
1,3-Dichlorobenzene	U	ug/l	625	0.67	03/04 08:00	03/05 09:26	LN
1,4-Dichlorobenzene	U	ug/l	625	0.67	03/04 08:00	03/05 09:26	LN
1,2-Dichlorobenzene	U	ug/l	625	0.73	03/04 08:00	03/05 09:26	LN
Bis(2-Chloroisopropyl) Ethe	U	ug/l	625	0.62	03/04 08:00	03/05 09:26	LN
N-Nitrosodi-n-propylamine	U	ug/l	625	0.97	03/04 08:00	03/05 09:26	LN
Hexachloroethane	U	ug/l	625	0.79	03/04 08:00	03/05 09:26	LN
Nitrobenzene	U	ug/l	625	0.65	03/04 08:00	03/05 09:26	LN
Isophorone	U	ug/l	625	0.64	03/04 08:00	03/05 09:26	LN
2-Nitrophenol	U	ug/l	625	0.74	03/04 08:00	03/05 09:26	LN
2,4-Dimethylphenol	U	ug/l	625	5.2	03/04 08:00	03/05 09:26	LN
Bis(2-Chloroethoxy)methane	U	ug/l	625	5.4	03/04 08:00	03/05 09:26	LN
2,4-Dichlorophenol	U	ug/l	625	0.75	03/04 08:00	03/05 09:26	LN
1,2,4-Trichlorobenzene	U	ug/l	625	5.7	03/04 08:00	03/05 09:26	LN
Naphthalene	U	ug/l	625	0.72	03/04 08:00	03/05 09:26	LN
Hexachlorobutadiene	U	ug/l	625	0.75	03/04 08:00	03/05 09:26	LN
4-Chloro-3-Methylphenol	U	ug/l	625	0.73	03/04 08:00	03/05 09:26	LN
	U	ug/l	625	5.1	03/04 08:00	03/05 09:26	LN

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

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. Date	Analysis Date	Analyst
Total Toxic Organics (Semivolatiles)		(continued)					
Hexachlorocyclopentadiene	U	ug/l	625	0.77	03/04 08:00	03/05 09:26	LN
2,4,6-Trichlorophenol	U	ug/l	625	4.8	03/04 08:00	03/05 09:26	LN
2-Chloronaphthalene	U	ug/l	625	0.74	03/04 08:00	03/05 09:26	LN
Dimethylphthalate	U	ug/l	625	0.86	03/04 08:00	03/05 09:26	LN
2,6-Dinitrotoluene	U	ug/l	625	1.3	03/04 08:00	03/05 09:26	LN
Acenaphthylene	U	ug/l	625	0.80	03/04 08:00	03/05 09:26	LN
Acenaphthene	U	ug/l	625	0.88	03/04 08:00	03/05 09:26	LN
2,4-Dinitrophenol	U	ug/l	625	6.2	03/04 08:00	03/05 09:26	LN
2,4-Dinitrotoluene	U	ug/l	625	1.3	03/04 08:00	03/05 09:26	LN
4-Nitrophenol	U	ug/l	625	5.1	03/04 08:00	03/05 09:26	LN
Diethylphthalate	U	ug/l	625	1.1	03/04 08:00	03/05 09:26	LN
Fluorene	U	ug/l	625	0.97	03/04 08:00	03/05 09:26	LN
4-Chlorophenyl-phenylether	U	ug/l	625	0.94	03/04 08:00	03/05 09:26	LN
4,6-Dinitro-2-Methylphenol	U	ug/l	625	4.3	03/04 08:00	03/05 09:26	LN
N-Nitrosodiphenylamine	U	ug/l	625	1.1	03/04 08:00	03/05 09:26	LN
4-Bromophenyl-phenylether	U	ug/l	625	1.2	03/04 08:00	03/05 09:26	LN
Hexachlorobenzene	U	ug/l	625	1.4	03/04 08:00	03/05 09:26	LN
Pentachlorophenol	U	ug/l	625	8.5	03/04 08:00	03/05 09:26	LN
Anthracene	U	ug/l	625	0.98	03/04 08:00	03/05 09:26	LN
Phenanthrene	U	ug/l	625	1.0	03/04 08:00	03/05 09:26	LN
Di-N-Butylphthalate	U	ug/l	625	1.4	03/04 08:00	03/05 09:26	LN
Fluoranthene	U	ug/l	625	1.1	03/04 08:00	03/05 09:26	LN
Pyrene	U	ug/l	625	0.37	03/04 08:00	03/05 09:26	LN
Butylbenzylphthalate	U	ug/l	625	1.6	03/04 08:00	03/05 09:26	LN
Benzo(a)anthracene	U	ug/l	625	1.3	03/04 08:00	03/05 09:26	LN
3,3'-Dichlorobenzidine	U	ug/l	625	6.6	03/04 08:00	03/05 09:26	LN
Chrysene	U	ug/l	625	0.36	03/04 08:00	03/05 09:26	LN
Bis(2-Ethylhexyl)Phthalate	U	ug/l	625	2.6	03/04 08:00	03/05 09:26	LN
Di-N-Octylphthalate	U	ug/l	625	1.8	03/04 08:00	03/05 09:26	LN
Benzo[b]fluoranthene	U	ug/l	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	03/05 09:26	LN
Benzo[a]pyrene	U	ug/l	625	1.4	03/04 08:00	03/05 09:26	LN
Indeno[1,2,3-cd]pyrene	U	ug/l	625	1.9	03/04 08:00	03/05 09:26	LN
Dibenzo[a,h]Anthracene	U	ug/l	625	2.1	03/04 08:00	03/05 09:26	LN
Benzo[g,h,i]perylene	U	ug/l	625	2.0	03/04 08:00	03/05 09:26	LN
Benzidine	U	ug/l	625	27	03/04 08:00	03/05 09:26	LN
1,2-Diphenylhydrazine	U	ug/l	625	0.35	03/04 08:00	03/05 09:26	LN
2,3,7,8-TCDD (Dioxin Scan)	U	ug/l	625	n/e	03/04 08:00	03/05 09:26	LN
Dilution Factor	1.0		625	n/e	03/04 08:00	03/05 09:26	LN

Client #: FTL-11-050102
Address: City of Port St. Lucie
900 E. Ogden
Port St. Lucie, FL 34983
Wes Upham

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. Date	Analysis Date	Analyst
Total Toxic Organics (Semivolatiles)		(continued)					
Surrogate Recoveries:							
2-Fluorophenol	30.0	%	625	10-115	03/04 08:00	03/05 09:26	LN
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	56.0	%	625	45-126	03/04 08:00	03/05 09:26	LN
2,4,6-Tribromophenol	70.0	%	625	51-134	03/04 08:00	03/05 09:26	LN
Terphenyl-d14	72.0	%	625	50-146	03/04 08:00	03/05 09:26	LN
Total Toxic Organics (Pest/PCB)							
Aldrin	U	ug/l	608	0.012	03/03 11:45	03/06 10:02	AW
Dieldrin	U	ug/l	608	0.0072	03/03 11:45	03/06 10:02	AW
Dilution Factor	1.0		608	n/a	03/03 11:45	03/06 10:02	AW
Surrogate Recoveries:							
TCMX	66.0	%	608	41-153	03/03 11:45	03/06 10:02	AW
Decachlorobiphenyl	68.0	%	608	31-170	03/03 11:45	03/06 10:02	AW
Inorganics/Other							
BOD	3.2	mg/L	405.1	2.0	02/28 16:00	03/05 16:00	KC
General Chemistry							
Ammonia as N	34	mg/l	350.1	0.040	03/05 12:38	03/05 12:38	MG
Chemical Oxygen Demand	50	mg/l	410.4	8.8	03/05 14:00	03/05 14:00	IG
Organic Nitrogen as N	2.0	mg/l	Calc	0.50	03/07 16:00	03/07 16:00	HH
Total Phosphorus as P	0.57	mg/l	365.1	0.0081	03/05 16:30	03/06 14:20	MA
Total Kjeldahl Nitrogen as	36	mg/l	351.2	1.2	03/06 06:00	03/07 13:16	MA

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.
Flags: CFR-Pb/Cu rule; ND-non detect(RL estimated); NFL-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
FLDEP 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
SUB DOH# 86122,86109,E86048
SC CERT# 96031001
USACE
VA CERT# 00395

DOH# E86240
ADEM ID# 40850
TN CERT# 02985
GA CERT# 917
USDA Soil Permit# S-35240

NC CERT# 444
IL CERT# 200020

Respectfully submitted,

LouAnn Jones
Project Manager

USBIOSYSTEMS

CHAIN OF CUSTODY RECORD

Log # 73594 /YNI   Quote:

SHORT HOLD

LAB USE ONLY

	YES	NO	N/A
Samples INTACT upon arrival? Temp.			
PRESERVATIVES indicated?			
HOLDING TIME?			
CUSTODY SEALS INTACT?			
VOLATILES rec'd W/OUT HEADSPACE?			
PROPER CONTAINERS used?			

Company Name CITY OF PORT ST LUCIE PO# 29710

Address 900 E OGDEN

City PORT ST LUCIE State FL Zip 34952

Attn: WES UPHAM Fax#

Project Name WESTPORT MIN CRITERIA Proj#

Sampler Name/Signature J. PREGTI Phone# 772-744-4281

Matrix Codes*

SD	Solid Waste	OL	Oil
GW	Ground Water	SL	Sludge
EFF	Effluent	SO	Soil Sediment
AFW	Analyte Free H_2O	AQ	Aqueous
WW	Waste Water	NA	Nonaqueous
DW	Drinking Water	PE	Petroleum
SU	Surface Water	O	Other (Please Specify)

Pres/Codes

A. None	G. $Na_2S_2O_3$
B. HNO_3	H. $NaHSO_4$
C. H_2SO_4	I. Ice
D. NaOH	J. MCAA
E. HCL	O. Other
F. MeOH	

23

Matrix Code

#	Sample ID	Date	Time	Matrix			10-NP	COLOR, ODOR	REMARKS
1	EFF-1	1-27-03	10:05	WW		6AL Gal 2V	X	X	29710
2									
3									
4									
5									
6									
7									
8									
9									
0									

ORIGINAL

Deliv) #10 + micro

(Y) N   Date required   Y N   None ✓ 1___ 2___ 3___ Other___   (Y) N CP

#	Relinquished by	Date	Time	Received by	Date	Time
	[signature]	12/26/02	11:04	[signature]	12/27/02	15:00
	[signature]	1/27/03	16:00	CKlasure	1/28/03	1125

3231 N.W. 7th Avenue
Boca Raton, FL 33431
888-862-LABS
561-447-7373
888-456-4846 Fax
561-447-6136 Fax

C.O.C. # 51982

2

Envirodyne Inc.

4805 N.W. 2nd Avenue
Boca Raton, FL 33431
561-989-5225

RECEIVED
AUG 07 2003
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

SAMPLE ID: MW-1 Lower Zone

Collected by: Dagoberto Penate

Collected on: 07/28/03
Received on: 07/28/03

PARAMETER	RESULT	METHOD	DL	UNITS	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						
Temperature	30.8	170.1		°C	07/28/03	DP

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U = Analyte Not Detected
DL = Detection Limit

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

PARAMETER	RESULT	METHOD	DL	UNITS	DATE	ANALYST
Fecal Coliform Bacteria	<1	SM9222D	1	cfu/100 ml	07/28/03	JGT
Fecal Coliform Date & Time Sampled: 07/28/03 14:10						
Fecal Coliform Date & Time Analyzed: 07/28/03 16:42						
pH (Field)	7.8	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 14:10						
Total Coliform Date & Time Analyzed: 07/28/03 16:52						
Temperature	30.0	170.1		°C	07/28/03	DP

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.

Adrian D. Moran
Project Manager

John Taylor
Quality Assurance Officer

Analysis Performed in Accordance with E.P.A. Methods
Laboratory Certification No. E86188

QA/QC Review
U = Analyte Not Detected
DL = Detection Limit

Envirodyne Inc.

CHAIN OF CUSTODY RECORD
AND
ANALYSIS REQUEST

4805 NW 2nd Avenue • Boca Raton, FL 33431
(800) 713-7737 • Fax (561) 989-5204
edyne@bellsouth.net

PROJECT NUMBER	PROJECT NAME	P.O. NUMBER	SAMPLE TYPE	PRESERVATIVE
PF001153.0003	RMA WestPort WWTP			$Na_2S_2O_3$, $Na_2S_2O_3$, Field, Field

PROJECT LOCATION: Port St. Lucie Project

CLIENT NAME: ARCADIS

CLIENT ADDRESS: ON File

PHONE: FAX:

ANALYSES REQUESTED: T. coliForm, F. coliForm, PH, Temp

RUSH TAT (SURCHARGE) ☐ DUE DATE:

SAMPLE INFORMATION

NUMBER	DATE	TIME	IDENTIFICATION	SOLID	LIQUID	AIR	NON-AQUEOUS LIQUID	T. coliForm	F. coliForm	PH	Temp					NO. OF CONTAINERS	REMARKS
1	7-28-03	14:02	MW-1 Lower Zone (Deep)					✓	✓	7.5	30.8					2	
2	7-28-03	14:10	MW-1 UPPer Zone (shallow)					✓	✓	7.8	30.0					2	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

SAMPLE COLLECTED BY: Dagoberto Penate

ARE THESE SAMPLES LISTED OR CHARACTERISTIC HAZARDOUS WASTE? ☐ YES ☐ NO
ARE THESE SAMPLES FROM ☐ PETROLEUM ☐ DRY CLEANER OR ☐ OTHER SITE?

TOTAL OF ALL CONTAINERS: 4

SEND REPORT TO (PERSON): Michael J. Waldron.

SAMPLES CONDITION: INTACT 4°C

LOG NUMBER: 2003 07543

	RELINQUISHED BY	DATE	TIME		RECEIVED BY	DATE	TIME
1	DP (signature)	7-28-03	16:02	2	Michelle Mercado	7-28-03	1602
3				4			
5				6			

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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_{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_{CO_2} found down-well. 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
pH	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
Cl	231	mg/L
Alkalinity	40 as $CaCO_3$	mg/L

"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
pH	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

"mg/L" denotes concentration reported in units of milligrams per liter.

Table 3. Simulation Conditions and Selected Results from USGS PHREEQC

			Equilibrium Phases								
				Saturation Index[3]		Saturation Index		Calculated	Mole transfer (millimoles)		
Model	Mix[1]	Water[2]	$\log P_{CO2}$	Calcite	Dolomite	Calcite	Dolomite	pH	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		
6	7:10::3:5					2.57	5.34	8.177			

1. The terminology "k:#x::l:#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.